LIMITING CONDITION FOR OPERATION	SURVEILLANCE REQUIREMENT

3.2.3 COOLANT CHEMISTRY

Applicability:

Applies to the reactor coolant system chemical requirements.

Objective:

To assure the chemical purity of the reactor coolant water.

Specification:

a. The reactor coolant water shall not exceed the following limits with the coolant temperature $\geq$ 200 degrees F and reactor thermal power $\leq$ 10%, except as specified in 3.2.3c:

Conductivity	1 μmho/cm
Chloride ion	100 ppb
Sulfate ion	100 ppb

b. The reactor coolant water shall not exceed the following limits with reactor thermal power > 10%, except as specified in 3.2.3c:

Conductivity	1 μmho/cm
Chloride ion	20 ppb
Sulfate ion	20 ppb

4.2.3 COOLANT CHEMISTRY

Applicability:

Applies to the periodic testing requirements of the reactor coolant chemistry.

Objective:

To determine the chemical purity of the reactor coolant water.

Specification:

Samples shall be taken and analyzed for conductivity, chloride and sulfate ion content at least 3 times per week with a maximum time of 96 hours between samples. In addition, if the conductivity becomes abnormal (other than short term spikes) as indicated by the continuous conductivity monitor, samples shall be taken and analyzed within 8 hours and daily thereafter until conductivity returns to normal levels.

When the continuous conductivity monitor is inoperable, a reactor coolant sample shall be taken and analyzed for conductivity, chloride and sulfate ion content at least once per 8 hours.

LIMITING CONDITION FOR OPERATION	SURVEILLANCE REQUIREMENT

c. The limits specified in 3.2.3a and 3.2.3b may be exceeded for a period of time not to exceed 24 hours. In no case shall the reactor coolant exceed the following limits at the specified conditions:

1. With reactor coolant temperature $\geq$ 200 degrees F, the conductivity has a maximum limit of 5μmho/cm, or

2. With reactor coolant temperature $\geq$ 200 degrees F and reactor thermal power $\leq$ 10%, the maximum limit of chloride or sulfate ion concentration is 200 ppb, or

3. With reactor thermal power > 10%, the maximum limit of chloride or sulfate ion concentration is 100 ppb.

d. If Specifications 3.2.3a, b, and c are not met, normal orderly shutdown shall be initiated within one hour and the reactor shall be shutdown and reactor coolant temperature be reduced to < 200 degrees F within ten hours.

e. If the continuous conductivity monitor is inoperable for more than seven days, the reactor shall be shutdown and reactor coolant temperature be reduced to < 200 degrees F within 24 hours.

This specification is being submitted to address an NRC safety evaluation requirement. In its May 8, 1997 letter, the NRC required that NMPC submit an application for amendment to address the differences between the current TS conductivity limits for reactor coolant chemistry and the analysis assumptions for the core shroud crack growth evaluations. The purpose of this specification is to limit intergranular stress corrosion cracking (IGSCC) crack growth rates through the control of reactor coolant chemistry. The LCO values ensure that transient conditions are acted on to restore reactor coolant chemistry values to normal in a reasonable time frame. Under transient conditions, potential crack growth rates could exceed analytical assumptions, however, the duration will be limited so that any effect on potential crack growth is minimized and the design basis assumptions are maintained. The plant is normally operated such that the average chemistry for the operating cycle is maintained at the conservative values of < 0.2 μmho/cm for conductivity and < 5 ppb for chloride ions < 5 ppb for sulfate ions. This will ensure that the crack growth rate is bounded by the core shroud analysis assumptions (the analysis shows the crack growth to be < 2.2E-5 in/hr for these levels). Since these are average values, there are no specific LCO actions to be taken if these values are exceeded at a specific point in time.

Specification 3.2.3a, b, and c is consistent with the BWR water coolant chemistry guidelines, 1996 revision (EPRI TR-103515-R1, BWRVIP-29). The 24 hour action time period for exceeding the coolant chemistry limits described in 3.2.3a and b ensures that prompt action is taken to restore coolant chemistry to normal operating levels. The requirement to commence shutdown within 1 hour, and to be shutdown and reactor coolant temperature be reduced to < 200 degrees F within 10 hours minimizes the potential for IGSCC crack growth.

