Tennessee Valley Authority
1101 Market Street, LP 3R
Chattanooga, Tennessee 37402-2801

R. M. Krich
Vice President
Nuclear Licensing

August 31, 2011

10 CFR 50.4
10 CFR 50.90

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Sequoyah Nuclear Plant, Unit 2
Facility Operating License No. DPR-79
NRC Docket No. 50-328

Subject: **Application for Temporary Change to Technical Specifications to Allow Use of Penetrations in Shield Building Dome During Modes 1 through 4; and Request for Specific Usage of Alternate Source Term Methodology for Calculating Radiation Doses Associated with the Proposed Temporary Change to Technical Specifications (TS-SQN-2011-03)**

In accordance with the provisions of 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit," the Tennessee Valley Authority (TVA) is submitting a request for a temporary license change to Facility Operating License No. DPR-79 for the Sequoyah Nuclear Plant (SQN), Unit 2. During the SQN, Unit 2 refueling outage, conducted in the spring of 2011, two penetrations through the Shield Building dome were created. To maintain Shield Building integrity, these penetrations were closed with a steel hatch assembly prior to entering Mode 4 at the end of the refueling outage.

The proposed change will revise the SQN, Unit 2, Technical Specifications (TS) to allow SQN, Unit 2, to open one of the penetration hatches in the Shield Building dome for up to five hours per day, six days per calendar week while in Modes 1 through 4 during Unit 2 Cycle 18 (U2C18) from receipt of NRC approval for this request and until entering Mode 5 at the start of the Unit 2 refueling outage 18 (U2R18). The U2R18 refueling outage commences in the fall of 2012.

D030
NRR

Use of the Shield Building penetration hatches will provide Steam Generator Replacement Project (SGRP) workers an alternate path of moving materials inside the Annulus for on-line work. Without use of the Shield Building penetration hatches, materials would travel through the Auxiliary Building, to the Annulus access door, and be hoisted up the Annulus access ladders. Bypassing the Auxiliary Building and the Annulus access ladders reduces the risk of potential adverse effects to sensitive equipment along that path. The alternate path is estimated to save approximately 2.8 rem by allowing materials to be passed through the open dome penetration hatch in lieu of carrying the material past higher dose areas. In addition, passing material through the open dome hatch will significantly improve the industrial safety aspect of the work and will provide work efficiency gains since material will be provided closer to the point of use.

The TS will revert to the pre-amendment requirements prior to entering Mode 4 during startup from the U2R18 refueling outage since work activities related to the SGRP to restore the Shield Building dome will permanently eliminate these penetrations.

The Enclosure provides a description of the proposed changes, technical evaluation of the proposed changes, regulatory evaluation, and a discussion of environmental considerations. Attachment 1 to the Enclosure provides the existing Unit 2 TS pages marked-up to show the proposed changes. Attachment 2 to the Enclosure provides the existing TS Bases pages marked-up to show the proposed changes. Attachment 3 to the Enclosure provides the existing Unit 2 TS pages retyped to show the proposed changes. Attachment 4 to the Enclosure provides the existing TS Bases pages retyped to show the proposed changes.

Regulatory Guide 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," provides for the use of the Alternate Source Term (AST) methodology in calculating accident radiation doses. The use of the AST methodology that is contained in the Enclosure complies with the Regulatory Guide 1.183 requirements for employing this methodology. Since the AST is not currently described in the SQN Updated Final Safety Analysis Report (UFSAR) for this specific accident analysis application, NRC approval to use the AST methodology is requested in accordance with 10 CFR 50.67, "Accident source term," paragraph (b)(1). Attachment 5 to the Enclosure provides a mark-up of the UFSAR to appropriately describe the usage of the Regulatory Guide 1.183 AST methodology. Attachment 6 to the Enclosure provides additional information related to dose calculations.

TVA has determined that there are no significant hazards considerations associated with the proposed change and that the TS change qualifies for a categorical exclusion from environmental review pursuant to the provisions of 10 CFR 51.22(c)(9).

The SQN Plant Operations Review Committee and the SQN Nuclear Safety Review Board have reviewed this proposed change and determined that operation of SQN in accordance with the proposed change will not endanger the health and safety of the public.

Additionally, in accordance with 10 CFR 50.91(b)(1), TVA is sending a copy of this letter and enclosure to the Tennessee Department of Environment and Conservation, Division of Radiological Health.

TVA requests approval of the TS by August 2012 to support work in advance of the U2R18 refueling outage during which replacement steam generators will be installed.

There are no regulatory commitments associated with this submittal. If you have any questions about this TS change, please contact Dan Green at 423-751-8423.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 31st day of August 2011.

Respectfully,

R. M. Krich

Enclosure:
Evaluation of Proposed Change

cc (Enclosure):
NRC Regional Administrator - Region II
NRC Senior Resident Inspector - Sequoyah Nuclear Plant
Director of Radiological Health, Tennessee Department of Environment and Conservation

ENCLOSURE

TENNESSEE VALLEY AUTHORITY
SEQUOYAH NUCLEAR PLANT
UNIT 2

EVALUATION OF PROPOSED CHANGE

Subject: **Application for Temporary Change to Technical Specifications to Allow Use of Penetrations in Shield Building Dome During Modes 1 through 4; and Request for Specific Usage of Alternate Source Term Methodology for Calculating Radiation Doses Associated with the Proposed Temporary Change to Technical Specifications (TS-SQN-2011-03)**

1.0 SUMMARY DESCRIPTION

The proposed temporary change would revise the Sequoyah Nuclear Plant (SQN), Unit 2, Operating License to allow SQN, Unit 2, to operate with one of the two approximately 18-inch diameter penetrations through the Shield Building dome opened temporarily while the unit is in Mode 1, 2, 3, or 4. Opening of the hatches installed over these penetrations in the Shield Building will be limited to a combined total of up to five hours per day, six days per calendar week while Unit 2 is in Mode 1, 2, 3, or 4 during the portion of SQN, Unit 2, Cycle 18 (U2C18) between receipt of NRC approval of this proposed change and entry into Mode 5 at the start of the Unit 2 refueling outage 18 (U2R18). The two approximately 18-inch diameter penetrations are designated 2-MPEN-302-RIC200 and 2-MPEN-302-RIC201. The hatches that service these penetrations are designated 2-EQH-410-0010 and 2-EQH-410-0011.

TVA is requesting approval of this license amendment request by August 2012, to support pre-outage activities for the fall 2012 U2R18 refueling outage.

2.0 DETAILED DESCRIPTION

Technical Specifications and Bases Changes

The proposed change would revise the SQN, Unit 2, Technical Specifications (TS), as follows.

TS Definition 1.30, "Shield Building Integrity," will be revised to allow one of the 18-inch Shield Building dome penetration hatches to be open in Mode 1, 2, 3, or 4 during SQN, Unit 2, Cycle 18. Specifically, item b of TS Definition 1.30 will be revised to state.

b. The emergency gas treatment system is OPERABLE *in accordance with LCO 3.6.1.8.*

A new item d will be added to TS Definition 1.30 as follows.

d. During Unit 2 Cycle 18, Penetration Hatch 2-EQH-410-0010 or 2-EQH-410-0011 may be open in MODE 1, 2, 3, or 4. The combined opening time of 2-EQH-410-0010 and 2-EQH-410-0011 shall be limited to 5 hours per day, 6 days per calendar week. Only one penetration hatch shall be open at any one time.

TS 3.6.1.4, "Containment Systems – Internal Pressure," will be revised to allow time for the required differential pressure between the Containment and the annulus (between -0.1 and +0.3 pounds per square inch gage (psig)) to be restored following opening or closing of a Shield Building dome penetration hatch. Specifically, the following exception is proposed to be added to the Limiting Condition for Operation (LCO) 3.6.1.4.

*, except when Penetration Hatch 2-EQH-410-0010 or 2-EQH-410-0011 in the Unit 2 Shield Building dome is being opened or being closed during Unit 2 Cycle 18 until annulus pressure is restored.**

In addition, the following asterisk footnote is proposed to be added to LCO 3.6.1.4 to restrict opening of the 18-inch Shield Building dome penetration hatches.

**The combined opening time of Penetration Hatch 2-EQH-410-0010 and 2-EQH-410-0011 shall be limited to 5 hours per day, 6 days per calendar week in MODE 1, 2, 3 or 4 during Unit 2 Cycle 18.*

TS 3.6.1.8, "Containment Systems – Emergency Gas Treatment System – EGTS – Cleanup Subsystem," will be revised. Specifically, when one of the two approximately 18-inch Shield Building dome penetration hatches is open, the annulus negative pressure that is normally maintained at -5 inches water gauge (wg) with respect to the atmosphere will be permitted to be equal to or more positive than -5 inches wg. Specifically LCO 3.6.1.8 is proposed to be modified with the following asterisk footnote.

** The ability to maintain annulus negative pressure equal to or more negative than -5 inches water gauge is not required when Penetration Hatch 2-EQH-410-0010 or 2-EQH-410-0011 is open during Unit 2 Cycle 18. The combined opening time of Penetration Hatches 2-EQH-410-0010 and 2-EQH-410-0011 shall be limited to 5 hours per day, 6 days per calendar week during Unit 2 Cycle 18. Only one penetration hatch shall be open at any one time. Upon opening Penetration Hatch 2-EQH-410-0010 or 2-EQH-410-0011, both EGTS control loops shall be placed in A-Auto Stand-by position and returned to normal position following closure of the penetration hatch.*

In addition, the Action of TS 3.6.1.8 is modified with the following double asterisks footnote.

***Penetration Hatch 2-EQH-410-0010 or 2-EQH-410-0011 shall not be opened during Unit 2 Cycle 18 if this Action has been entered. If either penetration hatch is open when this Action is entered, immediately take action to close the penetration hatch.*

TS 3.8.1.1, "A.C. Sources – Operating," Action b, will be revised to add a Note to preclude opening of the 18-inch Shield Building dome penetration hatches if a diesel generator is inoperable and to require immediate action to be taken to close the penetration hatch if a diesel generator is determined to be inoperable while an 18-inch Shield Building dome penetration hatch is open. Specifically, TS 3.8.1.1 Action b is proposed to be modified by the following footnote.

+Penetration Hatch 2-EQH-410-0010 or 2-EQH-410-0011 shall not be opened during Unit 2 Cycle 18 if Action b has been entered. If either penetration hatch is open when Action b is entered, immediately take action to close the penetration hatch.

Mark-ups of the affected TS pages are provided in Attachment 1

Corresponding changes are also proposed to the TS Bases. Markups of these proposed changes are provided in Attachment 2.

Updated Final Safety Analysis Report (UFSAR) Changes

Information is added to UFSAR Section 15.5.3, "Environmental Consequences of a Postulated Loss of Coolant Accident," on use of the 18-inch Shield Building dome penetration hatches and to provide details of the dose consequences that have been evaluated using the Alternate Source Term methodology as provided in

Regulatory Guide 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," (Ref. 1).

In summary, the above change will allow one of the two approximately 18-inch diameter penetration hatches in the SQN, Unit 2, Shield Building dome to be temporarily open while SQN, Unit 2, is in Mode 1, 2, 3, or 4 during U2C18. Opening of the Shield Building dome penetration hatches (2-EQH-410-0010 or 2-EQH-410-0011) will be limited for a combined total of up to five hours per day, six days per calendar week while Unit 2 is in Mode 1, 2, 3, or 4 during the time between receipt of NRC approval of this temporary change and entry into Mode 5 at the start of the U2R18 refueling outage. This will allow work to be performed in an efficient manner, resulting in worker dose reductions, in preparation for the steam generator replacement during the U2R18 refueling outage.

3.0 TECHNICAL EVALUATION

The SQN, Unit 2, steam generators (SGs) will be replaced during the U2R18 refueling outage. During the U2R18 refueling outage removal of the old SGs and installation of the replacement SGs will take place through openings in the SG compartment roofs, the Steel Containment Vessel (SCV) dome, and the Shield Building dome. Preparation for creation of the openings in these structures prior to the U2R18 refueling outage will involve numerous activities, such as welding stiffeners to the SCV, installation of a water collection system for hydro-demolition of the Shield Building concrete, and installation of scaffolding/work platforms inside the annulus between the SCV and the Shield Building. These preparatory activities will be performed while SQN, Unit 2, is in Mode 1, 2, 3, or 4 during U2R18. Movement of material required to support these activities up to the top of the annulus is currently only possible by hauling the material through the annulus and up the side of the SCV along the annulus ladder.

To support efficient movement of the material to the top of the annulus, two approximately 18-inch diameter Shield Building dome penetrations were drilled through the Shield Building dome and steel hatches were installed during the Unit 2 Cycle 17 refueling outage in the spring of 2011. Based on the use of similar penetrations and hatch installations that were made to support pre-Steam Generator Replacement outage entry into the Watts Bar Nuclear Plant, Unit 1, annulus to support that unit's SG replacement, movement of most of the material required for pre-outage work inside the SQN, Unit 2, annulus through these Shield Building dome penetrations is expected to reduce the amount of time personnel are required to spend working inside the annulus and the resulting personnel radiation exposures by approximately 2.8 rem. It will also minimize congestion and delays at the annulus ladder and reduce the potential for damaging equipment while hauling the material through the Auxiliary Building and through the annulus. The movement of material to the Shield Building dome will utilize a Liebherr Crawler Crane erected in a stationary position. Movement of materials will follow defined safe load paths as described below in the "Use of Crane" section. Load height and weight restrictions will be imposed to preclude nearby safety-related structures, systems, or components (SSCs) from being adversely affected by a postulated load drop. Protection of nearby SSCs during material movement and storage inside the annulus is described below in the "Use of Hatch Assemblies" section.

A pre-fabricated, watertight, spring balanced, steel hatch assembly was installed over each 18-inch diameter Shield Building dome penetration to provide a means to close each penetration and restore Shield Building integrity. Opening and closing of the Shield

Building dome penetration hatch while the annulus is at a negative pressure relative to the outside atmosphere is assisted by the spring loaded hinges. Following the Unit 2 refueling outage in the spring of 2011, leakage testing of the installed hatch assemblies was performed prior to entering Mode 4 to ensure that the Shield Building dome penetration hatches would provide a leak-tight barrier when closed. Subsequent leakage testing of the Shield Building dome penetration hatch assemblies in Modes 1 through 4 is described below (refer to "Use of Hatch Assemblies" section). The closed Shield Building dome penetration hatch assemblies are capable of withstanding the applicable design basis tornado missiles without perforation and the effects of tornado wind pressure and depressurization.

Creation of the Shield Building penetrations and installation of the steel hatch assemblies during the Unit 2 refueling outage in the spring of 2011 and operation with the steel hatch assemblies closed during the U2C18 operating cycle was evaluated in accordance with the requirements of 10 CFR 50.59, "Changes, tests, and experiments," and found to be acceptable. However, opening the steel hatch assembly and using the Shield Building dome penetrations during Modes 1 though 4 was determined to require prior approval by the NRC because of the impact on TS operability requirements and dose calculation results.

SQN UFSAR Section 6.2.1.1.2, "Secondary Containment Design Bases," describes the Shield Building is part of the secondary containment system. The EGTS is provided for ventilation control and cleanup of the atmosphere inside the annulus between the Shield Building and the primary Containment. The Reactor Building purge ventilation system is also available for cleaning up the atmosphere inside the Shield Building annulus. This section further states that the design bases for the secondary containment system were created to assure that an effective barrier will exist for airborne fission products that may leak from the primary containment during a loss-of-coolant accident (LOCA). Per UFSAR Section 15.5.3, the presence of the annulus between the containment vessel and the Shield Building reduces the probability of direct leakage from the containment vessel to the atmosphere and allows holdup, dilution, mixing, and plate-out of fission products in the Shield Building.

