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June 27, 2012 (3:42 p.m.)

OFFICE OF SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

Docket Nos. 50-361 and 50-362

June 27, 2012

Via Electronic & Overnight Mail

U.S. Nuclear Regulatory Commission
Office of Secretary of the Commission
Ms. Annette L. Vietti-Cook, Secretary of the Commission
Sixteenth Floor
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

**RE: NRDC's Response in Support of FOE Petition to Intervene, San Onofre Units 2 and 3**

Dear Ms. Vietti-Cook:

Please find attached *NRDC's Response in Support of FOE Petition to Intervene and NRDC's Notice of Intent to Participate,* filed this day via electronic and overnight mail to the service list created for this matter by Friends of the Earth (FOE) on June 18, 2012. There are two attachments to the document, a certificate of service and an entry of appearance included as well.

As we understand it, FOE filed original pleadings under the license numbers for the San Onofre Nuclear Generating Stations 50-361 and 50-362. FOE was denied an approval code to obtain the digital identification certificate necessary to file with the Commission's electronic filing system. As there is no docket and in order for our response to be timely, we file this day via electronic and overnight mail. We respectfully request notice via electronic mail at the address listed below if and when a docket is created for this matter.

If you have questions, please do not hesitate to contact me at (202) 289-2371. Thank you for considering our views on these important matters.

Sincerely,

(signed electronically) Geoffrey H. Fettus
Geoffrey H. Fettus
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Template: Secy-037

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

**BEFORE THE COMMISSION**

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| **In the Matter of:** | ) | |
| | ) | |
| **SOUTHERN CALIFORNIA EDISON** | ) | **License No. 50-361** |
| | ) | **License No. 50-362** |
| **(San Onofre Nuclear Generating Station, Units 2 and 3)** | ) | |

**June 27, 2011**

**NATURAL RESOURCES DEFENSE COUNCIL'S (NRDC) RESPONSE IN SUPPORT OF FRIENDS OF THE EARTH PETITION TO INTERVENE AND NRDC'S NOTICE OF INTENT TO PARTICIPATE**

## Introduction

The Natural Resources Defense Council ("NRDC") respectfully submits this timely response in support of the *Petition to Intervene and Request for Hearing* filed by Friends of the Earth ("FOE") on June 18, 2012 (hereinafter "FOE Petition for Hearing") and the associated *Application To Stay Any Decision To Restart Units 2 Or 3 At The San Onofre Nuclear Generating Station Pending Conclusion Of The Proceedings Regarding Consideration Of The Safety Of The Replacement Steam Generators* (hereinafter "FOE Stay Application"). *See* 10 C.F.R. § 2.323.

We believe that under current circumstances in which the NRC has found that San Onofre Nuclear Generating Station in San Clemente, California ("San Onofre") is not safe to operate at its licensed maximum thermal power limit given the rapid deterioration of its steam generator tubes, which resulted in a leak in one tube, law and precedent require NRC Staff to amend San Onofre's license to establish a new reduced maximum safe operating thermal power

limit. The new limit should correspond not only to the known impaired heat rejection capacity of the replacement steam generators (RSGs), but also to a new safe operating point at which a recurrence of the recent rapid tube erosion phenomena can be precluded prior to restart of one or both units at San Onofre. In short, specification of a new maximum safe thermal power limit requires a license amendment and notice of opportunity for public hearing with all procedural rights that accrue in such an instance.

NRDC therefore supports FOE's Petition for Hearing and requests NRC institute a license amendment proceeding with a notice of hearing allowing NRDC and other affected parties opportunity to participate.[1]

**Background**

The original facts that led to FOE's Petition for Hearing are well documented. On January 31, 2012, San Onofre suffered a steam generator tube leak in Unit 3 that resulted in the release of radioactive material into the environment. SCE thus performed a rapid shut down of the unit. Prior to the leak in Unit 3, SCE discovered excessive wear in Unit 2, which was offline for a refueling outage. Subsequently, advanced deterioration of many tubes was discovered in the replacement steam generators, which had been in operation for eleven months in Unit 3 and less than two years in Unit 2. Both units are currently shut down while NRC and SCE continue investigations. Both NRC and SCE have made periodic assurances that the matter is being addressed, but there has been no meaningful opportunity for public involvement that included any procedural or substantive rights.

One of the public actions taken with respect to the situation was the issuance of a

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1 We incorporate by reference the background, assertion of timeliness, supporting documentation and the single contention filed by FOE in its Petition for Hearing and Stay Application.

