VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

January 30, 1996

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC. 20555

Serial No. 96-005
NS&L/MDK/GDM: R1
Docket Nos. 50-280
50-281
License Nos. DPR-32
DPR-37

Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY
SURRY POWER STATION UNITS 1 AND 2
PROPOSED TECHNICAL SPECIFICATIONS CHANGE
REACTOR COOLANT SYSTEM LIQUID SAMPLING

Pursuant to 10 CFR 50.90, the Virginia Electric and Power Company requests amendments, in the form of a change to the Technical Specifications, to Facility Operating License Nos. DPR-32 and DPR-37 for Surry Power Station Units 1 and 2. The proposed Technical Specifications change will eliminate the surveillance requirement for certain reactor coolant liquid samples during periods when the fuel is removed from the vessel and no reasonable means of obtaining a sample is available.

A discussion of the proposed Technical Specifications change for Surry is provided in Attachment 1. The proposed Technical Specifications change is provided in Attachment 2. It has been determined that the proposed Technical Specifications change does not involve an unreviewed safety question as defined in 10 CFR 50.59 or a significant hazards consideration as defined in 10 CFR 50.92. The basis for our determination that the change does not involve a significant hazards consideration is provided in Attachment 3. The proposed Technical Specifications change has been reviewed and approved by the Station Nuclear Safety and Operating Committee and the Management Safety Review Committee.

Should you have any questions or require additional information, please contact us.

Very truly yours,

James P. O'Hanlon

James P. O'Hanlon
Senior Vice President - Nuclear

Attachments

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cc: U.S. Nuclear Regulatory Commission
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NRC Senior Resident Inspector
Surry Power Station

Commissioner
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COMMONWEALTH OF VIRGINIA)
)
COUNTY OF HENRICO)

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by J. P. O'Hanlon, who is Senior Vice President - Nuclear, of Virginia Electric and Power Company. He is duly authorized to execute and file the foregoing document in behalf of that Company, and the statements in the document are true to the best of his knowledge and belief.

Acknowledged before me this 30TH day of January, 1996.

My Commission Expires: May 31, 1998.

Vicki L. Hull
Notary Public

(SEAL)

Attachment 1

Discussion of Change

Surry Power Station

DISCUSSION OF CHANGES

INTRODUCTION

As part of the Unit 1 refueling outage in February 1992, Surry changed its outage practice to avoid certain maintenance activities when the Reactor Coolant System (RCS) inventory is decreased with fuel in the core. Currently, before certain refueling and maintenance activities are performed, the fuel is removed from the reactor vessel prior to the RCS being drained below the reactor pressure vessel flange, minimizing shutdown risk. During this period the interconnected support systems no longer required to be in service, are scheduled for maintenance. However, in this configuration, obtaining a reactor coolant chemistry sample as required by Technical Specification 3.1.F.4 and Table 4.1-2B, Item 1, or a representative sample from interconnected systems, is not possible. Administrative controls and procedures are in place to assure that RCS chemistry and therefore RCS integrity are maintained while in this configuration. Consequently, a change is proposed to eliminate the Technical Specifications sampling requirements for reactor coolant oxygen concentration when the reactor coolant is less than 250 degrees F. Also, reactor coolant sampling requirements for chloride, fluoride and oxygen concentration are eliminated during those periods when fuel has been removed from the reactor vessel and the reactor coolant is drained below the reactor pressure vessel flange. Our review performed in accordance with Title 10, Code of Federal Regulations, Part 50.59 has determined that the proposed changes do not constitute an unreviewed safety question, and that a significant hazards consideration in accordance with 10 CFR 50.92, is not created by the proposed Technical Specifications changes.

BACKGROUND

Sampling the RCS liquid inventory is a dynamic evolution during reactor shutdown conditions. During the cooldown process, samples can be taken utilizing the normal configuration of the Sampling System (SS). When the Residual Heat Removal (RHR) System is placed in service an alternate method of obtaining a representative sample of reactor coolant is available from that systems circulation path. The ability to obtain a liquid sample from the RCS or a representative sample from an interconnected system becomes more complicated when the RCS is depressurized and reactor coolant inventory is drained below the pressure vessel flange.