A short term spike is defined as a rise in conductivity (> 0.2 μmho/cm) such as that which could arise from injection of additional feedwater flow for a duration of approximately 30 minutes in time.

When conductivity is in its proper normal range, chloride, sulfate, and other impurities affecting conductivity must also be within their normal range. When and if conductivity becomes abnormal, then chloride and sulfate measurements are made to determine whether or not they are also out of their normal operating values. Significant changes provide the operator with a warning mechanism so he can investigate and remedy the condition causing the change and ensure that normal operating average conditions are maintained within the bounds of the core shroud crack growth analytical assumptions. Methods available to the operator for correcting the off-standard condition include, operation of the reactor clean-up system, reducing the input of impurities, and placing the reactor in shutdown and reducing reactor coolant temperature to < 200 degrees F. The major benefit of reducing reactor coolant temperature to < 200 degrees F is to reduce the temperature dependent corrosion rates and provide time for the clean-up system to re-establish the purity of the reactor coolant.

The conductivity of the reactor coolant is continuously monitored. The samples of the coolant which are analyzed for conductivity every 96 hours will serve as a comparison with the continuous conductivity monitor. The reactor coolant samples will also be used to determine the chloride and sulfate concentrations. Therefore, the sampling frequency is considered adequate to detect long-term changes in the chloride and sulfate ion content. However, if the conductivity becomes abnormal (> 0.2 μmho/cm), chloride and sulfate measurements will be made to assure that the normal limits (< 5 ppb of chloride or sulfate) are maintained.

ATTACHMENT B

NIAGARA MOHAWK POWER CORPORATION

LICENSE NO. DPR-63

DOCKET NO. 50-220

Supporting Information and No Significant Hazards Consideration Analysis

INTRODUCTION

The proposed Nine Mile Point Unit 1 (NMP1) Technical Specification (TS) change contained herein presents a revision to NMP1 TS Sections 3.2.3 and 4.2.3, and the Bases for 3.2.3 and 4.2.3, "Coolant Chemistry".

By letter dated April 8, 1997, Niagara Mohawk Power Corporation (NMPC) provided design documentation and evaluations to demonstrate the acceptability of the as-found vertical weld cracking in the NMP1 core shroud for at least 10,600 hours of hot (above 200 degrees F) operation. In its May 8, 1997 letter, "Modifications to Core Shroud Stabilizer Lower Wedge Retaining Clip and Evaluation of Shroud Vertical Weld Cracking, Nine Mile Point Nuclear Station, Unit 1," approving the restart of NMP1, the NRC required that NMPC submit an application for a license amendment addressing the difference between the current TS conductivity limits for reactor coolant chemistry and the analysis assumptions for core shroud crack growth rates.

This proposed change incorporates into the TS the reactor coolant chemistry assumptions that were used for the core shroud weld crack evaluations.

EVALUATION

The proposed revisions to TS Sections 3.2.3a, b, c, d, and e incorporate the analytical assumptions that were used by NMPC to evaluate the vertical weld cracking found in the NMP1 core shroud during the 1997 refueling outage. The TS changes establish limits for conductivity and chloride and sulfate ion concentrations that are equal to or more restrictive than the existing TS values. As a result of the analysis, an average value of 0.2 μmho/cm has been chosen for conductivity which is less than the BWR guideline action level 1 value for conductivity of 0.3 μmho/cm.

The purpose of this TS change is to limit IGSCC crack growth rates through the control of reactor coolant chemistry. The proposed LCO values ensure that transient conditions are acted on to restore reactor coolant chemistry values to normal levels in a reasonable time frame. Under transient conditions, potential crack growth rates could exceed analytical assumptions, however, the duration will be limited so that any effect on potential crack growth is minimized and the design basis assumptions are maintained. The plant is operated such that the average coolant chemistry values for the operating cycle are maintained at the conservative values of < 0.2 μmho/cm for conductivity and < 5 ppb for

chloride or sulfate ions. This will ensure that the crack growth rate is bounded by the 5E-5 in/hr core shroud analysis assumptions, since the analysis shows a crack growth rate of < 2.2E-5 in/hr for these chemistry levels. Since the conductivity and chloride and sulfate ion values are average values, there are no specific LCO actions to be taken if these values are exceeded at a specific point in time. However, plant procedures will ensure that actions are taken to reduce the chemistry levels to the appropriate levels within a reasonable time frame.