UFSAR Section 6.2.3.1.2, "Emergency Gas Treatment System," indicates that the Emergency Gas Treatment System (EGTS) is used following an accident to keep the air pressure within the Shield Building annulus below atmospheric pressure when containment integrity is required (Modes 1 through 4). The EGTS is also used to reduce the concentration of radioactive nuclides in annulus air that is released to the environs during a LOCA to levels sufficiently low to keep the site boundary and Low Population Zone (LPZ) doses below 10 CFR 100, "Reactor Site Criteria," values. The EGTS instrumentation and associated valves are supplied by the 125 volt direct current battery boards or via the associated vital inverters, and the associated fans are supplied by diesel generators in case of a loss of offsite power. The batteries provide sufficient power for approximately four hours without receiving a charge. In addition, the battery boards can also be powered from either train of diesel generators via vital battery chargers.

As described in UFSAR Section 6.2.3.2.2, "Emergency Gas Treatment System," the EGTS has two subsystems: the annulus vacuum control subsystem and the air cleanup subsystem. The annulus vacuum control subsystem is used to establish and maintain a negative pressure within the annulus during normal operations. The nominal setpoint for each annulus vacuum control equipment installation is 5 inches wg below reference

pressure in the Auxiliary Building. The required negative pressure level ensures that the annulus pressure will not reach positive values during the annulus pressure surge produced by a LOCA in the primary containment. During a postulated LOCA, this subsystem is isolated and shutdown. The air cleanup subsystem has the capability to perform two functions for the affected reactor secondary containment. One of these functions is to keep the secondary containment annulus air volume below atmospheric pressure. The negative pressure control setpoint chosen for post-accident operation is low enough that leakage across the boundary is into the annulus from both the primary containment and areas adjacent to the Shield Building. The second function is to remove airborne particulates from air drawn from the annulus.

Although the EGTS is a shared system between SQN, Units 1 and 2, the EGTS receives and responds to accident actuation signals from each unit independently. The shared portions of the EGTS are limited to those components located in the EGTS room (e.g., fans, filter housings, isolation/actuation valves, and ductwork). When an accident actuation signal is received, the EGTS aligns to the unit with the accident. As a result, opening a Shield Building dome penetration hatch on Unit 2 while Unit 1 is in a Mode that requires EGTS to be operable will not impact the ability of the EGTS to respond and mitigate a Unit 1 accident condition.

Individual use of the Shield Building dome penetration hatches (2-EQH-410-0010 or 2-EQH-410-0011) during Modes 1 through 4 creates a direct pathway to the outside atmosphere that would affect the ability of the annulus vacuum control subsystem to maintain the required annulus negative pressure under normal operation conditions, and also affects the ability of the air cleanup subsystem to reach required negative pressure in the timeframe assumed in the current accident analyses under post-accident conditions. Therefore, NRC approval is required prior to using one of the Shield Building dome penetration hatches while the unit is in Mode 1, 2, 3, or 4.

TS 1.30 provides the definition of Shield Building Integrity. This definition specifies that Shield Building Integrity exists when the door in each access opening is closed, except when the access opening is being used for normal transit entry and exit, when the EGTS is operable, and when the sealing mechanism associated with each penetration is operable. Shield Building dome penetration hatch position is not currently addressed in TS 1.30. Revision to TS 1.30 is required to support operation with one of the Shield Building dome penetration hatches (2-EQH-410-0010 or 2-EQH-410-0011) open while in Modes 1 through 4. The proposed change to TS 1.30 is discussed in Section 2.0 of this enclosure.

TS 3.6.1.4 requires that containment pressure shall be maintained between -0.1 and +0.3 psig relative to the annulus during Modes 1 through 4. When containment pressure is not within limits, the TS 3.6.1.4 Action requires that the containment pressure be restored within 1 hour. Following opening or closing of a Shield Building dome penetration hatch, additional time is needed to restore the required differential pressure between the Containment and the annulus (between -0.1 and +0.3 pounds per square inch gage (psig)). Revision to TS 3.6.1.4 and the associated Bases is required to support operation with one of the Shield Building dome penetration hatches open while in Modes 1 through 4. The proposed change to TS 3.6.1.4 is discussed in Section 2.0 of this enclosure.

TS 3.6.1.8 requires the operability of both trains of the EGTS during Modes 1 through 4. Associated TS Surveillance Requirement (SR) 4.6.1.8.d.4 is performed to demonstrate that a negative pressure greater than or equal to 0.5 inches wg is produced in the annulus within one minute after a start signal. When one of the Shield Building dome penetration hatches is open, the annulus negative pressure initial condition is not met which impacts the ability to meet TS SR 4.6.1.8.d.4. Revision to TS 3.6.1.8 and the associated Bases is required to support operation with one of the Shield Building dome penetration hatches (2-EQH-410-0010 or 2-EQH-410-0011) open while in Modes 1 through 4. The proposed change to TS 3.6.1.8 is discussed in Section 2.0 of this enclosure.

In addition, to provide additional assurance of support system operability, opening of a Shield Building dome penetration hatch shall be precluded if SQN, Unit 2, is in the Action of TS 3.6.1.8 or Action b of TS 3.8.1.1. If a Shield Building dome penetration hatch is open while either an EGTS subsystem or a diesel generator is inoperable during Mode 1, 2, 3, or 4, action shall be immediately taken to close the open Shield Building dome penetration hatch.

The technical basis for these changes is summarized below.

Offsite and Control Room Doses

The accidents of interest for the use of the Shield Building dome penetration hatches during Modes 1 through 4 are those that rely on the Shield Building boundary to limit the release of radioactivity to the environment (with the limiting accident being a LOCA) and those that result from some external event (i.e., a tornado). The integrity of the Shield Building is required to limit the release of radioactivity to the atmosphere following an accident and to protect the SCV from damage due to external events. The accident analyses assume that the Shield Building is intact and that the annulus is at a negative pressure relative to the outside atmosphere at the start of the postulated accident. The accident analyses further assume that the air cleanup subsystem of the EGTS keeps the secondary containment annulus air volume below atmospheric pressure during an accident. The determination of Control Room and offsite doses following a LOCA is based on these assumptions.

Use of one of the Shield Building dome penetration hatches during Modes 1 through 4 will affect the LOCA analysis assumptions that are described in UFSAR Section 15.5.3. Since the limiting accident during operation and associated with containment from a dose standpoint is the design basis LOCA, no other accidents were reevaluated for the change in consequences due to the opening of a Shield Building dome penetration hatch. The size of the Shield Building dome penetrations is greater than currently allowed by the plant design basis. Therefore, with one Shield Building dome penetration hatch open, the ability of the annulus vacuum control subsystem of the EGTS to maintain the annulus at a negative pressure relative to the outside atmosphere may be affected. If an accident occurs with the Shield Building dome penetration hatch open and the annulus at a reduced differential pressure, the air cleanup subsystem of the EGTS will likely not be able to maintain the annulus at a negative pressure relative to the outside atmosphere, until the steel hatch assembly over the open Shield Building dome penetration is closed.

While a Shield Building dome penetration hatch is open, two dedicated trained individuals with no other duties will be pre-positioned in the Control Room Habitability area to close the hatch should an event requiring Shield Building integrity occur. These dedicated

individuals in the Control Room will initiate actions for closure of the Shield Building dome penetration hatch should a reactor trip be announced by the Control Room operators. Upon notification from the Control Room, which is not assumed to occur until 10 minutes into the event, the dedicated individuals pre-positioned in the Control Room Habitability area will don self-contained breathing apparatus and immediately proceed from the Control Building, through the Turbine Building to the Auxiliary Building roof, to the Shield Building dome, where they will clear any material and rigging and then close the open Shield Building penetration hatch. The steel hatch assembly used to seal the Shield Building dome penetration has been designed such that it may be closed quickly (assumed to be 20 seconds to clear material and rigging from the open hatch and 13 seconds to close the hatch for a total of 33 seconds) to restore Shield Building integrity. Material being passed through the Shield Building dome penetration will be sized such that it may be passed through or removed from the Shield Building dome penetration so that the steel hatch assembly may be closed within the assumed 33 second timeframe. Following closure of the steel hatch assembly, the dedicated individuals whose duty it is to close the hatch will return to the Control Room and notify the Main Control Room that the hatch has been closed.

The installed spring balanced, quick acting, watertight hatch cover has a weight of 198 lbs. The spring is set at the factory to provide 110 lbs of upward force, i.e. assist to open. There are additional spring settings for field adjustment that have not been utilized at SQN. With the addition of the positive pressure force of 41 lbs from the annulus during a LOCA event, the closing force (110 lbs plus 41 lbs) is overcome by the weight of the hatch (198 lbs). However, the hatch cover is hinged on one side. During the shop pressure testing of the hatches, it was noted that when the hatch was "undogged," the hatch cover would open slightly on the non-hinged side due to the hatch seal (a firm rubber seal material) pushing on the hinged end of the hatch. This seal compression is assisted, during closure, by the design features of the dogs on the hatch door that are tapered and, as they are inserted into the latching position, draw the hatch lid into the seal. An individual closing the hatch easily overcame the seal resisting force when closing the hatch.

As detailed in the Mission Dose discussion below, an assumed 23.1 minutes elapses from the time a postulated LOCA occurs (with Penetration Hatch 2-EQH-410-0010 or 2-EQH-410-0011 open) until the point at which the open Shield Building dome penetration hatch has been closed by the individuals dedicated for this purpose and the operating EGTS trains have drawn down (i.e., depressurized) the annulus to a pressure of -0.25 inches wg, at which point direct releases to the environment are terminated. An evaluation of the impact on offsite and Control Room doses following a LOCA with the Shield Building dome penetration hatch assumed to be open for these first 23.1 minutes of the LOCA was performed, which conservatively assumed that during these first 23.1 minutes of the LOCA releases to the annulus were immediately released to the outside atmosphere without being filtered. Following closure of the steel hatch assembly, EGTS operation will return the annulus to a negative pressure relative to the outside atmosphere, and subsequent releases will be filtered by the air cleanup subsystem of the EGTS as described in UFSAR Section 15.5.3.

A TVA calculation has been performed that models the annulus pressure response during a LOCA by analyzing EGTS exhaust rates for the situation where the annulus starts at atmospheric conditions (zero differential pressure), which corresponds to the assumed starting condition when one Shield Building dome penetration hatch is open. The closure

of the open Shield Building dome penetration hatch (22.1 minutes) and reestablishment of annulus negative pressure (1 minute) at 23.1 minutes into the accident was modeled by taking the calculation zero differential pressure case and adding 23.1minutes to all times following the time the annulus reaches its maximum post-accident pressure. Additionally, a bounding single failure, i.e., a failure of the pressure control operator (PCO), is assumed that results in the greatest steady state EGTS flow being exhausted to the environment until one train is shut down by Operations at 2 hours into the LOCA event. At this point, the train that is selected is assumed to have a PCO failure. The model results of EGTS flows versus time (Figure 1) were then used in the Source Transport Program (STP) computer code model from the dose calculation to determine the radiological releases. The STP model (Figure 2) was modified as follows:

1. The EGTS exhaust flows (flow from 9 to 14 on Figure 2) as shown in Table 1 and Figure 1.
2. EGTS recirculation flows (flow from 9 to 3 on Figure 2) as shown in Table 1 and Figure 1.
3. For times less than 23.1minutes, the flow from containment to the annulus (flow from 2 to 5 on Figure 2) is zero, since this flow (1.74×10^{-6} cfm) is redirected to the environment (flow from 2 to 14 on Figure 2).

(Note: Model components 1 and 13 are not used in the current revision of the model and are not depicted in Figure 2.)

The time assumed in the calculation for the EGTS to depressurize the annulus (i.e., reach -0.25 inches wg) is conservatively assumed to be approximately one minute after the Shield Building dome penetration hatch is closed. The time calculated to reach -0.25 inches wg in the annulus starting at the initial condition of 0 inches water gauge and with the fans not actuated is approximately 68 seconds. At 22.1 minutes post-LOCA (i.e., the time at which the Shield Building dome penetration hatch is assumed to be closed), the EGTS fans have already been actuated and maximum flow has been achieved (i.e., it takes 49 seconds after the EGTS fans start for maximum flow to be achieved) due to the EGTS start at the beginning of the LOCA. As a result, the actual time required for EGTS to depressurize the annulus after Shield Building dome penetration hatch closure will be 19 seconds (i.e., 68 seconds - 49 seconds). Therefore, the use of one minute for EGTS to depressurize the annulus after the Shield Building dome penetration hatch is closed is conservative. The EGTS is tested to ensure fan flow rates of 3600 to 4400 cfm (i.e., design flow rate of 4000 cfm ± 10 percent) in accordance with TS SR 4.6.1.8.d.1. In addition, the annulus is periodically tested to ensure inputs to the depressurization calculation are met (i.e., TS SR 4.6.1.8.d.4 requires verification that each EGTS subsystem produces a negative pressure of greater than or equal to 0.5 inches wg in the annulus within one minute after a start signal). Leakage from the temporary Shield Building dome penetration hatches was confirmed to not impact the ability of EGTS to satisfy the requirements of TS SR 4.6.1.8.d.4 prior to SQN, Unit 2, entering Mode 4 after installation of the Shield Building dome penetration hatches during the Unit 2 Cycle 17 refueling outage. The time required to reach the -0.25 inches wg in the annulus cannot be tested since the time frame is determined in the analysis based on LOCA temperature and pressure transient conditions inside the annulus which are not present during non-accident conditions. However, the Control Room operators have access to instruments to verify that the annulus-atmosphere delta pressure requirements are met. There are also alarms in the Control Room for failure of the EGTS pressure controller to maintain the required pressure.

The radiological releases determined by the STP computer code were then used as input into the FENCDOSE computer code to determine the offsite doses and as input into the COROD computer code to determine the Control Room doses.

Regulatory Guide 1.183 provides guidance on acceptable application of an Alternate Source Term (AST) and has been used in the analysis supporting this proposed change. Regulatory Guide 1.183 does not contain conditions or limitations on the use of AST. The use of AST is not limited to any vendor design or type. The main difference between the current SQN analysis and an AST analysis is the release fractions and the timing. The values prescribed in Regulatory Guide 1.183 were used in the analysis supporting this change. All other current assumptions either bound or are in compliance with the guidance in Regulatory Guide 1.183. As required by 10 CFR 50.67, "Accident source term," and reflected in Regulatory Guide 1.183, the results are calculated in terms of total effective dose equivalent (TEDE). The computer codes used for the AST analysis are the same as those used for the current SQN analysis and calculate the TEDE as prescribed. The defense in depth philosophy has not changed and results of the analysis supporting this change show that there remains significant margin to regulatory limits as a result of implementing AST.

The results of the analysis of offsite and Control Room doses following a LOCA with one Shield Building dome penetration hatch open for 22.1 minutes and assumed to be a direct radionuclide release path for 23.1 minutes are summarized in Table 2 utilizing the Regulatory Guide 1.183 AST assumptions. The results of this analysis do not include any contribution to offsite and Control Room doses due to skyshine through the two Shield Building dome penetrations, since the skyshine contribution was determined to be a small fraction of the calculated doses. For comparative purposes, the dose results utilizing the criteria of Regulatory Guide 1.4, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss of Coolant Accident for Pressurized Water Reactors," (Ref. 2) are also provided in Table 2.