The general sequence for performing certain maintenance activities with the reactor coolant inventory drained below the pressure vessel flange involves: (1) removal of the reactor vessel head, (2) filling the refueling cavity, (3) removal of the upper internals from the vessel, (4) removal of fuel from the reactor vessel, (5) re-installation of the upper internals in the vessel (to reduce area radiation levels), and (6) draining the refueling cavity until vessel inventory is below the pressure vessel flange. Sampling the reactor coolant liquid during certain maintenance activities with the RCS inventory drained below the reactor vessel flange can not be performed using conventional methods since there is no motive force (system pressure) available in the RCS to drive the sample through the Sampling System. The Residual Heat Removal

System, Chemical Volume and Control System (CVCS), and the Reactor Cavity Purification (RL) System are normally taken out of service for maintenance and not capable of circulating reactor coolant once the inventory is reduced below the pressure vessel flange and therefore provide no capability of obtaining a representative liquid sample. In this configuration the only available method of obtaining a liquid sample would require an individual to enter the reactor vessel area and obtain a local sample by unconventional means, by dipping a sample container into the available inventory. However, local sampling at the reactor vessel is not possible when the reactor vessel upper internals or vessel head are installed.

Normal refueling practice at Surry requires the upper internals to be re-installed in the vessel following fuel off-load to minimize the radiation levels in the surrounding area. Dose rates in the vicinity of the reactor vessel with the upper internals removed and fuel off-loaded are prohibitively excessive when the RCS inventory is reduced below the pressure vessel flange. With the upper internals re-installed in the reactor vessel following fuel off-load, the dose rates are reduced to approximately 3 Roentgen Equivalent Man (REM) per hour when the RCS inventory is below the reactor vessel flange. Local sampling at the reactor vessel is not physically possible when the upper internals are installed since there is no access to the reactor coolant inventory due to the upper internals core barrel filling the reactor vessel opening. Alternatively, with the upper internals removed, anyone collecting a local sample at the reactor vessel and those individuals performing refueling activities in the vicinity of the reactor vessel at the same time would be subjected to excessive levels of radiation exposure.

CURRENT LICENSING BASIS

Currently, Technical Specification 3.1.F.4 establishes the reactor coolant liquid chloride, fluoride and oxygen concentration limits when the reactor coolant temperature is below 250 degrees F. The Technical Specifications sampling requirement in Table 4.1-2B, Item 1, specifies a frequency of five (5) days per week for sampling the reactor coolant liquid for chloride, fluoride, and oxygen concentration. There is no provision included in either the Technical Specifications Limiting Condition for Operation or the Technical Specifications Surveillance Requirements that allow deviating from this sampling frequency. However, this sampling cannot be performed by conventional sampling methods when the fuel is removed from the vessel and the RCS is drained below the pressure vessel flange.

CURRENT DESIGN BASIS

The Reactor Coolant System water chemistry is selected to provide the necessary boron content for reactivity control and to minimize corrosion of Reactor Coolant System surfaces. The 1972 Atomic Safety and Licensing Board (ASLB) transcript notes on the issue of disputed welds and welding practices at Surry specified limits for maximum reactor coolant contaminants that could influence Reactor Coolant System corrosion rates. The Supplemental Information Report provided to the Atomic Energy Commission on March 15, 1972, page 15 summarized the ASLB hearing transcript notes from Line 11 on page 65 as follows:

"Limits are specified for maximum reactor coolant contaminants that could influence corrosion rates. The concentration of contaminants in the reactor shall not exceed any one of the following limits when the reactor coolant is above 250 degrees F."