The NMP1-specific analysis has established that the BWRVIP-14, Section 6.1.1 stress intensity independent crack growth rate of 2.2E-5 in/hr is conservative for NMP1, provided that the average reactor coolant conductivity is maintained < 0.2 μmho/cm. The reactor coolant conductivity applied in the analysis derived a "model" conductivity which considers that reactor coolant is at the 5 ppb limits associated with the chloride and sulfate ion concentrations. Typically conductivity is maintained below 0.1 μmho/cm on a cycle average basis. This ensures that the NMP1-specific shroud analysis calculated crack growth is bounded by the 2.2E-5 in/hr growth rate as determined by the BWRVIP-14 disposition.

CONCLUSIONS

The design documentation and evaluations provided by NMPC to demonstrate the acceptability of the as-found vertical weld cracking in the NMP1 core shroud for at least 10,600 hours of hot (above 200 degrees F) operation were accepted by the NRC. However, the NRC's safety evaluation was contingent on maintaining reactor coolant chemistry within the BWR water chemistry guidelines, 1996 revision, and on the submittal of an application for amendment that addressed the difference between the current TS conductivity limits for reactor coolant chemistry and the analysis assumptions for core shroud crack growth rates. These proposed changes, which are equal to or more restrictive than the present TS values, will assure that NMP1 is operated within the requirements of the analysis used for the NRC's safety evaluation.

ANALYSIS

<u>No Significant Hazards Consideration Analysis</u>

10CFR50.91 requires that at the time a licensee requests an amendment, it must provide to the Commission its analysis using the standards in 10CFR50.92 concerning the issue of no significant hazards consideration. Therefore, in accordance with 10CFR50.91, the following analyses have been performed with respect to the requested change:

<u>The operation of Nine Mile Point Unit 1, in accordance with the proposed amendment, will not involve a significant increase in the probability or consequences of an accident previously evaluated.</u>

The changes to the conductivity and chloride ion action levels and the addition of sulfate ion levels as an action level in reactor water chemistry are being made to make the TS and its Bases consistent with the values used in the core shroud vertical weld cracking evaluations. These new values reflect the BWR water chemistry guidelines, 1996 revision (EPRI TR-103515-R1, BWRVIP-29) and are equal to or more restrictive than the present TS values. No physical modification of the plant is involved and no changes to the methods in

which plant systems are operated are required. None of the precursors of previously evaluated accidents are affected and therefore, the probability of an accident previously evaluated is not increased. These changes to the coolant chemistry TS are more restrictive limits and no new failure modes are introduced. Therefore, these changes will not involve a significant increase in the consequences of an accident previously evaluated.

<u>The operation of Nine Mile Point Unit 1, in accordance with the proposed amendment, will not create the possibility of a new or different kind of accident from any accident previously evaluated.</u>

The changes to the conductivity and chloride ion action levels and the addition of sulfate ion levels as an action level in reactor water chemistry are being made to make the TS and its Bases consistent with the values used in the core shroud vertical weld cracking evaluations. These new values reflect the BWR water chemistry guidelines, 1996 revision (EPRI TR-103515-R1, BWRVIP-29) and are equal to or more restrictive than the present TS values. No physical modification of the plant is involved and no changes to the methods in which plant systems are operated are required. The change does not introduce any new failure modes or conditions that may create a new or different accident. Therefore, this change does not create the possibility of a new or different kind of accident previously evaluated.

<u>The operation of Nine Mile Point Unit 1, in accordance with the proposed amendment, will not involve a significant reduction in a margin of safety.</u>

The changes to the conductivity and chloride ion action levels and the addition of sulfate ion levels as an action level in reactor water chemistry are being made to make the TS and its Bases consistent with the values used in the core shroud vertical weld cracking evaluations. These new values reflect the BWR water chemistry guidelines, 1996 revision (EPRI TR-103515-R1, BWRVIP-29) and are equal to or more restrictive than the present TS values. No physical modification of the plant is involved and no changes to the methods in which plant systems are operated are required. This change does not adversely affect any physical barrier to the release of radiation to plant personnel or the public. Therefore, the change does not involve a significant reduction in a margin of safety.