EGTS Exhaust Rate

Annulus Leakage = 500 cfm, Initial Annulus Pressure = 0 Inches HO

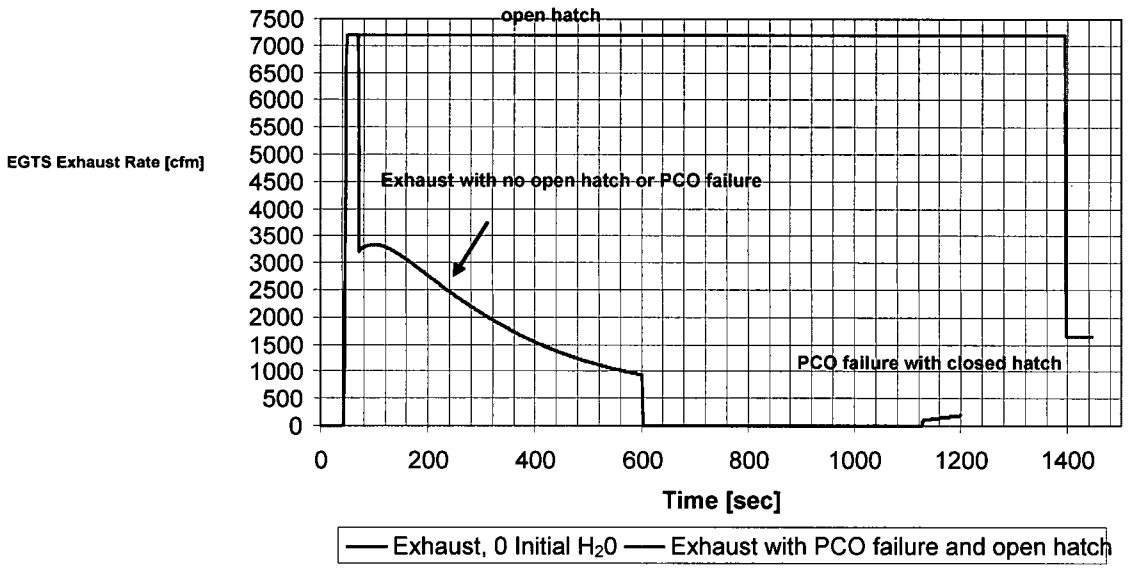


Figure 2: STP Model

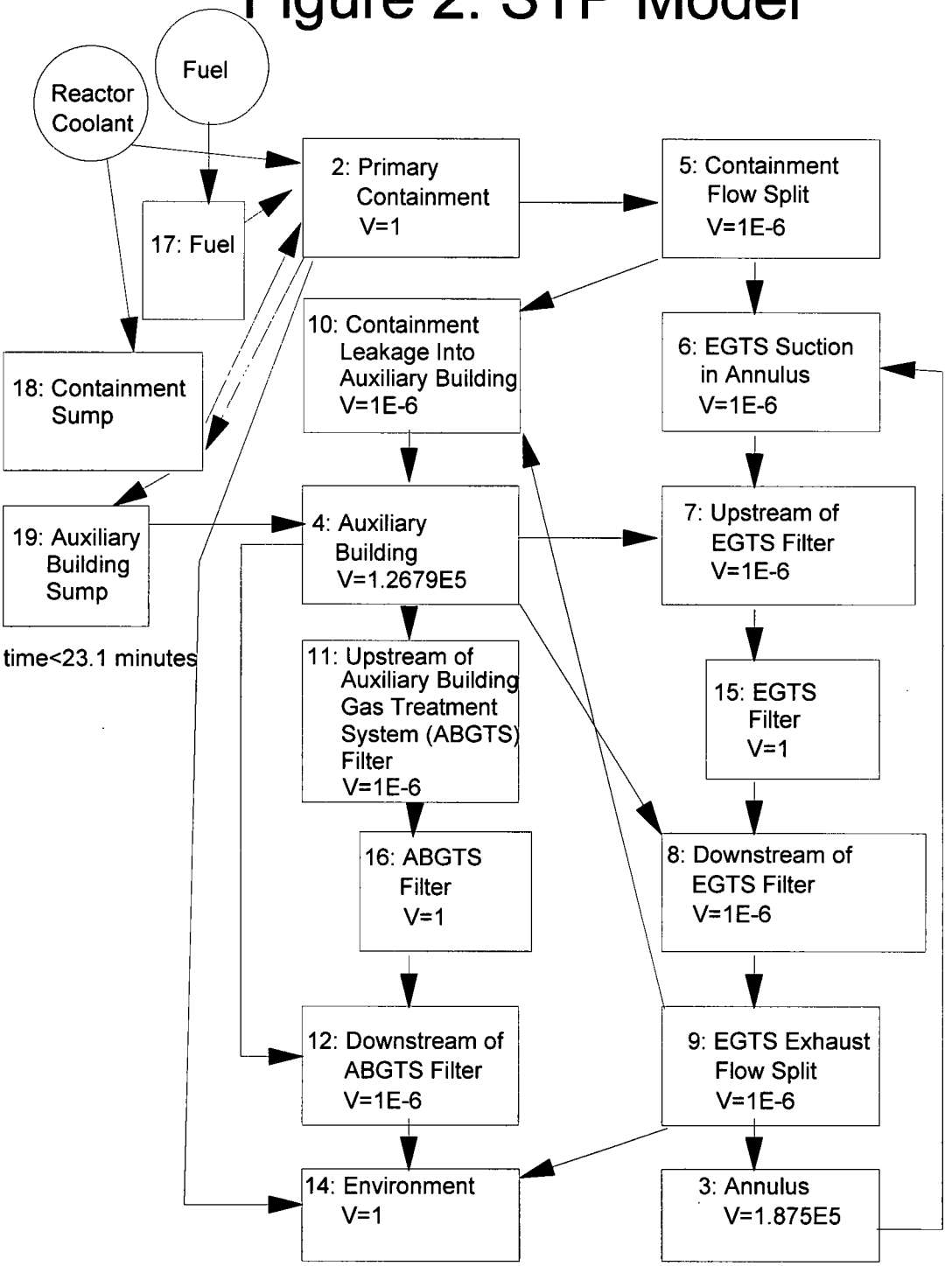


Table 1

EGTS Flow Rates

TIME SEC start	TIME SEC end	cfm exhaust	cfm recirculation	Flow 9-14 cfh exhaust	Flow 9-3 cfh recirculation	Flow 9-10 cfh duct leakage	Description
1	30	0	0	0.000E+00	0.000E+00	0.000E+00	EGTS starts.
30	43	0	7200	0.000E+00	4.265E+05	5.52E+03	---
43	44	149.98	7050.02	8.999E+03	4.175E+05	5.52E+03	---
44	45	1080.94	6119.06	6.486E+04	3.616E+05	5.52E+03	---
45	46	2425.8	4774.2	1.455E+05	2.809E+05	5.52E+03	---
46	47	3874.93	3325.07	2.325E+05	1.940E+05	5.52E+03	---
47	48	5265.57	1934.43	3.159E+05	1.105E+05	5.52E+03	---
48	49	6520.8	679.2	3.912E+05	3.523E+04	5.52E+03	---
49	1386	7200	0	4.320E+05	0.000E+00	5.52E+03	Open hatch=max flow for 23.1 minutes: 10 minute notification to close hatch + 12.1 minutes for closure (includes travel time, clearing hatch, and closing hatch) + 1 minute drawdown = 23.1 min, 2 trains.
1386	7200	1637	5210	9.822E+04	3.071E+05	5.52E+03	Closure of open hatch has occurred at 1326 seconds into the event. By 1386 seconds (and until 7200 seconds), 2 trains of EGTS are operating with assumed PCO failure with annulus pressure drawn down. Resultant EGTS flow rates during this interval are 6847 cfm total and 1637 cfm exhaust.
7200	720 hr	1041	3364	6.246E+04	1.963E+05	5.52E+03	1 train EGTS is assumed to be shut off by operations at 2 hours into the event. With 1 train remaining in operation (and assumed PCO failure), the resultant EGTS flow rates are 4405 cfm total flow and 1041 cfm exhaust.

Table 2

Resultant LOCA Doses with Open Shield Building Dome Penetration (Regulatory Guides 1.183 and 1.4)

Offsite Doses (in rem) Utilizing Regulatory Guide 1.183 Assumptions

	2-hr EAB	30-Day LPZ	Limit
Gamma	4.000	1.349	---
Beta	2.452	1.321	---
Thyroid (ICRP-30)	60.88	13.50	---
TEDE	6.710	2.075	25

Control Room Doses (in rem) Utilizing Regulatory Guide 1.183 Assumptions (with EGTS Controller Failure, Operator Action at 2 hours)

	Airborne	Shine	Ingress/ Egress	Total	Limit
Gamma	0.7210	0.5591	0.02899	1.309	---
Beta	6.695	0	0.04891	6.744	---
Thyroid (ICRP-30)	3.864	0	0.5678	4.432	---
TEDE	1.026	0.5591	0.06676	1.652	5

Offsite Doses (in rem) Utilizing Regulatory Guide 1.4 Assumptions

	2-hr EAB	30-Day LPZ	Limit
Gamma	13.38	2.21	25
Beta	6.67	1.65	300
Thyroid (ICRP-30)	641.60	82.32	300
TEDE	44.46	6.04	---

Control Room Doses (in rem) Utilizing Regulatory Guide 1.4 Assumptions

	Airborne	Shine	Ingress/ Egress	Total	Limit
Gamma	0.7121	0.6317	0.02985	1.37	5
Beta	6.332	0	0.06119	6.39	30
Thyroid (ICRP-30)	11.08	0	0.4624	11.54	30
TEDE	1.144	0.6317	0.0456	1.82	---

With application of the Regulatory Guide 1.183 AST assumptions, the offsite and Control Room doses due to a LOCA while one Shield Building dome penetration hatch is open do not exceed the 10 CFR 50.67 limits and the margin of the limits is acceptable.

Additional information regarding these dose calculations is provided in Attachment 6.

Mission Doses

NRC Information Notice (IN) 97-78, "Crediting of Operator Actions in Place of Automatic Actions and Modifications of Operator Actions, Including Response Times," (Ref. 4) and American National Standards Institute/American Nuclear Society (ANSI/ANS)-58.8, "Time Response Design Criteria for Safety-Related Operator Actions," (Ref. 5) provide guidance for consideration of safety-related operator actions. This guidance is summarized as follows.

1. The specific operator actions required,
2. The potentially harsh or inhospitable environmental conditions expected,
3. A general discussion of the ingress/egress paths taken by the operators to accomplish functions,
4. Procedural guidance for required actions,
5. Specific operator training necessary to carry out actions, including operator qualifications required to carry out actions,
6. Additional support personnel and/or equipment required by the operator to carry out actions,
7. Description of information required by the Control Room staff to determine whether such operator action is required, including qualified instrumentation used to diagnose the situation and to verify that the required action has successfully been taken,
8. The ability to recover from credible errors in performance of manual actions, the expected time to make such a recovery, and
9. Consideration of the risk significance of the proposed operator actions.

TVA has evaluated the above guidance relevant to the manual action to close an open Shield Building dome penetration hatch (2-EQH-410-0010 or 2-EQH-410-0011) as discussed below.

A mission dose evaluation of the post-LOCA exposure to personnel during ingress from the staging location in the Control Building Habitability area, closure of the steel hatch assembly, and egress from the Shield Building dome has been performed. The mission dose requires two dedicated trained individuals, both pre-staged in the Control Building, whenever a Shield Building dome penetration hatch is open. The individuals dedicated to closing the penetration hatch will be pre-positioned on the Control Building inside the Main Control Room Habitability area. Since the individuals are dedicated to this mission, there is no impact on plant staffing requirements. The mission assumes the individuals are not required to wear anti-contamination clothing. However, these individuals will have ready access to self-contained breathing apparatus (SCBA) respiratory protection equipment, with a protection factor of at least 10,000 that is required to be put on immediately upon notification of the accident. No special tools or equipment, other than the previously mentioned SCBA equipment, are required to complete the mission. Details of the mission are as follows.

- The individuals pre-staged inside the Control Room Habitabililty area, to close the hatch are assumed to be notified 10 minutes after the event.
- The individuals then each don a SCBA and walk from the Control Building, through the Turbine Building, to the Auxiliary Building roof, to the Unit 2 Shield Building dome, to the open hatch (2-EQH-410-0010 or 2-EQH-410-0011) (693 seconds).
- At the open hatch, the individuals, clear material and rigging and close the hatch (33 seconds).
- The individuals then walk back to the Shield Building dome ladder, and climb down the ladder to the Auxiliary Building roof (214 seconds).
- The mission is completed when the individuals walk to the U2 Turbine Building Main Steam Reheater deck and return to the Control Room Habitability area (230 seconds).

A mission time verification of the ingress/egress pathway was performed to conservatively determine/estimate the time required to complete each of the action steps described above. The verification was performed and overseen by personnel familiar with the plans for the operation of the Shield Building dome access hatches; the scaffolding necessary to access theses hatches; and the planned ingress/egress pathways to support the mission. Timing of each action step was performed for those action steps that actually could be performed. The action steps that could not be performed because of plant conditions (i.e., the hatch is presently installed and welded closed and some pathway scaffolding has been removed) were either estimated from prior work activities or simulated by constructing a mock-up of similar configuration.

Actual timing occurred for donning a SCBA and walking to the Unit 2 Shield Building dome hatch access point for Hatch 2-EQH-410-0011, which was the more conservative distance for this step of the mission. Actual timing was also validated for the egress of the Shield Building dome. This was timed from Hatch 2-EQH-410-0011 (as opposed to Hatch 2-EQH-410-0010), as it is the longest route off of the Shield Building dome and again contributes to the conservatism in the analysis. Actual timing was also performed/validated for egress from the Auxiliary Building roof to the Unit 2 Turbine Building Moisture Separator Reheater (MSR) deck and back to the Control Room Habitability area.

Certain activities were simulated because the access hatches are presently locked and welded closed and some scaffolding has been removed. Therefore, a mock-up was constructed representing the configuration that simulated climbing the scaffolding to access the hatch and the activity of clearing rigging and material from the access hatch to allow closure of the hatch. To validate these steps, two individuals were timed climbing the scaffolding and transitioning to a position on this scaffolding similar to the location of the installed hatch. Timing was also validated using the mock-up for the activity of clearing the hatch of material and rigging when the hatch would be in use. The largest, longest, and heaviest piece of material to be moved through the hatch was selected to ensure the validated times were conservative.

Closure of the hatch, as part of the "Clear material and rigging and close the hatch" actions, was estimated due to the inability to actually perform this task. The hatches were opened and closed many times prior to SQN entering Mode 4 from the spring 2011 refueling outage but were never timed for closure. These hatches are quick-acting to close using a hand wheel that turns 90 degrees to secure and lock the hatch closed. Time to close the hatch was estimated to take two to three seconds but 10 seconds was used to be conservative. This was based on observation and experience during shop pressure testing performed on the hatch.

To account for inconsistencies in individual performances of these action steps, an 80% confidence factor was applied (increasing the mission times) for all of the action times in the mission dose analysis.

During actual online operation, the individuals dedicated to closing the Shield Building dome access hatch will be trained in this activity. To preclude the dedicated individuals from receiving airborne dose, the individuals are required to each don a SCBA with a respiratory protection factor of at least 10,000 prior to movement from the Control Room Habitability area to the Shield Building dome access hatch.

Existing procedures describe required operator actions to respond to various plant events. Procedures for events requiring Shield Building integrity will not require revision to initiate closure of the open Shield Building dome penetration hatches, since the dedicated individual in the Control Room will initiate closure immediately following an announcement of a reactor trip over the PA system, regardless of the reason for the trip. Procedures will be revised as necessary to 1) place both EGTS control loops in the A-Auto Stand-by position when a Shield Building dome penetration hatch is opened and 2) reset one EGTS control loop to A-Auto and one to A-Auto Stand-by once annulus pressure becomes more negative than -0.2 inches wg following closure of a Shield Building dome penetration hatch assembly. Annulus pressure indication is provided in the Control Room. Training will be conducted for any procedure revisions, interim procedure revisions, and new procedures either through training classes, "hands-on" training, and/or required reading. In addition, the personnel in the Control Room will be notified prior to opening a Shield Building dome penetration hatch. Following closure of the steel hatch assembly, the dedicated individuals will notify the dedicated individual in the Control Room that the Shield Building dome hatch has been closed.

The current LOCA source term is based on the guidance in Regulatory Guide 1.183. Based on Regulatory Guide 1.183, the gap activities are assumed to be five percent iodines and five percent noble gases. All source term components were modeled to be airborne, and as a result, the sources were not assumed to go to the sump. Therefore, the containment spray and sump source terms were not included since this would be counting the source terms twice. The annulus source terms were also not included in the analysis, since these source terms are a factor of 10^6 lower than containment source terms.

The same methodologies, other than the Regulatory Guide 1.183 source term, and computer codes that were utilized to calculate the mission dose for Watts Bar Nuclear Plant, Unit 1, License Amendment Request (Ref. 3) to allow opening similar penetration hatches on the Shield Building dome of that unit during power operations were employed in calculating the mission dose for SQN, Unit 2, use of Shield Building dome Penetration Hatches 2-EQH-410-0010 and 2-EQH-410-0011 and are as follows.