Contaminant	Normal Steady-State Operation (PPM)	Transients not to Exceed 24 Hours (PPM)
Oxygen	0.10	1.00
Chloride	0.15	1.50
Fluoride	0.15	1.50

These limits were transposed into the initial Surry Technical Specifications, dated March 17, 1972. The ASLB transcript did not specify any reactor coolant contaminant limits for conditions when the reactor coolant temperature is below 250 degrees F.

DISCUSSION

Controlling the chloride, fluoride, and oxygen concentrations in the reactor coolant less than the Technical Specifications limits provides a measure of assurance that the integrity of the RCS will be maintained under all operating conditions. The RCS materials that are exposed to reactor coolant are corrosion resistant. These materials were chosen for specific applications within the system and for their compatibility with the reactor coolant. The chemical composition of the reactor coolant is maintained within the specifications of Technical Specification 3.1.F.4 through performance of the sampling as specified in Technical Specification Table 4.1-2B and consistent with the Updated Final Safety Analysis Report (UFSAR), Section 4, Table 4.2-2. Because of the time dependent nature of any adverse affects from chloride, fluoride, and oxygen concentrations in excess of the Technical Specifications allowed limits, measures such as maintaining makeup water purity and purification system ion exchanger removal efficiency are used to correct a deviating condition. These measures remain available prior to reducing reactor coolant inventory below the pressure vessel flange and after the reactor coolant inventory is restored.

Also, since the RCS and the RHR System are drained, the concentrations of chlorides, fluorides, and oxygen should not change. When the RCS inventory is reduced below the pressure vessel flange no makeup to the RCS is planned, and any makeup to the RCS would be detected by available level indication. Sampling for chloride and fluoride concentrations in the RCS will be performed prior to draining the system below the pressure vessel flange. Sampling the reactor coolant for chloride and fluoride concentrations will resume when the RCS is refilled.

When the RCS is opened for maintenance activities the reactor coolant temperature is below 140 degrees F and exposed to atmospheric conditions inside the containment building. Under these conditions the reactor coolant liquid is considered oxygen saturated. Technical Specification 3.1.F.4 allows a normal and transient oxygen

concentration of "saturated" when reactor coolant temperature is below 250 degrees F. Consequently, sampling the reactor coolant for oxygen concentration under these conditions at the Technical Specifications Table 4.1-2B specified frequency of five (5) days per week is not necessary since the oxygen concentration continues to remain in compliance with the Technical Specifications allowed limits. This position is also supported by Electric Power Research Institute (EPRI) Report NP-7077, Revision 2, "PWR Primary Water Chemistry Guidelines," which determined that the effect of dissolved oxygen and its contribution to stress corrosion cracking of RCS materials and to general corrosion of system and fuels materials is reduced to a point of little concern at less than 250 degrees F and operating controls need not be implemented until the coolant exceeds this temperature. Therefore, this proposed change deletes the Technical Specification 3.1.F.4 limits for both normal and transient oxygen concentrations when RCS temperature is below 250 degrees F. Surry Technical Specification 3.1.F.1, which prohibits reactor coolant temperature from exceeding 250 degrees F unless chloride, fluoride, and oxygen concentrations are within specified limits, will remain in place and is not affected by the proposed changes.

A challenge to RCS integrity is not encountered during refueling shutdown conditions with the fuel removed from the core unless a specific combination of conditions is present that could affect the RCS materials. The necessary conditions are a metallurgically susceptible alloy, an aggressive environment, stress, and time. This combination of factors cannot occur during the brief period of maintenance during the refueling conditions described above. During refueling shutdown with the fuel removed from the core, the reactor coolant temperature is less than or equal to 140 degrees F and the stresses induced under normal operating temperatures and pressures do not exist. Furthermore, an aggressive environment does not exist since the reactor coolant chemistry is maintained within specified limits and sampling remains in effect prior to the reactor coolant inventory being decreased below the pressure vessel flange. With the RCS and the RHR System drained below the pressure vessel flange, the inventory of chlorides, fluorides, and oxygen should not change. Any unplanned makeup to the RCS would be detected by available level indication. Reactor coolant liquid sampling for chlorides and fluorides will resume once the RCS is refilled following the maintenance activities. Consequently, RCS integrity is not challenged during refueling maintenance activities when the inventory is drained below the pressure vessel flange. This position is supported by EPRI Report NP-4449, "Guidelines For Control of Expendable Products," (Feb. 1986), which concluded that below 150 degrees F, chloride stress corrosion cracking and intergranular attack of stainless steel and nickel-based alloys are not a concern, independent of halogen level.