ATTACHMENT C

NIAGARA MOHAWK POWER CORPORATION

LICENSE NO. DPR-63

DOCKET NO. 50-220

Marked Copy of Proposed Changes to Current Technical Specification

The current version of pages 96, 97, and 98 of the NMP1 Technical Specifications have been hand marked-up to reflect the proposed changes.

LIMITING CONDITION FOR OPERATION

3.2.3 COOLANT CHEMISTRY

Applicability:

Applies to the reactor coolant system chemical requirements.

Objective:

To assure the chemical purity of the reactor coolant water.

Specification:

a. The reactor coolant water shall not exceed the following limits with ~~steaming rates less than 100,000 pounds per hour~~ the coolant temperature ≥ 200 degrees F and reactor thermal power ≤ 10%, except as specified in 3.2.3c:

Conductivity	1 ~~2~~ μmho/cm
Chloride ion	~~0.1 ppm~~ 100 ppb
SULFATE ION	100 ppb

b. The reactor coolant water shall not exceed the following limits with ~~steaming rates greater than or equal to 100,000 pounds per hour~~ reactor thermal power > 10%, except as specified in 3.2.3c:

Conductivity	1 ~~5~~ μmho/cm
Chloride ion	~~0.2 ppm~~ 20 ppb
SULFATE ION	20 ppb

SURVEILLANCE REQUIREMENT

4.2.3 COOLANT CHEMISTRY

Applicability:

Applies to the periodic testing requirements of the reactor coolant chemistry.

Objective:

To determine the chemical purity of the reactor coolant water.

Specification:

Samples shall be taken and analyzed for conductivity, ~~and~~ chloride and sulfate ion content at least 3 times per week with a maximum time of 96 hours between samples. In addition, if the conductivity becomes abnormal (other than short term spikes) as indicated by the continuous conductivity monitor, samples shall be taken and analyzed within 8 hours and daily thereafter until conductivity returns to normal levels.

When the continuous conductivity monitor is inoperable, a reactor coolant sample shall be taken and analyzed for conductivity, ~~and~~ chloride and sulfate ion content at least once per 8 hours.

LIMITING CONDITION FOR OPERATION	SURVEILLANCE REQUIREMENT

c. The limits specified in 3.2.3a and 3.2.3b may be exceeded for a period of time not to exceed 24 hours. In no case shall ~~(1) the conductivity exceed a maximum limit of 10 μmho/cm, or (2) the chloride ion concentration exceed a maximum limit of 0.5 ppm.~~ the reactor coolant exceed the following limits at the specified conditions;

1. With reactor coolant temperature ≥ 200 degrees F, the conductivity has a maximum limit of 5 umho/cm, or
2. With reactor coolant temperature ≥ 200 degrees F and reactor thermal power ≤ 10%, the maximum limit of chloride or sulfate ion concentration is 200 ppb, or
3. With reactor thermal power > 10%, the maximum limit of chloride or sulfate ion concentration is 100 ppb.

d. If Specifications 3.2.3a, b, and c are not met, normal orderly shutdown shall be initiated within one hour and the reactor shall be ~~in the cold~~ shutdown ~~condition~~ and reactor coolant temperature be reduced to < 200 degrees F within ten hours.

e. If the continuous conductivity monitor is inoperable for more than 7 days the reactor shall be ~~placed in the cold~~ shutdown ~~condition~~ and reactor coolant temperature be reduced to < 200 degrees F within 24 hours.

REPLACE WITH ATTACHED

BASES FOR 3.2.3 AND 4.2.3 COOLANT CHEMISTRY

Materials in the primary system are primarily 304 stainless steel and the Zircaloy fuel cladding. The reactor water chemistry limits are established to prevent damage to these materials. Limits are placed on chloride concentration and conductivity. The most important limit is that placed on chloride concentration to prevent stress corrosion cracking of the stainless steel. When the steaming rate is less than 100,000 pounds per hour, a more restrictive limit of 0.1 ppm has been established. At steaming rates of at least 100,000 pounds per hour, boiling occurs causing deaeration of the reactor water, thus maintaining oxygen concentration at low levels.

A short term spike is defined as a rise in conductivity (>0.2 µmho/cm) such as that which could arise from injection of additional feedwater flow for a duration of approximately 30 minutes in time.