- ARCON96 (NUREG/CR-6331)
- STP
- FENCDOSE
- PATH
- COROD

The dose rates due to shine from containment are higher at the beginning of the accident, while the doses due to releases are higher after some time into the accident. The mission assumes a 10-minute notification time before the dedicated individuals start to take action. However, if the dedicated individuals start earlier, they will receive a larger dose due to shine than if they start later. Therefore, to conservatively determine the total mission dose, the shine dose used is that corresponding to the earliest time the dedicated individuals can get to the dome (i.e., assuming notification time is zero minutes and that the dedicated individuals start to take action immediately), while the dose due to airborne radiation is maximized by including the 10-minute notification time before the dedicated individuals start to take action. The mission dose results are provided in Table 3.

Table 3

Shield Building Dome Penetration Hatch Closure Mission Doses Utilizing Regulatory Guide 1.183 Assumptions

	Dose (rem)	Limit (rem)
Gamma (whole body)	3.74	--
Beta (skin)	0.211	--
Inhalation	0.0555	--
TEDE	3.62	5

*For the inhalation dose results and the TEDE dose results, the dedicated individuals are each assumed to don a SCBA with a respiratory protection of at least a factor of 10000 upon notification of an accident.

Credit for Operator Actions

ANSI/ANS-58.8, Subparagraph 3.1.3, states that *safety-related operator actions shall be credited only where a single operator error of omission does not result in exceeding any limiting design requirement for the design basis event under consideration.* Section 2 of ANSI/ANS-58.8, however, defines operator error in the context of single failure criteria; i.e., a single incorrect or omitted action by a human operator attempting to perform a safety-related action in response to an initiating occurrence is a single failure. The operator actions to place both EGTS control loops in the A-Auto Stand-by position assure that a single failure concurrent with the perceived failure of the operating loop will not render the EGTS inoperable after opening a Shield Building dome penetration hatch. Single failure criteria do not require the assumption of two unrelated failures. Consequently, an assumption of a single failure of the EGTS along with a failure of an operator to place both EGTS loops in the A-Auto Stand-by position is not considered a credible failure. Therefore, the intent of ANSI/ANS-58.8 is met as related to design basis considerations.

An error of commission or omission by a dedicated individuals to close an open Shield Building dome penetration hatch when directed by the Control Room is considered unlikely. The individuals involved in performance of these tasks are dedicated to these tasks and adequate communication exists in the Control Room to alert the dedicated individuals in the Control Room of a reactor trip.

Closure of the Shield Building dome penetration hatches is required following a LOCA event. The frequencies of occurrence of LOCA events are small. The initiating events to be considered and their frequency of occurrence are listed below.

Excessive LOCA	3.22E-08/yr
Large LOCA	1.75E-06/yr
Medium LOCA	1.60E-06/yr

Allowing one of the Shield Building dome penetration hatches to be open is based on dedicated and trained individuals being in place to close it within 22.1 minutes of initiation of the event (with release through the Shield Building dome penetration terminating with annulus pressure reduced to -0.25 inches wg at Time = 23.1 minutes). The individuals required to close the Shield Building dome penetration hatches are dedicated and trained to the tasks (i.e., the two individuals located within Control Room Habitability area who close the open penetration hatch (2-EQH-410-0010 or 2-EQH-410-0011)). Therefore, the likelihood of failing to close the open Shield Building dome penetration hatch is considered low. Given the low probability of an initiating event and low probability of failing to close 2-EQH-410-0010 or 2-EQH-410-0011, the failure to close an open Shield Building dome penetration hatch after a LOCA is considered unlikely.

In addition, TVA has performed additional analysis assuming delayed closure of the Shield Building dome penetration hatch during a LOCA. Based on the results of this analysis, offsite dose limits and Control Room dose limits of 10 CFR 50.67 would not be exceeded until the Shield Building dome penetration hatch has been open for more than 48 minutes (i.e., Shield Building dome penetration hatch opened for 47 minutes plus 1 minute for EGTS to depressurize the annulus).

Tornado Protection

Administrative controls will be put in place to require closure of the Shield Building dome penetration hatch under a National Weather Service issued tornado watch or warning. The steel hatch assembly is designed to protect against tornado differential pressure and the spectrum of applicable tornado missiles described in SQN UFSAR Table 3.5.5-2, "Sequoyah Nuclear Plant Tornado Missile Spectrum A for Category I Structures." Therefore, closure of the open Shield Building dome penetration hatch restores the ability of the Shield Building to protect SSCs inside the Shield Building from tornado missiles and the differential pressure created by a tornado.

Seismic Qualification

The Shield Building dome penetration steel hatch assembly is dedicated to Seismic Category I criteria. The occurrence of a seismic event while the Shield Building dome penetration hatch is closed will not affect the ability of the Shield Building dome penetration hatch to perform its function. Should a seismic event occur while the Shield Building dome penetration hatch is open, the possibility exists that the ability to close the Shield Building dome penetration hatch will be affected. Since no radioactive release is postulated to occur concurrent with a seismic event, this situation is no different than a failure of the Shield Building dome penetration hatch for any other reason. If the Shield Building dome penetration hatch had failed in the open position and could not be closed within the time restriction of the proposed asterisk footnote of LCO 3.6.1.8, e.g., 5 hours, then both trains of EGTS would be considered inoperable and a unit shutdown in accordance with TS 3.0.3 would be required.

Unplanned Releases

During use of the Shield Building dome penetration hatch (2-EQH-410-0010 or 2-EQH-410-0011), temporary radiation monitoring equipment will be provided near the penetration hatches as directed by SQN Radiation Protection personnel to provide monitoring in the event of an unplanned/unanticipated release. This provision does not prevent unplanned or unanticipated releases, but allows monitoring in the event of an unplanned/unanticipated release.

Use of Hatch Assemblies

Prior to entering Mode 4 following installation of the Shield Building dome penetration hatch assemblies, the Shield Building dome penetration hatch assemblies were locked closed with a Security Access Only padlock and a metal strap welded across the face to prevent opening. The Shield Building dome penetration hatches will remain locked and welded closed while in Modes 1 through 4 until NRC approval of this proposed TS change is received.

Nuclear security will establish appropriate access control measures in accordance with the NRC approved site Physical Security Plan (PSP) and associated Site Security Instructions (SSIs) to effectively control personnel access through an open Shield Building dome penetration hatch when it is in use. Nuclear security personnel will not be positioned on the Shield Building roof, however, nuclear security personnel will be positioned in a location that provides positive access control to the Shielding Building dome. Materials required to be passed through the open Shield Building dome penetration hatch will be searched and access controlled in accordance with the site PSP and associated SSIs. When the Shield Building dome penetration hatch is not being used, the associated penetration hatch assembly will be locked closed with a Security Access Only controlled device in accordance with the site PSP and associated SSIs. During normal operation, Security personnel dose will not exceed 10 CFR 20, "Standards for Protection Against Radiation," requirements.

System operating procedures for the annulus vacuum control system and EGTS will be modified as required to describe controls for these systems when one of the hatch assemblies is opened in Modes 1 through 4. Continued operation of the annulus vacuum

control system while the hatch is open has been evaluated and will have little if any maintenance impact on annulus vacuum control system dampers or fans.

Following closure of a Shield Building dome penetration hatch assembly, the hatch assembly will be locally leak tested to verify it is adequately sealed. Local leak testing will not be required if the Shield Building dome penetration hatch assembly is closed as a result of direction from the Control Room during an event or if it will only be closed briefly and then reopened.

Provisions will be provided to protect the SCV and other SSCs required to be operable in Modes 1 through 4 from impact during handling of material through an open Shield Building dome penetration and inside the annulus. Once inside the annulus, materials not in use will be stored on and secured to the existing platform around the perimeter of the SCV dome. The materials will be secured in a manner that will preclude impact on safety-related SSCs in the annulus. The quantity of materials stored on the platform will be controlled such that the load capacity of the platform is not exceeded. Netting will be used beneath the platforms for protection from dropped small items and hand tools. Equipment protection as prescribed by Operations will be installed for sensitive components in the work vicinity.

Use of Crane

A Liebherr Crawler Crane will be used to lift materials to the Shield Building roof. While in use, the crane will be erected in a stationary position with the outriggers positioned. The material will then be manually moved to and through the hatches. A calculation was performed to allow use of this crane when both Unit 1 and Unit 2 are in any mode. The calculation concluded that the Liebherr Crawler Crane will remain stable and preclude any impact interactions with safety related SSCs in a seismic event. The calculation describes the location, safe load path requirements, and administrative controls for operation to prevent any damage to important-to-safety SSCs. Load height and weight restrictions will be imposed to preclude nearby safety-related SSCs from being adversely affected by a postulated load drop.

Crane operations under various wind conditions shall be in accordance with the Liebherr Crawler Crane Operating Manual in addition to the requirements below. Crane operation is permissible for wind speeds up to 20 mph. The wind data refers to values measured at the crane at its upper wind sensor. Wind loads on the lifted loads shall be accounted for in accordance with the Crane Operating Manual.

In the event wind conditions exceeding 20 mph occur during crane load handling operations, actions shall be taken in accordance with the crane operating manual/instructions. For winds exceeding 20 mph, crane load handling operations shall be stopped and the load shall be lowered and secured.

In the event warnings/watches and where the possibility exists for high winds exceeding 50 mph, severe weather, and or tornadoes, the crane shall be taken down and secured in a safe manner.

Lifts using the Liebherr Crawler Crane shall proceed only after obtaining reasonable assurance (based on weather forecasts from the local National Weather Service office, etc.) that no severe weather or high wind conditions are anticipated at least for the anticipated duration of the lift.

The above operating and administrative restrictions under high wind and/or severe weather conditions ensure that the crane will be secured in a safe position under these conditions thereby precluding an undesirable failure and an adverse impact interaction of the crane components under these conditions.

The Liebherr Crane will be located in the "yard area" east of the Unit 2 East Main Steam Valve Vault and will be in nearest proximity to the Valve Vault, Unit 2 Additional Equipment Building and the Condensate Waste Evaporator Building. The crane will be considered as "transient combustibles." As such, administrative controls as documented in plant procedure NPG-SPP-18.4.7, "Control of Transient Combustibles," will be in place to ensure that no adverse fire hazard impact occurs at the location of the crane. Assuming a worst case condition of failure of the crane's diesel fuel tank, it has been demonstrated that the limiting rated fire barrier, i.e., a 1-1/2 hour fire barrier (Fire Door A118), is adequate to prevent fire spread between the yard area and the nearest building. The location and use of the crane will provide no adverse impact to the adjacent areas, and thus, no adverse impact to the ability to safely shutdown the plant in the event of a fire.

Risk Insights

The current Probabilistic Risk Assessment (PRA) model for SQN was issued on May 27, 2011. The previous model was updated from RISKMAN to CAFTA, which included a detailed internal flooding analysis, and a more in depth analysis of all plant systems to represent the as built, as operated plant. A peer review of the model was performed in January 2011 on the internal events and internal flooding supporting requirements of the American Society of Mechanical Engineers/American Nuclear Society (ASME/ANS) PRA Standard (i.e., ASME/ANS RA-Sa-2009, "Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications"). The peer review team endorsed the model as being compliant with the ASME/ANS PRA standard with 77 findings and observations identified. All of the Findings and Observations were resolved to meet capability category II prior to issue of the model of record.

The SQN PRA model did not include the Shield Building for either unit. No credit for this concrete structure was taken in the model for reducing core damage frequency (CDF) or large early release frequency (LERF). Also, this analysis does not model the EGTS or the annulus vacuum control subsystem of the EGTS. No credit for filtration by the air cleanup subsystem of the EGTS was included in the LERF model. Therefore, opening and leaving open the 18-inch diameter hatch in the Shield Building would not have any effect on the calculated CDF or LERF.

4.0 REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements/Criteria

Regulatory requirements and guidance applicable to this change are as follows.

- 10 CFR 50.67 provides a mechanism for licensed power reactors to replace the traditional accident source term used in their design basis accident analyses with an alternative source term. 10 CFR 50.67 requires a licensee seeking to use an AST to apply for a license amendment and requires that the application contain an evaluation of the consequences of affected DBAs. Regulatory guidance for the implementation of these ASTs is provided in Regulatory Guide 1.183. TVA has addressed these requirements in proposing to use the AST described in Regulatory Guide 1.183 as the source term used to evaluate the radiological consequences of a LOCA occurring while a Shield Building dome penetration hatch is open. As part of the implementation of the AST, the TEDE acceptance criterion of 10 CFR 50.67(b)(2) replaces the previous whole body and thyroid dose guidelines of 10 CFR 100.11 and 10 CFR Part 50, Appendix A, General Design Criterion 19, for the LOCA occurring while a Shield Building dome penetration hatch is open.

- TVA has evaluated the use of the proposed operator actions using the guidance provided in NRC IN 97-78 and ANSI/ANS-58.8. Based on this evaluation, the implementation of manual actions to close an open Shield Building dome penetration and to configure the EGTS control loops following the opening and closing of a Shield Building dome penetration ensure that the Shield Building boundary is maintained and that the EGTS will respond as designed. Procedures will be revised and training completed to implement these manual actions. These actions are considered safe and meet the applicable regulatory requirements.

4.2 Precedent

The proposed changes to the SQN, Unit 2, TS are modeled after similar use of Shield Building dome penetration hatches in TVA's Watts Bar Nuclear Plant, Unit 1, that were utilized in support of the steam generator replacement performed for that unit in fall 2006. Correspondence associated with the Watts Bar Nuclear Plant, Unit 1, License Amendment Request submittal, responses to NRC Requests for Additional Information (RAIs), and NRC approval is contained in References 3, 6, 7, and 8.

4.3 Significant Hazards Consideration

The Tennessee Valley Authority (TVA) is submitting a request for a temporary change to the SQN, Unit 2, Technical Specifications (TSs). The proposed amendment would allow a penetration hatch in the Shield Building dome (2-EQH-410-0010 or 2-EQH-410-0011) to be temporarily opened in support of the pre-outage activities for the SQN, Unit 2, steam generator replacement.

TVA has evaluated whether or not a significant hazards consideration is involved with the proposed amendments by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of Amendment," as discussed below:

1. **Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?**

   Response: No.

   The bounding transients and accidents (i.e., loss-of-coolant-accident (LOCA), tornado, and earthquake) that are potentially affected by the assumptions associated with the use of one of the Shield Building dome penetration hatches (2-EQH-410-0010 or 2-EQH-410-0011) have been evaluated/analyzed. Weather and seismic related events are determined by regional conditions. Therefore, the probability of a tornado or earthquake is not affected by the use of one of the Shield Building dome penetration hatches. Failure of the Shield Building or Emergency Gas Treatment System (EGTS) is not an initiator of any of the accidents and transients described in the Updated Final Safety Analysis Report (UFSAR). Therefore, since no initiating event mechanisms are being changed, the use of one of the Shield Building dome penetration hatches will not result in an increase in probability of any previously evaluated accident.

   The use of one of the Shield Building dome penetration hatches affects the integrity of the Shield Building and the ability of the EGTS to maintain the annulus at a negative pressure relative to the outside atmosphere such that the function in mitigating the radiological consequences of an accident is affected. TVA's evaluation documents the radiological consequences of a LOCA assuming the open Shield Building dome penetration hatch is closed within 22.1 minutes and the operating EGTS trains draw down the annulus to -0.25 inches wg to effectively end the direct release of radionuclides to the environment 23.1minutes after accident initiation. TVA's evaluation also documents the mission dose an individual may receive during ingress from the Control Building Habitability area to the Shield Building dome, closure of the steel hatch assembly, and egress from the Shield Building dome. Although the LOCA radiological consequences with the Shield Building dome penetration hatch open for 22.1 minutes (and assumed to be a direct release path for 23.1 minutes) are higher than those described in the UFSAR, the offsite and Control Room doses remain within the limits of 10 CFR 50.67, "Accident source term," when applying the Alternate Source Term (AST) methodology in accordance with Regulatory Guide 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," dated July 2000. The calculated mission doses are also less than the limits of 10 CFR 50.67, "Accident source term," paragraph (b)(2)(iii) when applying the AST methodology in accordance with Regulatory Guide 1.183. Therefore, since the increase in radiological consequences of the previously evaluated LOCA remains bounded by the applicable regulatory limits, the increased consequences are not considered significant.