The proposed change eliminates Technical Specification 3.1.F.4 chemistry requirement for oxygen concentration in the reactor coolant liquid when the RCS is below 250 degrees F since the reactor coolant is allowed to be oxygen saturated under these conditions and the Technical Specifications for both normal and transient concentration limits remain satisfied. Also, the proposed change eliminates the Technical Specifications Table 4.1-2B, Item 1, sampling frequency of five (5) days per week for chloride, fluoride, and oxygen concentration during maintenance activities when the RCS inventory is reduced below the pressure vessel flange. Sampling for chloride, fluoride, and oxygen concentration will not be required when the fuel has

been removed from the reactor vessel and the RCS is drained below the reactor pressure vessel flange, whether the vessel internals and / or vessel head are in place or not. There are no changes proposed for the Technical Specifications values for normal or transient concentrations of chlorides and fluorides within the RCS. No hardware modifications are involved. System configuration and plant operations are not being changed.

SPECIFIC CHANGES

Technical Specification 3.1.F.4, item "a" is revised to delete the requirement that oxygen concentrations for both normal and transient conditions not exceed saturation when the reactor coolant is below 250 degrees F. Administrative changes are included which capitalize the Technical Specifications defined term "cold shutdown" to maintain consistency throughout the Technical Specifications, and the word "degrees" is spelled-out when referring to the Fahrenheit temperature, rather than using the symbol. Also, an additional administrative change is necessary to re-order the list of remaining contaminants as a result of the oxygen contaminant requirements being deleted, with no changes made to the remaining normal or transient concentration limits. The revised list of contaminants in Technical Specification 3.1.F.4 is shown below for conditions where the reactor coolant is below 250 degrees F:

Contaminant	Normal Concentration (PPM)	Transients not to exceed 24 hours (PPM)
a. Chloride	0.15	1.5
b. Fluoride	0.15	1.5

Technical Specification 3.1.F.5 is revised administratively to capitalize the term "Technical Specifications" since the term specifically refers to Surry Technical Specifications 3.1.F.1 and 3.1.F.4. Also, the word "degrees" is spelled-out when referring to the Fahrenheit temperature, rather than using the symbol. The revised Technical Specification 3.1.F.5 reads as follows:

5. For the purposes of correcting the contaminant concentrations to meet Technical Specifications 3.1.F.1 and 3.1.F.4 above, increase in coolant temperature consistent with operation of primary coolant pumps for a short period of time to assure mixing of the coolant shall be permitted. This increase in temperature to assure mixing shall in no case cause the coolant temperature to exceed 250 degrees F.

Technical Specification 3.1.F.6 is revised to clarify its applicability to conditions above "cold shutdown" which is a Technical Specifications defined term. The requirement to place the reactor in cold shutdown for conditions where contaminant limits are exceeded for any seven consecutive day period is not changed. An administrative change is included which capitalizes the defined term "cold shutdown" to maintain

consistency throughout the Technical Specifications. The revised Technical Specification 3.1.F.6 reads as follows:

6. For conditions above COLD SHUTDOWN, if more than one contaminant or contaminants transient, which results in contaminant levels exceeding any of the normal steady state operation limits specified in 3.1.F.1 or 3.1.F.4, is experienced in any seven consecutive day period, the reactor shall be placed in COLD SHUTDOWN until the cause of the out-of-specification operation is ascertained and corrected.