When conductivity is in its proper normal range, ~~pH and~~ chloride, SULFATE, and other impurities affecting conductivity must also be within their normal range. When and if conductivity becomes abnormal, then chloride and sulfate measurements are made to determine whether or not they are also out of their normal operating values. ~~This would not necessarily be the case. Conductivity could be high due to the presence of a neutral salt, e.g., Na_2SO_4, which would not have an affect on pH or chloride. In such a case, high conductivity alone is not a cause for shutdown. In some types of water-cooled reactors, conductivities are in fact high due to purposeful addition of additives. In the case of BWR's, however, where no additives are used and where neutral pH is maintained, conductivity provides a very good measure of the quality of the reactor water.~~ Significant changes ~~therein~~ provide the operator with a warning mechanism so he can investigate and remedy the condition causing the change ~~before limiting conditions, with respect to variables affecting boundaries of the reactor coolant, are exceeded.~~ and ensure that normal operating average conditions are maintained within the bounds of the core shroud crack growth analytical assumptions. Methods available to the operator for correcting the off-standard condition include, operation of the reactor clean-up system, reducing the input of impurities, and reducing reactor coolant temperature to <200 degrees F and placing the reactor in ~~the cold~~ shutdown ~~condition~~. The major benefit of ~~cold shutdown~~ reducing reactor temperature to <200 degrees F is to reduce the temperature dependent corrosion rates and provide time for the clean-up system to re-establish the purity of the reactor coolant. ~~During start-up periods, which are in the category of less than 100,000 pounds per hour, conductivity may exceed 2 µmho/cm because of the initial evolution of gases and the initial addition of dissolved metals. During this period of time, when the conductivity exceeds 2 µmho (other than short term spikes), samples will be taken to assure that the chloride concentration is less than 0.1 ppm.~~

The conductivity ~~at~~ of the reactor coolant is continuously monitored. The samples of the coolant which are ~~taken~~ analyzed for conductivity every 96 hours will serve as a comparison with the continuous conductivity monitor ~~reference for calibration of these monitors and is considered adequate to assure accurate readings of the monitors. If conductivity is within its normal range, chlorides and other impurities will also be within their normal ranges.~~ The reactor coolant samples will also be used to determine the chloride ~~s~~ and SULFATE concentrations. Therefore, the sampling frequency is considered adequate to detect long-term changes in the chloride ion and sulfate content. However, if the conductivity ~~changes significantly~~ becomes abnormal (>0.2 µmho/cm), chloride and SULFATE measurements will be made to assure that the ~~chloride~~ NORMAL limits ~~of~~ (<5ppb of CHLORIDE OR SULFATE) are maintained. ~~Specification 3.2.3 are not exceeded.~~

INSERT IN BASES

This specification is being submitted to address an NRC safety evaluation requirement. In its May 8, 1997 letter, the NRC required that NMPC submit an application for amendment to address the differences between the current TS conductivity limits for reactor coolant chemistry and the analysis assumptions for the core shroud crack growth evaluations. The purpose of this specification is to limit intergranular stress corrosion cracking (IGSCC) crack growth rates through the control of reactor coolant chemistry. The LCO values ensure that transient conditions are acted on to restore reactor coolant chemistry values to normal in a reasonable time frame. Under transient conditions, potential crack growth rates could exceed analytical assumptions, however, the duration will be limited so that any effect on potential crack growth is minimized and the design basis assumptions are maintained. The plant is normally operated such that the average chemistry for the operating cycle is maintained at the conservative values of < 0.2 μmho/cm for conductivity and < 5 ppb for chloride ions < 5 ppb for sulfate ions. This will ensure that the crack growth rate is bounded by the core shroud analysis assumptions (the analysis shows the crack growth to be $< 2.2E-5$ in/hr for these levels). Since these are average values, there are no specific LCO actions to be taken if these values are exceeded at a specific point in time.

Specification 3.2.3a, b, and c is consistent with the BWR water coolant chemistry guidelines, 1996 revision (EPRI TR-103515-R1, BWRVIP-29). The 24 hour action time period for exceeding the coolant chemistry limits described in 3.2.3a and b ensures that prompt action is taken to restore coolant chemistry to normal operating levels. The requirement to commence shutdown within 1 hour, and to be shutdown and reactor coolant temperature be reduced to $<$ 200 degrees F within 10 hours minimizes the potential for IGSCC crack growth.