2. Does the proposed change create the possibility of a new of different kind of accident from any accident previously evaluated?

Response: No.

Loss of Shield Building integrity or EGTS failure is not an initiator of any of the accidents and transients described in the UFSAR. Shield Building integrity as the pressure boundary for the EGTS, and loss of Shield Building integrity due to an open penetration hatch in the Shield Building dome (Hatch 2-EQH-410-0010 or 2-EQH-410-0011) during Modes 1 through 4 potentially renders both trains of EGTS incapable of establishing a post-accident annulus pressure. This condition would require SQN, Unit 2, to enter the Action of TS Limiting Condition for Operation (LCO) 3.6.1.8 (for the condition of one train of EGTS being inoperable) and enter TS LCO 3.0.3 (due to both trains of EGTS being inoperable). TS LCO 3.0.3 requires that the unit be shutdown within specified time periods. Closure of the open Shield Building dome penetration steel hatch assembly restores the integrity of the Shield Building such that both trains of EGTS would be operable as required by TS LCO 3.6.1.8. Failure of the Shield Building dome penetration steel hatch assemblies will not initiate any of the accidents and transients described in the UFSAR. Postulated failures of the Shield Building dome penetration steel hatch assemblies are degradation/damage to the seals or damage to the hatch hinges. Like any other Shield Building failure during Modes 1 through 4 that potentially renders both trains of EGTS inoperable, these postulated Shield Building dome penetration steel hatch assembly failures result in a loss of Shield Building integrity and require that the failed component be repaired or replaced within a specified time period or that plant shutdown be initiated.

Therefore, a failure of a steel hatch assembly during use of the Shield Building dome penetration will not initiate an accident nor create any new failure mechanisms. The changes do not result in any event previously deemed incredible being made credible. The use of Shield Building dome Penetration Hatch 2-EQH-410-0010 or 2-EQH-410-0011 is not expected to result in more adverse conditions in the annulus and is not expected to result in any increase in the challenges to safety systems.

Manual action is required to close an open Shield Building dome penetration hatch and to configure the EGTS control loops following the opening and closing of a Shield Building dome penetration hatch such that the EGTS will respond as designed. NRC Information Notice (IN) 97-78, "Crediting of Operator Actions in Place of Automatic Actions and Modifications of Operator Actions, Including Response Times," and American National Standards Institute/American Nuclear Society (ANSI/ANS)-58.8, "Time Response Design Criteria for Safety-Related Operator Actions," provide guidance for consideration of safety-related operator actions.

The manual actions implemented as a result of this change can be completed within the guidance and criteria provided in Information Notice (IN) 97-78 and ANSI/ANS-58.8. Consequently, the manual actions can be credited in the mitigation of events that require Shield Building integrity. With credit for the manual actions to close an open Shield Building dome penetration hatch

(2-EQH-410-0010 or 2-EQH-410-0011) and reconfigure the EGTS control loops subsequent to an event, the types of accidents currently evaluated in the UFSAR remain the same.

Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

3. **Does the proposed change involve a significant reduction in a margin of safety?**

Response: No.

The manual actions to close an open Shield Building dome penetration hatch (2-EQH-410-0010 or 2-EQH-410-0011) and to configure the EGTS control loops following the opening and closing of a Shield Building dome penetration hatch ensure that the EGTS will respond as designed. Safety-related instrumentation is available to inform operators that a reactor trip has occurred, and dedicated trained individuals will be positioned to close an open Shield Building dome penetration hatch should an accident occur. The manual actions meet the criteria for safety-related operator actions contained in NRC IN 97-78 and ANSI/ANS-58.8. The use of manual actions maintains the margin of safety by assuring compliance with acceptance limits reviewed and approved by the NRC. The appropriate acceptance criteria for the various analyses and evaluations have been met; therefore, there has not been a reduction in any margin of safety.

Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, TVA concludes that the proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

4.4 Conclusions

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

5.0 ENVIRONMENTAL CONSIDERATION

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment needs to be prepared in connection with the proposed amendment.

6.0 REFERENCES

1. Regulatory Guide 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Plants," dated July 2000

2. Regulatory Guide 1.4, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss of Coolant Accident for Pressurized Water Reactors," Revision 2, dated June 1974

3. Letter from TVA to NRC, Watts Bar Nuclear Plant (WBN), Unit 1, "Proposed Temporary License Amendment Request Change No. WBN-TS-04-17 – Revise Sections 3.6.4 and 3.6.15 to Allow Use of Penetrations in Shield Building Dome during Modes 1-4 for Preparation of Steam Generator Replacement Project (SGRP)," dated April 4, 2005

4. NRC Information Notice 97-78, "Crediting of Operator Actions in Place of Automatic Actions and Modifications of Operator Actions, Including Response Times," dated October 23, 1997

5. ANSI/ANS-58.8, "Time Response Design Criteria for Safety-Related Operator Actions," dated 1994

6. Letter from TVA to NRC, Watts Bar Nuclear Plant (WBN), Unit 1, "Request for Additional Information Regarding the Temporary Use of Penetrations in the Shield Building Dome during Modes 1-4 (TAC No. MC6269)," dated September 30, 2005

7. Letter from TVA to NRC, Watts Bar Nuclear Plant (WBN), Unit 1, "Request for Additional Information Regarding the Temporary Use of Penetrations in the Shield Building Dome during Modes 1-4 (TAC No. MC6269)," dated November 8, 2005

8. Letter from NRC to TVA, "Watts Bar Nuclear Plant, Unit 1 – Issuance of Amendment Regarding Temporary Use of Penetrations in Shield Building Dome during Modes 1-4 (TAC No. MC6569)," dated January 6, 2006

ATTACHMENT 1

Proposed TS Changes (Mark-Ups)

RATED THERMAL POWER (RTP)

1.27 RATED THERMAL POWER (RTP) shall be a total reactor core heat transfer rate to the reactor coolant of 3455 MWt.

REACTOR TRIP SYSTEM (RTS) RESPONSE TIME

1.28 The REACTOR TRIP SYSTEM RESPONSE TIME shall be the time interval from when the monitored parameter exceeds its (RTS) trip setpoint at the channel sensor until loss of stationary gripper coil voltage. The response time may be measured by means of any series of sequential, overlapping, or total steps so that the entire response time is measured. In lieu of measurement, response time may be verified for selected components provided that the components and the methodology for verification have been previously reviewed and approved by NRC.

REPORTABLE EVENT

1.29 DELETED

SHIELD BUILDING INTEGRITY

1.30 SHIELD BUILDING INTEGRITY shall exist when:

a. The door in each access opening is closed except when the access opening is being used for normal transit entry and exit.

b. The emergency gas treatment system is OPERABLE.

in accordance with LCO 3.6.1.8

c. The sealing mechanism associated with each penetration (e.g., welds, bellows or O-rings) is OPERABLE.

d. During Unit 2 Cycle 18, Penetration Hatch 2-EQH-410-0010 or 2-EQH-410-0011 may be open in MODE 1, 2, 3, or 4. The combined opening time of 2-EQH-410-0010 and 2-EQH-410-0011 shall be limited to 5 hours per day, 6 days per calendar week. Only one penetration hatch shall be open at any one time.

SHUTDOWN MARGIN

1.31 SHUTDOWN MARGIN shall be the instantaneous amount of reactivity by which the reactor is subcritical or would be subcritical from its present condition assuming all full length rod cluster assemblies (shutdown and control) are fully inserted except for the single rod cluster assembly of highest reactivity worth which is assumed to be fully withdrawn.

SITE BOUNDARY

1.32 The SITE BOUNDARY shall be that line beyond which the land is not owned, leased, or otherwise controlled by the licensee.

CONTAINMENT SYSTEMS

INTERNAL PRESSURE

LIMITING CONDITION FOR OPERATION

3.6.1.4 Primary containment internal pressure shall be maintained between -0.1 and 0.3 psig relative to the annulus pressure., except when Penetration Hatch 2-EQH-410-0010 or 2-EQH-410-0011 in the Unit 2 Shield Building dome is being opened or closed during Unit 2 Cycle 18 until annulus pressure is restored.*

APPLICABILITY: MODES 1, 2. 3 and 4.

ACTION:

With the containment internal pressure outside of the above limits, restore the internal pressure to within the limits within 1 hour or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.6.1.4 The primary containment internal pressure shall be determined to within the specified limits at least once per 12 hours.

*The combined opening time of Penetration Hatch 2-EQH-410-0010 and 2-EQH-410-0011 shall be limited to 5 hours per day, 6 days per calendar week in MODE 1, 2, 3, or 4 during Unit 2 Cycle 18. Only one penetration hatch shall be open at any one time.

CONTAINMENT SYSTEMS

EMERGENCY GAS TREATMENT SYSTEM - EGTS - CLEANUP SUBSYSTEM

LIMITING CONDITION FOR OPERATION

3.6.1.8 Two independent emergency gas treatment system cleanup subsystems (EGTS) shall be OPERABLE.*

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION: **

With one EGTS cleanup subsystem inoperable, restore the inoperable subsystem to OPERABLE status within 7 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.6.1.8 Each EGTS cleanup subsystem shall be demonstrated OPERABLE:

a. At least once per 31 days on a STAGGERED TEST BASIS by initiating, from the control room, flow through the HEPA filters and charcoal adsorbers and verifying that the system operates for at least 10 hours with the heaters on.

b. At least once per 18 months or (1) after any structural maintenance on the HEPA filter or charcoal adsorber housings, or (2) following painting, fire or chemical release in any ventilation zone communicating with the system by:

1. Verifying that the cleanup system satisfies the in-place testing acceptance criteria and uses the test procedures of Regulatory Position C.5.a., C.5.c and C.5.d of Regulatory Guide 1.52, Revision 2, March 1978 (except for the provisions of ANSI N510 Sections 8 and 9), and the system flow rate is 4000 cfm ± 10%.

2. Verifying within 31 days after removal that a laboratory analysis of a representative carbon sample obtained in accordance with Regulatory Position C.6.b of Regulatory Guide 1.52, Revision 2, March 1978, shows the methyl iodide penetration less than 2.5% when tested in accordance with ASTM D3803-1989 at a temperature of 30°C (86° F) and a relative humidity of 70%.

3. Verifying a system flow rate of 4000 cfm ± 10% during system operation when tested in accordance with ANSI N510-1975.

*The ability to maintain annulus negative pressure equal to or more negative than -5 inches water gauge is not required when Penetration Hatch 2-EQH-410-0010 or 2-EQH-410-0011 is open during Unit 2 Cycle 18. The combined opening time of Penetration Hatch 2-EQH-410-0010 and 2-EQH-410-0011 shall be limited to 5 hours per day, 6 days per calendar week in MODE 1, 2, 3, or 4 during Unit 2 Cycle 18. Only one penetration hatch shall be open at any one time. Upon opening Penetration Hatch 2-EQH-410-0010 or 2-EQH-410-0011, both EGTS control loops shall be placed in the A-Auto Stand-by position and returned to normal position following closure of the penetration hatch.

**Penetration Hatch 2-EQH-410-0010 or 2-EQH-410-0011 shall not be opened during Unit 2 Cycle 18 if this Action has been entered. If either penetration hatch is open when this Action is entered, immediately take action to close the penetration hatch.

3/4.8 ELECTRICAL POWER SYSTEMS

3/4.8.1 A.C. SOURCES

OPERATING

LIMITING CONDITION FOR OPERATION

3.8.1.1 As a minimum, the following A.C. electrical power sources shall be OPERABLE:

a. Two physically independent circuits between the offsite transmission network and the onsite Class 1E distribution system, and

b. Four separate and independent diesel generator sets each with:
   1. Two diesels driving a common generator
   2. Two engine-mounted fuel tanks containing a minimum volume of 250 gallons of fuel, per tank
   3. A separate fuel storage system containing a minimum volume of 62,000 gallons of fuel,
   4. A separate fuel transfer pump, and
   5. A separate 125-volt D.C. distribution panel, 125-volt D.C. battery bank and associated charger.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

a. With one offsite A.C. circuit of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining offsite A.C. circuit by performing Surveillance Requirement 4.8.1.1.1.a within one hour and at least once per 8 hours thereafter. Restore at least two offsite circuits to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b.# With diesel generator set(s) 1A-A and/or 2A-A or 1B-B and/or 2B-B of the above required A.C. electrical power sources inoperable,* demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirement 4.8.1.1.1.a within one hour and at least once per 8 hours thereafter, and determining OPERABLE diesel generator sets are not inoperable due to common cause failure or performing Surveillance Requirement 4.8.1.1.2.a.4 within 24 hours; restore at least four diesel generator sets to OPERABLE status within 7 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

+ Penetration Hatch 2-EQH-410-0010 or 2-EQH-410-0011 shall not be opened during Unit 2 Cycle 18 if Action b has been entered. If either penetration hatch is open when Action b is entered, immediately take action to close the penetration hatch.

Required actions, to verify OPERABLE diesel generator sets are not inoperable due to common cause failure or perform SR 4.8.1.1.2.a.4, shall be completed if this action is entered.

* No more than one diesel generator may be made simultaneously inoperable on a pre-planned basis for maintenance, modifications, or surveillance testing.

ATTACHMENT 2

Proposed TS Bases Changes (Mark-Ups)

3/4.6.1.3 CONTAINMENT AIR LOCKS

The limitations on closure and leak rate for the containment air locks are required to meet the restrictions on CONTAINMENT INTEGRITY and containment leak rate. Surveillance testing of the air lock seals provide assurance that the overall air lock leakage will not become excessive due to seal damage during the intervals between air lock leakage tests.

3/4.6.1.4 INTERNAL PRESSURE

The limitations on containment internal pressure ensure that 1) the containment structure is prevented from exceeding its design negative pressure differential with respect to the annulus atmosphere of 0.5 psig and 2) the containment peak pressure does not exceed the maximum allowable internal pressure of 12 psig during LOCA conditions.

INSERT A

3/4.6.1.5 AIR TEMPERATURE

The limitations on containment average air temperature ensure that 1) the containment air mass is limited to an initial mass sufficiently low to prevent exceeding the maximum allowable internal pressure during LOCA conditions and 2) the ambient air temperature does not exceed that temperature allowable for the continuous duty rating specified for equipment and instrumentation located within containment.

The containment pressure transient is sensitive to the initially contained air mass during a LOCA. The contained air mass increases with decreasing temperature. The lower temperature limits of 100°F for the lower compartment, 85°F for the upper compartment, and 60°F when less than or equal to 5% of RATED THERMAL POWER will limit the peak pressure to an acceptable value. The upper temperature limit influences the peak accident temperature slightly during a LOCA; however, this limit is based primarily upon equipment protection and anticipated operating conditions. Both the upper and lower temperature limits are consistent with the parameters used in the accident analyses.

3/4.6.1.6 CONTAINMENT VESSEL STRUCTURAL INTEGRITY

This limitation ensures that the structural integrity of the containment steel vessel will be maintained comparable to the original design standards for the life of the facility. Structural integrity is required to ensure that the vessel will withstand the maximum pressure of 12 psig in the event of a LOCA. Periodic visual inspections in accordance with the Containment Leakage Rate Test Program are sufficient to demonstrate this capability.

3/4.6.1.7 SHIELD BUILDING STRUCTURAL INTEGRITY

This limitation ensures that the structural integrity of the containment shield building will be maintained comparable to the original design standards for the life of the facility. Structural integrity is required to provide 1) protection for the steel vessel from external missiles, 2) radiation shielding in the event of a LOCA, and 3) an annulus surrounding the steel vessel that can be maintained at a negative pressure during accident conditions.

INSERT B

INSERT A (TS Bases 3/4.6.1.4, page B 3/4 6-2)

When Penetration Hatch 2-EQH-410-0010 or 2-EQH-410-0011 in the Unit 2 Shield Building dome is being opened or closed, the differential pressure between the Containment and the annulus may exceed the requirements of the LCO until annulus pressure is restored. The combined opening time of the penetration hatches shall be limited to five hours per day, six days per calendar week during Unit 2 Cycle 18.