Technical Specifications Table 4.1-2B, Item 1, Reactor Coolant Liquid Samples, is revised to eliminate the chemistry sampling frequency of 5 days per week for chloride, fluoride, and oxygen concentration when reactor coolant inventory is reduced below the reactor vessel flange for maintenance activities. Specifically, chemistry sampling for chloride, fluoride, and oxygen concentration is not required when fuel is removed from the reactor vessel and the reactor coolant inventory is drained below the reactor pressure vessel flange, whether the upper internals and / or vessel head are in place or not. For consistency with the changes to Technical Specification 3.1.F.4, sampling for oxygen concentration will not be required when reactor coolant temperature is below 250 degrees F. Note 9 is added to the reactor coolant liquid sampling requirements for chloride, fluoride, and oxygen concentrations as specified in Technical Specifications Table 4.1-2B, Item 1, Reactor Coolant Liquid Samples, and reads as follows:

(9) Sampling for chloride and fluoride concentrations is not required when fuel is removed from the reactor vessel and the reactor coolant inventory is drained below the reactor vessel flange, whether the upper internals and / or vessel head are in place or not. Sampling for oxygen concentration is not required when the reactor coolant temperature is below 250 degrees F.

SAFETY SIGNIFICANCE

The proposed Technical Specifications changes do not involve any hardware modifications or changes in system configuration or plant operations. The changes have been reviewed against the criteria of 10 CFR 50.59 and it has been determined that an unreviewed safety question does not exist for the following reasons:

During Reactor Coolant System (RCS) maintenance activities with the inventory reduced below the pressure vessel flange, dose rates in the vicinity of the reactor vessel with the upper internals removed and fuel off-loaded are prohibitively excessive. Normal operating practice requires the reactor vessel upper internals to be re-installed following fuel off-load to minimize the radiation levels in the surrounding area. With the upper internals re-installed in the reactor vessel following fuel off-load, the dose rates are reduced to approximately 3 REM per hour when the RCS inventory is below the reactor vessel flange. However, during RCS maintenance activities with the inventory reduced below the pressure vessel flange, those systems which provide for the sampling of reactor coolant are no longer in service and conventional sampling is not possible. Local sampling at the reactor vessel is not physically possible when the upper internals are installed since there is no access to the reactor coolant inventory due to the upper internals core barrel filling the reactor vessel opening. Alternatively, with the upper internals removed, anyone collecting a local sample at the reactor vessel and those individuals performing refueling activities in the vicinity of the reactor vessel at the same time would be subjected to excessive levels of radiation exposure. The proposed Technical Specifications changes minimize personnel radiation exposure during maintenance activities when the RCS inventory is reduced below the pressure vessel flange with no harmful effect on Reactor Coolant System integrity.

The surveillance frequency specified in Technical Specifications requires chemistry sampling for chloride, fluoride, and oxygen concentration in the RCS at least five (5) times per week when the reactor coolant temperature is below 250 degrees F, as a measure of assurance that the integrity of the RCS will be maintained under all operating conditions. This sampling cannot be performed by conventional sampling methods when certain refueling and maintenance activities involve the fuel being removed from the vessel and the RCS being drained below the pressure vessel flange. However, since the RCS and the RHR Systems are drained, the inventory of chlorides, fluorides, and oxygen should not change. During these maintenance and refueling activities, only controlled makeup to the RCS is planned, and any planned or unplanned makeup to the RCS would be detected by available level indication. Measures remain available prior to reducing reactor coolant inventory below the pressure vessel flange and after the reactor coolant inventory is restored, to correct any off-normal reactor coolant chemistry condition. Therefore, the reactor coolant chemistry sampling frequency of five times per week can be interrupted during periods when the fuel has been off-loaded and the RCS inventory is reduced below the pressure vessel flange, with no deleterious affect on RCS integrity.