INSERT B (TS Bases 3/4.6.1.7, page B 3/4 6-2)

Refer to TS Bases 3/4.6.1.8, Emergency Gas Treatment System (EGTS), for further information on operation of the EGTS during the use of Shield Building dome Penetration Hatches 2-EQH-410-0010 or 2-EQH-410-0011 during Unit 2 Cycle 18.

3/4.6.1.8 EMERGENCY GAS TREATMENT SYSTEM (EGTS)

The OPERABILITY of the EGTS cleanup subsystem ensures that during LOCA conditions, containment vessel leakage into the annulus will be filtered through the HEPA filters and charcoal adsorber trains prior to discharge to the atmosphere. This requirement is necessary to meet the assumptions used in the accident analyses and limit the site boundary radiation doses to within the limits of 10 CFR 100 during LOCA conditions. Cumulative operation of the system with the heaters on for 10 hours over a 31 day period is sufficient to reduce the buildup of moisture on the absorbers and HEPA filters. ANSI N510-1975 will be used as a procedural guide for surveillance testing.

INSERT C

3/4.6.1.9 CONTAINMENT VENTILATION SYSTEM

This specification has been relocated

3/4.6.2 DEPRESSURIZATION AND COOLING SYSTEMS

3/4.6.2.1 CONTAINMENT SPRAY SUBSYSTEMS

The OPERABILITY of the containment spray subsystems ensures that containment depressurization and cooling capability will be available in the event of a LOCA. The pressure reduction and resultant lower containment leakage rate are consistent with the assumptions used in the accident analyses.

Manual actions are required to align the containment spray system for sump recirculation. In Mode 4 when RHR shutdown cooling is in service, these manual actions may include local actions to cool the RHR suction piping (portions of which is shared by Containment Spray) to ensure adequate NPSH.

3/4.6.2.2 CONTAINMENT COOLING FANS

The OPERABILITY of the lower containment vent coolers ensures that adequate heat removal capacity is available to provide long-term cooling following a non-LOCA event. Postaccident use of these coolers ensures containment temperatures remain within environmental qualification limits for all safety-related equipment required to remain functional.

INSERT C (TS Bases 3/4.6.1.8, page B 3/4 6-3)

LCO 3.6.1.8 is modified by a * footnote which indicates the ability to maintain the annulus pressure during EGTS operation equal to or more negative than -0.5 inches water gauge (wg) is not required while Penetration Hatch 2-EQH-410-0010 or 2-EQH-410-0011 in the Unit 2 Shield Building dome is open during Unit 2 Cycle 18. Additionally, the time allowed for opening either of the penetration hatches is limited to a combined total of five hours per day, six days per calendar week during Unit 2 Cycle 18. Only one of the penetration hatches is permitted to be open at any one time. The acceptability of allowing one of the Unit 2 Shield Building dome penetration hatches to be open is based on provisions of administrative controls that require pre-positioning two dedicated trained individuals in the Control Room Habitability area to close the penetration hatch within 22.1 minutes should an event occur.

During normal plant operation, the Annulus is maintained at a negative pressure equal to or more negative than -5 inches wg by the Annulus Vacuum Control subsystem (non-safety related) of the EGTS. One train (loop) of EGTS is normally operating with the controls in A-Auto and one train is in A-Auto Stand-by. Opening one of the Shield Building dome Penetration Hatches, SQN-2-EQH-410-0010 or SQN-2-EQH-410-0011, during Mode 1, 2, 3, or 4, will result in the Annulus pressure becoming more positive than the -5 inches wg normally maintained by the Annulus Vacuum Control subsystem. When the Annulus pressure becomes more positive than -0.2 inches wg, along with a Phase A Containment Isolation actuation signal, the EGTS control system perceives that the loop in A-Auto (i.e., the operating train) has failed. This initiates a swapover signal to the control valves. Control of Annulus pressure is then transferred to the loop in A-Auto Stand-by (i.e., the train in standby). Since the loop originally controlling Annulus pressure is perceived to have failed, only one control loop (the controller originally in A-Auto Stand-by) remains functional. If a single failure of the remaining control loop were to occur, this would result in both control loops failing and would render the safety-related portion of EGTS inoperable. To prevent this situation, Operator action will need to be taken to place both EGTS control loops in the A-Auto Stand-by position when the Annulus differential pressure is more positive than -5.0 inches wg. If EGTS is subsequently initiated in this configuration, both trains of EGTS control loops will be placed into service. One EGTS control loop train will be manually placed in Closed position when the Annulus pressure becomes more negative than -0.2 inches wg. Should a single failure of the loop that is in A-Auto Stand-by occur, then the loop that was previously placed in Closed would be taken to A-Auto Stand-by and the failed train to Closed. A-Auto position will not function once the swapover circuit has actuated.

The ** footnote for the Action of LCO 3.6.1.8 restricts opening of the Penetration Hatch 2-EQ-410-0010 or 2-EQ-410-0011 if the Action has been entered. If the Action is entered when a penetration hatch is open, then actions must be immediately taken to close the open penetration hatch.

3/4.8.1 AND 3/4.8.2 A.C. SOURCES AND ONSITE POWER DISTRIBUTION SYSTEMS

The OPERABILITY of the A.C. and D.C power sources and associated distribution systems during operation ensures that sufficient power will be available to supply the safety related equipment required for 1) the safe shutdown of the facility and 2) the mitigation and control of accident conditions within the facility. The minimum specified independent and redundant A.C. and D.C. power sources and distribution systems satisfy the requirements of General Design Criterion I7 of Appendix "A" to 10 CFR 50.

The ACTION requirements specified for the levels of degradation of the power sources provide restriction upon continued facility operation commensurate with the level of degradation. The OPERABILITY of the power sources are consistent with the initial condition assumptions of the safety analyses and are based upon maintaining at least one redundant set of onsite A.C. and D.C. power sources and associated distribution systems OPERABLE during accident conditions coincident with an assumed loss of offsite power and single failure of the other onsite A.C. source.

#

The footnote for Action b of LCO 3.8.1.1 requires completion of a determination that the OPERABLE diesel generators are not inoperable due to common cause failure or performance of Surveillance 4.8.1.1.2.a.4 if Action b is entered. The intent is that all diesel generator inoperabilities must be investigated for common cause failures regardless of how long the diesel generator inoperability persists.

INSERT D

Action b of LCO 3.8.1.1 is further modified by a second note which precludes making more than one diesel generator inoperable on a pre-planned basis for maintenance, modifications, or surveillance testing. The intent of this footnote is to explicitly exclude the flexibility of removing a diesel generator set from service as a part of a pre-planned activity. While the removal of a diesel generator set (A or B train) is consistent with the initial condition assumptions of the accident analysis, this configuration is judged as imprudent. The term pre-planned is to be taken in the context of those activities which are routinely scheduled and is not relative to conditions which arise as a result of emergent or unforeseen events. As an example, this footnote is not intended to preclude the actions necessary to perform the common mode testing requirements required by Action b. As another example, this footnote is not intended to prevent the required surveillance testing of the diesel generators should one diesel generator maintenance be unexpectedly extended and a second diesel generator fall within its required testing frequency. Thus, application of the note is intended for pre-planned activities.

In addition, this footnote is intended to apply only to those actions taken directly on the diesel generator. For those actions taken relative to common support systems (e.g. ERCW), the support function must be evaluated for impact on the diesel generator.

The action to determine that the OPERABLE diesel generators are not inoperable due to common cause failures provides an allowance to avoid unnecessary testing of OPERABLE diesel generators. If it can be determined that the cause of the inoperable diesel generator does not exist on the OPERABLE diesel generators, Surveillance Requirement 4.8.1.1.2.a.4 does not have to be performed. If the cause of inoperability exists on other diesel generator(s), the other diesel generator(s) would be declared inoperable upon discovery and Action e of LCO 3.8.1.1 would be entered as applicable. Once the common failure is repaired, the common cause no longer exists, and the action to determine inoperability due to common cause failure is satisfied. If the cause of the initial inoperable diesel generator cannot be confirmed not to exist on the remaining diesel generators, performance of Surveillance 4.8.1.1.2.a.4 suffices to provide assurance of continued OPERABILITY of the other diesel generators.

INSERT D (TS Bases 3/4.8.1.1, page B3/4 8-1)

The + footnote for Action b of LCO 3.8.1.1 restricts opening of the Penetration Hatch 2-EQ-410-0010 or 2-EQ-410-0011 if Action b of TS 3.8.1.1 has been entered. If Action b is entered when a penetration hatch is open, then actions must be immediately taken to close the open penetration hatch.

ATTACHMENT 3

Proposed TS Changes (Final Typed)

RATED THERMAL POWER (RTP)

1.27 RATED THERMAL POWER (RTP) shall be a total reactor core heat transfer rate to the reactor coolant of 3455 MWt.

REACTOR TRIP SYSTEM (RTS) RESPONSE TIME

1.28 The REACTOR TRIP SYSTEM RESPONSE TIME shall be the time interval from when the monitored parameter exceeds its (RTS) trip setpoint at the channel sensor until loss of stationary gripper coil voltage. The response time may be measured by means of any series of sequential, overlapping, or total steps so that the entire response time is measured. In lieu of measurement, response time may be verified for selected components provided that the components and the methodology for verification have been previously reviewed and approved by NRC.

REPORTABLE EVENT

1.29 DELETED

SHIELD BUILDING INTEGRITY

1.30 SHIELD BUILDING INTEGRITY shall exist when:

a. The door in each access opening is closed except when the access opening is being used for normal transit entry and exit.

b. The emergency gas treatment system is OPERABLE in accordance with LCO 3.6.1.8.

c. The sealing mechanism associated with each penetration (e.g., welds, bellows or O-rings) is OPERABLE.

d. During Unit 2 Cycle 18, Penetration Hatch 2-EQH-410-0010 or 2-EQH-410-0011 may be open in MODE 1, 2, 3, or 4. The combined opening time of 2-EQH-410-0010 and 2-EQH-410-0011 shall be limited to 5 hours per day, 6 days per calendar week. Only one penetration hatch shall be open at any one time.

SHUTDOWN MARGIN

1.31 SHUTDOWN MARGIN shall be the instantaneous amount of reactivity by which the reactor is subcritical or would be subcritical from its present condition assuming all full length rod cluster assemblies (shutdown and control) are fully inserted except for the single rod cluster assembly of highest reactivity worth which is assumed to be fully withdrawn.

SITE BOUNDARY

1.32 The SITE BOUNDARY shall be that line beyond which the land is not owned, leased, or otherwise controlled by the licensee.

INTERNAL PRESSURE

LIMITING CONDITION FOR OPERATION

3.6.1.4 Primary containment internal pressure shall be maintained between -0.1 and 0.3 psig relative to the annulus pressure, except when Penetration Hatch 2-EQH-410-0010 or 2 EQH-410-0011 in the Unit 2 Shield Building dome is being opened or closed during Unit 2 Cycle 18 until annulus pressure is restored.*

APPLICABILITY: MODES 1, 2. 3 and 4.

ACTION:

With the containment internal pressure outside of the above limits, restore the internal pressure to within the limits within 1 hour or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.6.1.4 The primary containment internal pressure shall be determined to within the specified limits at least once per 12 hours.

* The combined opening time of Penetration Hatch 2-EQH-410-0010 and 2-EQH-410-0011 shall be limited to 5 hours per day, 6 days per calendar week in MODE 1, 2, 3, or 4 during Unit 2 Cycle 18. Only one penetration hatch shall be open at any one time.

CONTAINMENT SYSTEMS

EMERGENCY GAS TREATMENT SYSTEM - EGTS - CLEANUP SUBSYSTEM

LIMITING CONDITION FOR OPERATION

3.6.1.8 Two independent emergency gas treatment system cleanup subsystems (EGTS) shall be OPERABLE*.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:**

With one EGTS cleanup subsystem inoperable, restore the inoperable subsystem to OPERABLE status within 7 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.6.1.8 Each EGTS cleanup subsystem shall be demonstrated OPERABLE:

a. At least once per 31 days on a STAGGERED TEST BASIS by initiating, from the control room, flow through the HEPA filters and charcoal adsorbers and verifying that the system operates for at least 10 hours with the heaters on.

b. At least once per 18 months or (1) after any structural maintenance on the HEPA filter or charcoal adsorber housings, or (2) following painting, fire or chemical release in any ventilation zone communicating with the system by:

   1. Verifying that the cleanup system satisfies the in-place testing acceptance criteria and uses the test procedures of Regulatory Position C.5.a., C.5.c and C.5.d of Regulatory Guide 1.52, Revision 2, March 1978 (except for the provisions of ANSI N510 Sections 8 and 9), and the system flow rate is 4000 cfm ± 10%.

   2. Verifying within 31 days after removal that a laboratory analysis of a representative carbon sample obtained in accordance with Regulatory Position C.6.b of Regulatory Guide 1.52, Revision 2, March 1978, shows the methyl iodide penetration less than 2.5% when tested in accordance with ASTM D3803-1989 at a temperature of 30°C (86° F) and a relative humidity of 70%.

   3. Verifying a system flow rate of 4000 cfm ± 10% during system operation when tested in accordance with ANSI N510-1975.

* The ability to maintain annulus negative pressure equal to or more negative than -5 inches water gauge is not required when Penetration Hatch 2-EQH-410-0010 or 2-EQH-410-0011 is open during Unit 2 Cycle18. The combined opening time of Penetration Hatch 2-EQH-410-0010 or 2-EQH-410-0011 shall be limited to 5 hours per day, 6 days per calendar week in MODE 1, 2, 3, or 4 during Unit 2 Cycle 18. Only one penetration hatch shall be open at any one time. Upon opening Penetration Hatch 2-EQH-410-0010 or 2-EQH-410-0011, both EGTS control loops shall be placed in A-Auto Stand-by position and returned to normal position following closure of the penetration hatch.

** Penetration Hatch 2-EQH-410-0010 or 2-EQH-410-0011 shall not be opened during Unit 2 Cycle 18 if this Action has been entered. If either penetration hatch is open when this Action is entered, immediately take action to close the penetration hatch.

3/4.8 ELECTRICAL POWER SYSTEMS

3/4.8.1 A.C. SOURCES

OPERATING

LIMITING CONDITION FOR OPERATION

3.8.1.1 As a minimum, the following A.C. electrical power sources shall be OPERABLE:

a. Two physically independent circuits between the offsite transmission network and the onsite Class 1E distribution system, and

b. Four separate and independent diesel generator sets each with:
   1. Two diesels driving a common generator
   2. Two engine-mounted fuel tanks containing a minimum volume of 250 gallons of fuel, per tank
   3. A separate fuel storage system containing a minimum volume of 62,000 gallons of fuel,
   4. A separate fuel transfer pump, and
   5. A separate 125-volt D.C. distribution panel, 125-volt D.C. battery bank and associated charger.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

a. With one offsite A.C. circuit of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining offsite A.C. circuit by performing Surveillance Requirement 4.8.1.1.1.a within one hour and at least once per 8 hours thereafter. Restore at least two offsite circuits to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b.# + With diesel generator set(s) 1A-A and/or 2A-A or 1B-B and/or 2B-B of the above required A.C. electrical power sources inoperable,* demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirement 4.8.1.1.1.a within one hour and at least once per 8 hours thereafter, and determining OPERABLE diesel generator sets are not inoperable due to common cause failure or performing Surveillance Requirement 4.8.1.1.2.a.4 within 24 hours; restore at least four diesel generator sets to OPERABLE status within 7 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

Required actions, to verify OPERABLE diesel generator sets are not inoperable due to common cause failure or perform SR 4.8.1.1.2.a.4, shall be completed if this action is entered.

* No more than one diesel generator may be made simultaneously inoperable on a pre-planned basis for maintenance, modifications, or surveillance testing.

+ Penetration Hatch 2-EQH-410-0010 or 2-EQH-410-0011 shall not be opened during Unit 2 Cycle 18 if Action b has been entered. If either penetration hatch is open when Action b is entered, immediately take action to close the penetration hatch.

ATTACHMENT 4

Proposed TS Bases Changes (Final Typed)

3/4.6.1.3 CONTAINMENT AIR LOCKS

The limitations on closure and leak rate for the containment air locks are required to meet the restrictions on CONTAINMENT INTEGRITY and containment leak rate. Surveillance testing of the air lock seals provide assurance that the overall air lock leakage will not become excessive due to seal damage during the intervals between air lock leakage tests.

3/4.6.1.4 INTERNAL PRESSURE

The limitations on containment internal pressure ensure that 1) the containment structure is prevented from exceeding its design negative pressure differential with respect to the annulus atmosphere of 0.5 psig and 2) the containment peak pressure does not exceed the maximum allowable internal pressure of 12 psig during LOCA conditions.

When Penetration Hatch 2-EQH-410-0010 or 2-EQH-410-0011 in the Unit 2 Shield Building dome is being opened or closed, the differential pressure between the Containment and the annulus may exceed the requirements of the LCO until annulus pressure is restored. The combined opening time of the penetration hatches shall be limited to five hours per day, six days per calendar week during Unit 2 Cycle 18.

3/4.6.1.5 AIR TEMPERATURE

The limitations on containment average air temperature ensure that 1) the containment air mass is limited to an initial mass sufficiently low to prevent exceeding the maximum allowable internal pressure during LOCA conditions and 2) the ambient air temperature does not exceed that temperature allowable for the continuous duty rating specified for equipment and instrumentation located within containment.

The containment pressure transient is sensitive to the initially contained air mass during a LOCA. The contained air mass increases with decreasing temperature. The lower temperature limits of 100°F for the lower compartment, 85°F for the upper compartment, and 60°F when less than or equal to 5% of RATED THERMAL POWER will limit the peak pressure to an acceptable value. The upper temperature limit influences the peak accident temperature slightly during a LOCA; however, this limit is based primarily upon equipment protection and anticipated operating conditions. Both the upper and lower temperature limits are consistent with the parameters used in the accident analyses.

3/4.6.1.6 CONTAINMENT VESSEL STRUCTURAL INTEGRITY

This limitation ensures that the structural integrity of the containment steel vessel will be maintained comparable to the original design standards for the life of the facility. Structural integrity is required to ensure that the vessel will withstand the maximum pressure of 12 psig in the event of a LOCA. Periodic visual inspections in accordance with the Containment Leakage Rate Test Program are sufficient to demonstrate this capability.

3/4.6.1.7 SHIELD BUILDING STRUCTURAL INTEGRITY

This limitation ensures that the structural integrity of the containment shield building will be maintained comparable to the original design standards for the life of the facility. Structural integrity is required to provide 1) protection for the steel vessel from external missiles, 2) radiation shielding in the event of a LOCA, and 3) an annulus surrounding the steel vessel that can be maintained at a negative pressure during accident conditions.

Refer to TS Bases 3/4.6.1.8, Emergency Gas Treatment System (EGTS), for further information on operation of the EGTS during the use of Shield Building dome Penetration Hatches 2-EQH-410-0010 or 2-EQH-410-0011 during Unit 2 Cycle 18.

3/4.6.1.8 EMERGENCY GAS TREATMENT SYSTEM (EGTS)

The OPERABILITY of the EGTS cleanup subsystem ensures that during LOCA conditions, containment vessel leakage into the annulus will be filtered through the HEPA filters and charcoal adsorber trains prior to discharge to the atmosphere. This requirement is necessary to meet the assumptions used in the accident analyses and limit the site boundary radiation doses to within the limits of 10 CFR 100 during LOCA conditions. Cumulative operation of the system with the heaters on for 10 hours over a 31 day period is sufficient to reduce the buildup of moisture on the absorbers and HEPA filters. ANSI N510-1975 will be used as a procedural guide for surveillance testing.

LCO 3.6.1.8 is modified by a * footnote which indicates the ability to maintain the annulus pressure during EGTS operation equal to or more negative than -0.5 inches water gauge (wg) is not required while Penetration Hatch 2-EQH-410-0010 or 2-EQH-410-0011 in the Unit 2 Shield Building dome is open during Unit 2 Cycle 18. Additionally, the time allowed for opening either of the penetration hatches is limited to a combined total of five hours per day, six days per calendar week during Unit 2 Cycle 18. Only one of the penetration hatches is permitted to be open at any one time. The acceptability of allowing one of the Unit 2 Shield Building dome penetration hatches to be open is based on provisions of administrative controls that require pre-positioning two dedicated trained individuals in the Control Room Habitability area to close the penetration hatch within 22.1 minutes should an event occur.

During normal plant operation, the Annulus is maintained at a negative pressure equal to or more negative than -5 inches wg by the Annulus Vacuum Control subsystem (non-safety related) of the EGTS. One train (loop) of EGTS is normally operating with the controls in A-Auto and one train is in A-Auto Stand-by. Opening one of the Shield Building dome Penetration Hatches, SQN-2-EQH-410-0010 or SQN-2-EQH-410-0011, during Mode 1, 2, 3, or 4, will result in the Annulus pressure becoming more positive than the -5 inches wg normally maintained by the Annulus Vacuum Control subsystem. When the Annulus pressure becomes more positive than -0.2 inches wg, along with a Phase A Containment Isolation actuation signal, the EGTS control system perceives that the loop in A-Auto (i.e., the operating train) has failed. This initiates a swapover signal to the control valves. Control of Annulus pressure is then transferred to the loop in A-Auto Stand-by (i.e., the train in standby). Since the loop originally controlling Annulus pressure is perceived to have failed, only one control loop (the controller originally in A-Auto Stand-by) remains functional. If a single failure of the remaining control loop were to occur, this would result in both control loops failing and would render the safety-related portion of EGTS inoperable. To prevent this situation, Operator action will need to be taken to place both EGTS control loops in the A-Auto Stand-by position when the Annulus differential pressure is more positive than -5.0 inches wg.

EMERGENCY GAS TREATMENT SYSTEM (EGTS) (Continued)

If EGTS is subsequently initiated in this configuration, both trains of EGTS control loops will be placed into service. One EGTS control loop train will be manually placed in Closed position when the Annulus pressure becomes more negative than -0.2 inches wg. Should a single failure of the loop that is in A-Auto Stand-by occur, then the loop that was previously placed in Closed would be taken to A-Auto Stand-by and the failed train to Closed. A-Auto position will not function once the swapover circuit has actuated.

The ** footnote for the Action of LCO 3.6.1.8 restricts opening of the Penetration Hatch 2-EQ-410-0010 or 2-EQ-410-0011 if the Action has been entered. If the Action is entered when a penetration hatch is open, then actions must be immediately taken to close the open penetration hatch.

3/4.6.1.9 CONTAINMENT VENTILATION SYSTEM

This specification has been relocated

3/4.6.2 DEPRESSURIZATION AND COOLING SYSTEMS

3/4.6.2.1 CONTAINMENT SPRAY SUBSYSTEMS

The OPERABILITY of the containment spray subsystems ensures that containment depressurization and cooling capability will be available in the event of a LOCA. The pressure reduction and resultant lower containment leakage rate are consistent with the assumptions used in the accident analyses.

Manual actions are required to align the containment spray system for sump recirculation. In Mode 4 when RHR shutdown cooling is in service, these manual actions may include local actions to cool the RHR suction piping (portions of which is shared by Containment Spray) to ensure adequate NPSH.

3/4.6.2.2 CONTAINMENT COOLING FANS

The OPERABILITY of the lower containment vent coolers ensures that adequate heat removal capacity is available to provide long-term cooling following a non-LOCA event. Postaccident use of these coolers ensures containment temperatures remain within environmental qualification limits for all safety-related equipment required to remain functional.

3/4.8.1 AND 3/4.8.2 A.C. SOURCES AND ONSITE POWER DISTRIBUTION SYSTEMS

The OPERABILITY of the A.C. and D.C power sources and associated distribution systems during operation ensures that sufficient power will be available to supply the safety related equipment required for 1) the safe shutdown of the facility and 2) the mitigation and control of accident conditions within the facility. The minimum specified independent and redundant A.C. and D.C. power sources and distribution systems satisfy the requirements of General Design Criterion I7 of Appendix "A" to 10 CFR 50.

The ACTION requirements specified for the levels of degradation of the power sources provide restriction upon continued facility operation commensurate with the level of degradation. The OPERABILITY of the power sources are consistent with the initial condition assumptions of the safety analyses and are based upon maintaining at least one redundant set of onsite A.C. and D.C. power sources and associated distribution systems OPERABLE during accident conditions coincident with an assumed loss of offsite power and single failure of the other onsite A.C. source.

The # footnote for Action b of LCO 3.8.1.1 requires completion of a determination that the OPERABLE diesel generators are not inoperable due to common cause failure or performance of Surveillance 4.8.1.1.2.a.4 if Action b is entered. The intent is that all diesel generator inoperabilities must be investigated for common cause failures regardless of how long the diesel generator inoperability persists.

The + footnote for Action b of LCO 3.8.1.1 restricts opening of the Penetration Hatch 2-EQ-410-0010 or 2-EQ-410-0011 if Action b of TS 3.8.1.1 has been entered. If Action b is entered when a penetration hatch is open, then actions must be immediately taken to close the open penetration hatch.

Action b of LCO 3.8.1.1 is further modified by a second note which precludes making more than one diesel generator inoperable on a pre-planned basis for maintenance, modifications, or surveillance testing. The intent of this footnote is to explicitly exclude the flexibility of removing a diesel generator set from service as a part of a pre-planned activity. While the removal of a diesel generator set (A or B train) is consistent with the initial condition assumptions of the accident analysis, this configuration is judged as imprudent. The term pre-planned is to be taken in the context of those activities which are routinely scheduled and is not relative to conditions which arise as a result of emergent or unforeseen events. As an example, this footnote is not intended to preclude the actions necessary to perform the common mode testing requirements required by Action b. As another example, this footnote is not intended to prevent the required surveillance testing of the diesel generators should one diesel generator maintenance be unexpectedly extended and a second diesel generator fall within its required testing frequency. Thus, application of the note is intended for pre-planned activities.

In addition, this footnote is intended to apply only to those actions taken directly on the diesel generator. For those actions taken relative to common support systems (e.g. ERCW), the support function must be evaluated for impact on the diesel generator.

The action to determine that the OPERABLE diesel generators are not inoperable due to common cause failures provides an allowance to avoid unnecessary testing of OPERABLE diesel generators. If it can be determined that the cause of the inoperable diesel generator does not exist on the OPERABLE diesel generators, Surveillance Requirement 4.8.1.1.2.a.4 does not have to be performed. If the cause of inoperability exists on other diesel generator(s), the other diesel generator(s) would be declared inoperable upon discovery and Action e of LCO 3.8.1.1 would be entered as applicable. Once the common failure is repaired, the common cause no longer exists, and the action to determine inoperability due to common cause failure is satisfied. If the cause of the initial inoperable diesel generator cannot be confirmed not to exist on the remaining diesel generators, performance of Surveillance 4.8.1.1.2.a.4 suffices to provide assurance of continued OPERABILITY of the other diesel generators.

ATTACHMENT 5

Proposed UFSAR Changes (Mark-Ups)

15.5.3 Environmental Consequences of a Postulated Loss of Coolant Accident

The results of the analysis presented in this section demonstrate that the amounts of radioactivity released to the environment in the event of a Loss-of-Coolant Accident (LOCA) do not result in doses which exceed the guideline values specified in a 10 CFR 100.

An analysis based on Regulatory Guide 1.4, 1973, (Reference 3) was performed. The parameters used for the analysis are listed in Table 15.5.3-1. In addition, an evaluation of the dose to control room operators and an evaluation of the offsite dose resulting from the operation of the Post-Accident Sampling Facility are presented.

INSERT 1

Fission Product Release to the Containment

Following a postulated double-ended rupture of a reactor coolant pipe with subsequent blowdown, the Emergency Core Cooling System keeps cladding temperatures well below melting, and limits zirconium-water reactions to an insignificant level, ensuring that the core remains intact and in place.

As a result of the increase in cladding temperature and rapid depressurization of the core, however, some cladding failure may occur in the hottest regions of the core. Thus, a fraction of the fission products accumulated in the pellet-cladding gap may be released to the Reactor Coolant System and thereby to the primary containment.

In order to conservatively evaluate the radiological consequences of a fission product release, the offsite doses were calculated for a core inventory fission product release case.

Core Activity Release (Regulatory Guide 1.4 Analysis)

The offsite doses resulting from a hypothetical accident such as a large LOCA assuming core activity releases have been analyzed. Activity releases of these magnitudes have a considerably lower probability than those associated with a gap release. For the analysis of this hypothetical case, it is assumed that of the entire core-fission product inventory, 100 percent of the noble gases, 50 percent of the halogens, and 1% of the solids in the fission product inventory are released to the containment. Of the fission product iodine released to the containment, 50 percent is considered to be available for leakage, while the remaining 50 percent is assumed to condense on the various structural surfaces in the containment.

Thus, a total of 100 percent of the noble gas core inventory and 25 percent of the core iodine inventory are assumed to be immediately available for leakage from the primary containment. Of the halogen activity available for release, it is further assumed that 91 percent is in elemental form, 4 percent in methyl form, and 5 percent in particulate form.

The fission product inventories used for the core activity release cases are listed in Table 15.5.3-5. Post LOCA radiation doses at the site boundary and low population zone are provided in Table 15.5.3-4.

INSERT 1 (New Paragraph on UFSAR Page 15.5-4)

In preparation for the replacement of the Unit 2 steam generators, two approximately 18" diameter penetrations are core-drilled into the concrete Shield Building dome during the outage prior to the steam generator replacement (SGR) outage. Each penetration is closed using a lockable steel hatch assembly, and appropriate administrative measures are instituted for controlling the opening and closing of these hatches (Penetration Hatches 2-EQH-410-0010 and 2-EQH-410-0011). Both hatches will be removed during the SGR outage, and their associated penetrations in the Shield Building dome will be restored with concrete. Prior to Unit 2 shutdown to perform the SGR, during Unit 2 Modes 1 through 4, opening of either of these penetration hatches is governed by Technical Specifications. The accident doses for this configuration (Penetration Hatch 2-EQH-410-0010 or 2-EQH-410-0011 open at start of a LOCA) are calculated using the dose model consistent with the use of the alternate source term methodology (Regulatory Guide 1.183), which is described in UFSAR Section 15.5.3.

Where

$\bar{C}_{ij}$ = Average concentration of isotope i during time period j.

Inhalation Dose (Thyroid)

The inhalation dose for a given period of time has the general form:

$$D_I = (X/Q)(B)\left[\sum_{i=1}^{n} (Q_{ij})(DCF_i)\right](t_j - t_{j-1}) \quad (13)$$

Where

D_I = Thyroid inhalation dose, rem

X/Q = Site dispersion factor during time period, sec/m^3

B = Breathing rate during time period, m^3/hr

Q_{ij} = Average activity release rate during time period j of iodine isotope i

DCF_i = Dose conversion factor for iodine isotope i, rem/microcurie inhaled

t_j = Total time at end of period j, hours

For inhalation dose within the control room equation (13) becomes:

$$D_i = (B)\left[\sum_{i=1}^{n} \bar{C}_{ij}(DCF_i)\right](t_j - t_{j-1}) \quad (14)$$

In this expression $\bar{C}_{ij}$, the average concentration of isotope i during time period j, has replaced the following factor:

$(X/Q)\,Q_{ij}$

The C_{ij}'s are those determined by equations (4) and (6).

The assumed breathing rates, B, are shown on Table 15A-1.

← INSERT 2

INSERT 2 (New Paragraph on UFSAR Page 15.5-16)

Environmental Consequences of a LOCA during Use of Shield Building Dome Penetration Hatches 2-EQH-41 0-001 0 or 2-EQH-41 0-0011 During Unit 2 Cycle 18

Single use of either Penetration Hatch 2-EQH-410-0010 or 2-EQH-410-0011 during Unit 2 Cycle 18 is governed by Technical Specifications. The LOCA doses were calculated using dose modeling consistent with the use of the alternate source term methodology (Regulatory Guide 1.183) and are compared to the accident limits of 10 CFR 50.67, "Accident source term," for offsite dose and Control Room dose. The dose analysis assumptions regarding use of Penetration Hatch 2-EQH-410-0010 or 2-EQH-410-0011 during Unit 2 Cycle 18 are:

1. Either Penetration Hatch 2-EQH-410-0010 or 2-EQH-410-0011 is open at LOCA initiation and will not be closed with the annulus depressurized for a 23.1-minute period. This results in an open pathway for radiological release of the expected accident leakage from the Unit 2 containment (1.74 x 10-6 cfm) being released from the Unit 2 annulus directly to the atmosphere (i.e., for modeling purposes this containment accident leakage is assumed to bypass the annulus directly to the atmosphere).