Chemistry sampling for chloride and fluoride concentrations in the RCS will be performed prior to draining the RCS inventory below the pressure vessel flange. This chemistry sampling will resume when the RCS is refilled. During these draining and

refilling evolutions the chloride and fluoride concentrations are known and the Technical Specifications Limiting Conditions for Operation, Action Statements, and Surveillance Requirements will continue to be followed in accordance with the administrative controls and procedures that are in place. The RCS is vented and open during maintenance activities when the inventory is reduced below the pressure vessel flange. The reactor coolant temperature is below 140 degrees F and exposed to atmospheric conditions inside the containment building. Under these conditions the reactor coolant liquid is considered oxygen saturated. Technical Specification TS 3.1.F.4 allows normal and transient oxygen concentrations to be "saturated" when the reactor coolant temperature is below 250 degrees F. Therefore, sampling the reactor coolant for oxygen concentration at the Technical Specifications Table 4.1-2B specified frequency of five (5) times per week is not necessary when the RCS temperature is below 250 degrees F. This position is consistent with EPRI Report NP-7077, Revision 2.

The materials that are exposed to reactor coolant are corrosion resistant. They were chosen for specific applications within the system and for their compatibility with the reactor coolant. The chemical composition of the reactor coolant is maintained within the specifications given in Technical Specification 3.1.F, UFSAR Table 4.2-2, and Technical Specification Table 4.1-2B. A challenge to RCS integrity is not encountered during refueling shutdown conditions with the fuel removed from the core unless a specific combination of conditions is present that could affect the RCS materials. The necessary conditions are a metallurgically susceptible alloy, an aggressive environment, stress, and time. This combination of factors cannot occur during the brief period of maintenance during the refueling conditions described above. During refueling shutdown with the fuel removed from the core, the reactor coolant temperature is less than or equal to 140 degrees F and the stresses induced under normal operating temperatures and pressures do not exist. Furthermore, an aggressive environment does not exist since the reactor coolant chemistry is maintained within specified limits and sampling remains in effect while the reactor coolant inventory is decreased below the pressure vessel flange. Because of the time dependent nature of a chemistry condition in excess of the chloride and fluoride concentrations specified in the Technical Specifications, measures are available and appropriate actions can be taken to correct these conditions without deleterious reduction in the integrity of the RCS. Surry Technical Specification 3.1.F.1 prohibits reactor coolant temperature from exceeding 250 degrees F unless chloride, fluoride, and oxygen concentrations are within specified limits. Consequently, RCS integrity will not be challenged by off-normal concentrations during refueling shutdown when maintenance activities are performed with the fuel off-loaded and reactor coolant inventory reduced below the pressure vessel flange and the existing accident analyses remain bounding. This position is consistent with EPRI Report NP-4449 (Feb. 1986).

Therefore, based on the reasons described above, the probability of occurrence or the consequences of an accident or malfunction of equipment important to safety and previously evaluated in the Updated Final Safety Analysis Report is not increased.

The chemical composition of the reactor coolant will be maintained within the specifications given within Technical Specification 3.1.F, UFSAR Table 4.2-2, and Technical Specification Table 4.1-2B. The time dependent nature of any adverse affects from chloride and fluoride concentrations in excess of the Technical Specification 3.1.F.4 limits, allows measures to be taken to correct any off-normal concentrations while the reactor is in a safe condition, prior to any deleterious effect. Therefore, the possibility for an accident or malfunction of a different type than previously evaluated in the safety analysis report has not been created.

The margin of safety as described in the Bases Section of any part of the Technical Specifications is not reduced since sampling for chloride and fluoride concentrations is performed and maintained within the specified values prior to RCS drain down, and sampling will resume when the RCS is refilled. Conditions that could challenge RCS integrity are not present during refueling shutdown when maintenance activities are performed with the fuel off-loaded and the RCS inventory reduced below the pressure vessel flange. Existing Technical Specifications Action Statements and Allowed Outage Times control any off-normal concentrations that may be encountered. Surry Technical Specification 3.1.F.1 remains unaffected by this change and continues to prohibit reactor coolant temperature from exceeding 250 degrees F unless chloride, fluoride, and oxygen concentrations are within specified limits.

Attachment 2

Technical Specifications Change

Surry Power Station