2. The open penetration hatch is closed and the Emergency Gas Treatment System (EGTS) draws down the annulus pressure 23.1 minutes into the LOCA. For this event both trains of EGTS are operating. The EGTS air flow modeling also assumes the failure of a pressure control operator (PCO), the result of which will cause the operating EGTS trains to control the exhaust and recirculation dampers of the filter trains such that the greatest steady state EGTS flow is exhausted to the environment. Two hours from the initiation of the LOCA, operator action is taken to shut down one of the operating trains of EGTS, with the remaining operating train of EGTS being the train that has the PCO failure.

3. A source transport model (STP) is used to determine the radiological releases, which are then used as input into the FENCDOSE computer code to determine the offsite doses and as input into the COROD computer code to determine the Control Room doses. The calculated dose output from this dose modeling takes into account the fact that EGTS recirculation is impaired during the event because of the assumed PCO failure. With EGTS recirculation reduced, the efficiency of reducing radionuclides in the EGTS exhaust itself is reduced, since recirculation of air, mixing of the air volume within the annulus, and plate out are not optimal.

INSERT 2 (Continued)

The resultant doses and comparison to dose limits are presented below.

Offsite Doses (in rem) Utilizing Regulatory Guide 1.183 Assumptions

	2-hr EAB	30-Day LPZ	Limit
Gamma	4.000	1.349	---
Beta	2.452	1.321	---
Thyroid (ICRP-30)	60.88	13.50	---
TEDE	6.710	2.075	25

Control Room Doses (in rem) Utilizing Regulatory Guide 1.183 Assumptions (with EGTS Controller Failure, Operator Action at 2 hours)

	Airborne	Shine	Ingress/Egress	Total	Limit
Gamma	0.7210	0.5591	0.02899	1.309	---
Beta	6.695	0	0.04891	6.744	---
Thyroid (ICRP-30)	3.864	0	0.5678	4.432	---
TEDE	1.026	0.5591	0.06676	1.652	5

ATTACHMENT 6

Additional Information Regarding Dose Calculations

Additional Information Regarding Dose Calculations

For the revised loss-of-coolant accident (LOCA) dose consequence analysis, performed to support this change request, parameters are the same as the design basis case described in SQN Updated Final Safety Analysis Report (UFSAR) Section 15.5, "Environmental Consequences of Accidents," with the exception of release fractions, timing of releases, Emergency Gas Treatment System (EGTS) operation, purge releases, and Emergency Core Cooling System (ECCS) leakage outside of containment. Differences between the revised LOCA dose consequence analysis and the design basis case are as follows.

- The release fraction and timing of releases used in the revised LOCA dose consequence analysis are based on Regulatory Guide 1.183, Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," instead of Regulatory Guide 1.4, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss of Coolant Accident for Pressurized Water Reactors," assumptions.

- The EGTS operation parameters used in the revised LOCA dose consequence analysis that are different than the design basis case are as follows.

  - Direct leakage to the environment from the annulus for the first 23.1 minutes.
  - EGTS recirculation rates versus time.
  - EGTS exhaust rates versus time.

- Purge releases have not been included in the revised LOCA dose consequence analysis since the Annulus is open to the environment, and since purge releases are filtered, it is actually more conservative to not model a filtered purge. Gap releases were assumed to start at t=0 instead of at 30 seconds, which would bound any purge releases as well.

- ECCS leakage outside of containment has been included in the revised LOCA dose consequence analysis.

With respect to control room atmospheric dispersion factors (X/Q values) used in the dose assessment for postulated releases from the openings in the shield building dome to 1) the control room air intakes and 2) as a result of unfiltered inleakage, the following information is provided.

1) The control room atmospheric dispersion factors (X/Q values) used in the dose assessment for postulated releases from the penetrations in the Shield Building dome to the control room air intakes are as follows:

   The design basis control room X/Q values are as follows.

0-2 hours	5.63E-04 sec/m^3
2-8 hours	3.78E-04 sec/m^3
8-24 hours	1.12E-04 sec/m^3
24-96 hours	9.38E-05 sec/m^3
96-720 hours	6.96E-05 sec/m^3

   These values are shown in Sequoyah Nuclear Plant (SQN) UFSAR Table 15.5.3-6, "Atmospheric Dilution Factors at Control Building."

The control room dose analyses with the open penetration in containment used the same X/Q values as the design basis (no opening in containment) case. The reasoning for using the design basis X/Q values is as follows:

> At the beginning of an accident, the EGTS will begin to operate within 30 seconds. Therefore, this exhaust will flow out of the Shield Building vent regardless if a Shield Building dome penetration hatch is open. Realistically, with these flow rates and the relatively small size of the opening (18-inch diameter), it is expected that the direction of flow at the opening will be into the annulus, not out of the annulus. Even if there is some outflow, it will not be nearly the rate of EGTS. However, for conservatism, flow out of the vent is considered unfiltered for the assumed 23.1 minute time period to close the hatch and depressurize the annulus, even though EGTS exhaust is through safety-related filters. By comparison, the containment leakage is 0.25 percent per day which is approximately 2.2 cfm. Therefore, the containment leakage is a very small percentage of the exhaust, meaning that differential pressure created by the EGTS exhaust will be equalized by roughly the same flow rate through the penetration opening from the outside.

Preliminary ARCON96 runs indicated that the worst case X/Q values for releases from the open penetration will be greater than the vent X/Q, however these values are within a factor of 2 of the design basis vent X/Q values.

It was decided that using the open penetration as a release point would be inappropriate as realistic flow patterns would have the vast majority of any releases going out the vent and not the penetration. However, to simulate any releases that do get out, no filtration is assumed while the penetration is open. The higher X/Q values for the releases of the penetration opening (factor of 2) are more than offset by not crediting the EGTS filters for the vent releases.

Other input data used for this calculation is as follows.

Meteorological Data:

Parameter	Units
9.7-meter wind speed	0.1 mi/hr
9.7-meter wind direction	degrees azimuth
Atmospheric stability class (based on 45.6-9.5 meter temperature difference)	P-G stability class (1-7)

Wind speed assigned to calm = 0.5 m/sec (ARCON96 default)
Data Period: January 1, 1976 through December 31, 1993

Release/Receptor Data:

1. Unit 1 Reactor Vent to Emergency Control Room Air Intake (LOCA)

Distance from Reactor Vent to emergency control room air intake = 108.7 meters
Wind direction from Reactor Vent to emergency control room air intake = 74° azimuth
Plant grade elevation = 705.0 ft
Emergency control room air intake elevation = 752.0 ft

Emergency control room air intake elevation above grade = 752.0 ft - 705.0 ft = 47.0 ft (14.33 m)
Reactor Vent elevation = 834.6 ft
Reactor Vent height above grade = 834.6 ft - 705.0 ft = 129.6 ft (39.5 m)
Reactor Building height up to dome base = 839.0 ft -705.0 ft = 134.0 ft
Reactor Building diameter (d) = 131.08 ft
Reactor Building area (up to dome curvature) = 134.0 ft x 131.08 ft = 17,564.7 ft^2 (1,631.8 m^2)
Reactor Building dome area = $\pi r^2 (\theta/360) - [r^2 \sin(\theta)]/2$; where
$\theta = 2\cos^{-1}(d/r)$, and
d =distance from the origin of the dome sphere to the top of the dome base
Elevation of the origin of the dome sphere = 767.01 ft
Distance (d) from the origin of the dome sphere to the top of the dome base = 839.0 ft - 767.01 ft = 71.99 ft
Reactor Building dome radius (r) = 89.03 ft
$\theta = 2\cos^{-1}(71.99 \text{ ft}/89.03 \text{ ft})$ =72.08 degrees
Reactor Building dome area = $\pi(89.03 \text{ ft})^2 (72.08/360) - [(89.03)^2 \sin(72.08)]/2$ = 1,214.9 ft^2
Full Reactor Building area (total) = 17,564.7 ft^2 + 1,214.9 ft^2 = 18,779.6 ft^2 (1,744.7 m^2)
1/2 Reactor Building area = (1,744.7 m^2)/2 = 872.4 m^2
1/4 Reactor Building area = (1,744.7 m^2)/4 = 436.2 m^2
1/8 Reactor Building area = (1,744.7 m^2)/8 = 218.1 m^2

2. Unit 1 Reactor Vent to Normal Control Room Air Intake (LOCA)

Distance from Reactor Vent to normal control room air intake = 67.9 meters
Wind direction from Reactor Vent to normal control room air intake = 116° azimuth
Plant grade elevation = 705 ft
Normal control room air intake elevation = 752 ft
Normal control room air intake elevation above grade = 752 ft - 705 ft = 47.0 ft (14.33 m)
Reactor Vent elevation = 834.6 ft
Reactor Vent height above grade = 834.6 ft -705.0 ft = 129.6 ft (39.5 m)
Reactor Building area - see Release/Receptor No. 1

3. Unit 2 Reactor Vent to Emergency Control Room Air Intake (LOCA)

Distance from Reactor Vent to emergency control room air intake = 79.6 meters
Wind direction from Reactor Vent to emergency control room air intake = 138° azimuth
Plant grade elevation = 705.0 ft
Emergency control room air intake elevation = 752.0 ft
Emergency control room air intake elevation above grade = 752.0 ft - 705.0 ft = 47.0 ft (14.33 m)
Reactor Vent elevation = 834.6 ft
Reactor Vent height above grade = 834.6 ft - 705.0 ft = 129.6 ft (39.5 m)
Reactor Building area - see Release/Receptor No. 1

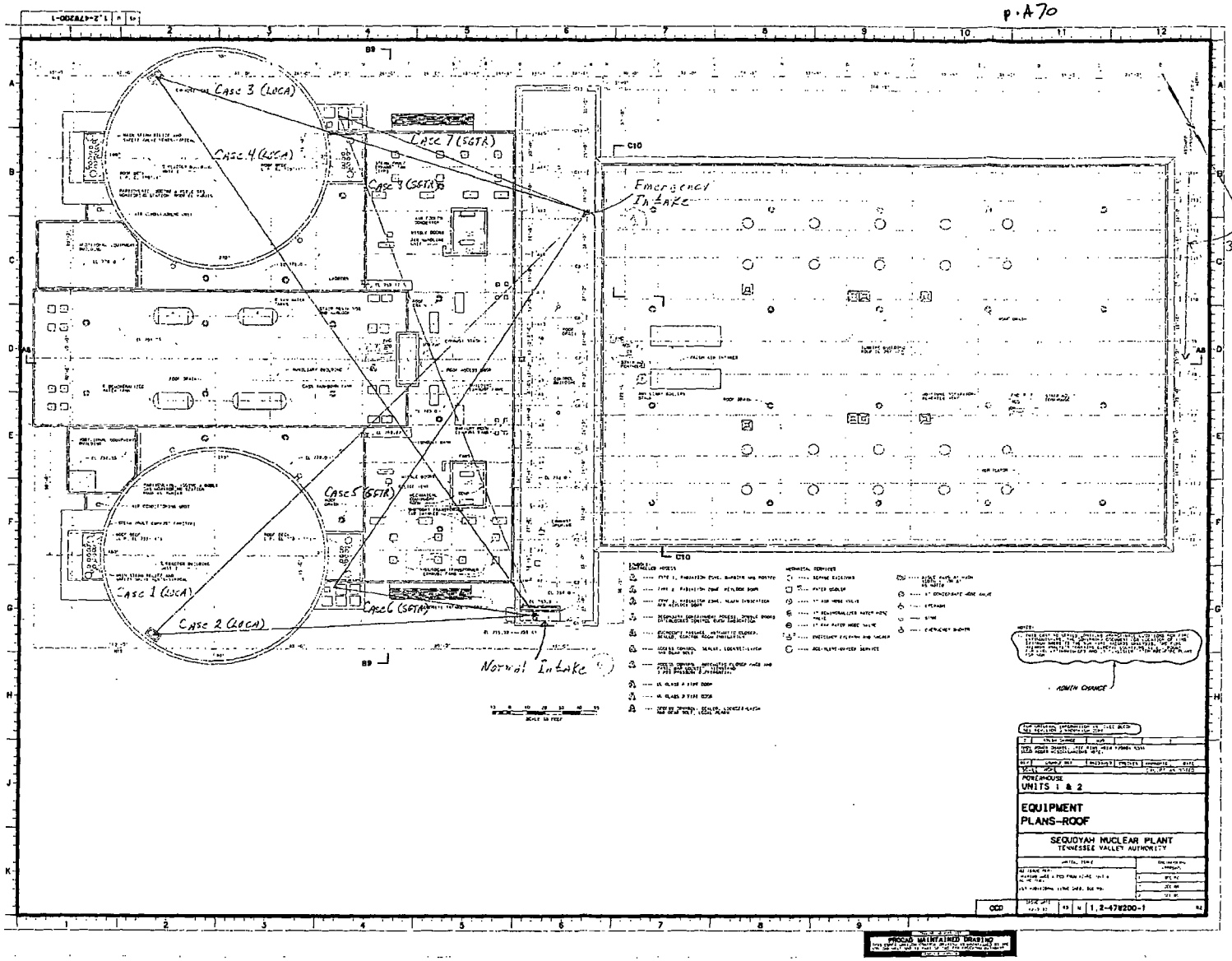
4. Unit 2 Reactor Vent to Normal Control Room Air Intake (LOCA)

Distance from Reactor Vent to normal control room air intake = 119.3 meters
Wind direction from Reactor Vent to normal control room air intake = 176° azimuth
Plant grade elevation = 705.0 ft

Normal control room air intake elevation = 752.0 ft
Normal control room air intake elevation above grade = 752.0 ft - 705.0 ft = 47.0 ft (14.33 m)
Reactor Vent elevation = 834.6 ft
Reactor Vent height above grade = 834.6 ft - 705.0 ft = 129.6 ft (39.5 m)
Reactor Building area - see Release/Receptor No. 1

ATTACHMENT A
p. A70

P. B-1
13090.0200
WA(B)-001
Rev. 0



2) Unfiltered inleakage into the Main Control Room is assumed to be 51 cfm in the accident analysis. This limit includes 3.0 cfm for doors. This value has been confirmed to be conservative by the tracer gas testing performed as required by SQN Unit 2 Technical Specifications (TS) Surveillance Requirement 4.7.7.h and TS 6.17, "Control Room Envelope Habitability Program." The results of the tracer gas test confirmed the total unfiltered inleakage to be 8.1 cfm.

   The unfiltered inleakage X/Q values are assumed to be the same as the control room intake X/Q values. The X/Q values established by ARCON96 are the worst case of a set of X/Q values. Each X/Q set is based on the intake location. The control room intake locations are on opposite sides of the buildings. As such, using the worst case X/Q value based on the intake is conservative relative to the potential locations for unfiltered inleakage into the building. This includes consideration of the door leading from the Main Control Room Habitability Zone to the Turbine Building (for egress/ingress).

With respect to X/Q values used in the dose assessment for postulated releases from the openings in the Shield Building dome to the exclusion area boundary and low population zone, these X/Q values are as follows.

Time Period	Exclusion Area Boundary	Low Population Zone
0-2 hours	1.64E-3 sec/m^3	1.96E-4 sec/m^3
2-8 hours		2.46E-5 sec/m^3
8-24 hours		2.02E-5 sec/m^3
24-96 hours		1.03E-5 sec/m^3
96-720 hours		4.77E-6 sec/m^3

These values are shown in SQN UFSAR Table 15A-2, "Accident Atmospheric Dilution Factors."

Because the penetration and the Shield Building vent are in close proximity of each other and on the same building, the offsite X/Q values are the same for the open penetration and the design basis case.