Confirmatory Action Letter (CAL) from the NRC staff to SCE on March 27, 2012. The CAL directed SCE to keep San Onofre Units 2 and 3 shut down until SCE has taken, and NRC has reviewed, certain actions related to the investigation of the rapid tube degradation that was detected in both units and which caused a radioactive release in Unit 3. As FOE described in its petition, the CAL does not require SCE to propose a license amendment, nor does it specify that it will allow for a public adjudicatory hearing process as provided for by 10 C.F.R. § 2.309, or for one prior to restarting the units. Instead, the CAL restates SCE's description of the steam generator problems and the commitments SCE made as of March 23, 2012 to address the issues at Units 2 and 3; it does not show any independent analysis by the NRC, nor require more of the licensee beyond the actions for which SCE has volunteered.

On June 18, 2012, FOE filed its Petition for Hearing with the Commission. FOE's Petition asserts that under 10 C.F.R. § 50.59 the San Onofre replacement steam generators may not be operated without one or more amendments to the San Onofre operating license. The FOE Petition then asks that the Commission either recognize that the current CAL process instituted by NRC to address the situation at San Onofre is in fact a license amendment proceeding under 10 C.F.R. § 2.309 and 42 U.S.C. § 2239, or convene such a license amendment proceeding under these authorities or under the Commission's inherent supervisory authority over the nuclear industry. FOE further requested status as a party in any such proceeding, and that, pursuant to 10 C.F.R. § 2.309, the Commission provide an adjudicatory public hearing with respect to the causes and potential remedies for the failure of the replacement steam generators at San Onofre.

Contemporaneous with FOE's Petition and Stay Motion, NRC Staff disclosed its preliminary findings to the press, five months after the break that precipitated the shutdown of

Unit 3. *See, Feds Say Design Flaw Led To Calif. Nuke Plant Woes.* Michael R. Blood, Associated Press, Jun. 18, 2012, http://www.sacbee.com/2012/06/18/4570064/ap-exclusive-feds-design-led-to.html. In the article, it is apparent that substantial changes were made regarding structural and material elements that may have direct implications in the accelerated degradation of steam tubes at San Onofre.

**Discussion**

**Precedent Requires a License Amendment**

Section 182a of the Atomic Energy Act requires applicants for nuclear power plant operating licenses to include Technical Specifications ("TSs") as part of the license. 42 U.S.C. § 2232. The licensee provides TSs in order to maintain operational capability of structures, systems and components that are required to protect the health and safety of the public. The Commission's regulatory requirements related to the content of the TSs are found in 10 CFR § 50.36, "Technical specifications," which include the following categories: (1) safety limits, limiting safety systems settings and control settings (§ 50.36 (c)(1)); (2) limiting conditions for operation (LCOs) (§ 50.36 (c)(2)); (3) surveillance requirements (SRs) (§ 50.36 (c)(3)); (4) design features (§ 50.36 (c)(4)); and (5) administrative controls (§ 50.36 (c)(5)). In general, there are two classes of changes to TSs: (a) changes needed to reflect modifications to the design basis (TSs are derived from the design basis), and (b) voluntary changes to take advantage of the evolution in policy and guidance as to the required content and preferred format evolve TSs over time. The situation at San Onofre is within the regulatory language contemplated by changes needed to reflect modifications to the design basis.

As an example of bases for a hearing, by letter dated June 25, 2009 (ML091670298), the

NRC issued Amendment No. 220 to the operating license for San Onofre Unit 2 and Amendment No. 213 for San Onofre Unit 3. These amendments revised the inspection requirements and tube plugging criteria for the replacement steam generators. It is being widely reported that the licensee may plug more tubes than required by the steam generator plan described in TS 5.5.2.11.[2] In that case, the steam generator program as found in the TSs appears deficient, requiring that the licensee adopt more stringent measures for safe reactor operation than prescribed within the program.

Regarding the tube plugging criteria or some other technical matter of which we are currently not aware, the San Onofre circumstance is analogous to a situation at the Nine Mile Point Nuclear Generating Station in 1997. There, the licensee had a consultant evaluate cracking identified in the reactor core shroud. The consultant's report concluded that crack propagation rates would not undermine necessary safety margins, but the consultant's evaluation assumed better reactor water chemistry than defined by the TSs.[3] By letter dated July 2, 1997, the licensee submitted a license amendment request to replace the non-conservative water chemistry measures that had existed in the TSs with the far more conservative parameters established in the consultant's report.[4] By letter dated September 18, 1998, (ML011030259), NRC issued

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2 *See*, *e.g.*, "[a]ny tube that satisfies the SG Program repair criteria will be removed from service by plugging. Preventative plugging and stabilization of specific tubes potentially susceptible to degradation is also planned." May 10, 2012, Licensee Event Report (LER) 2012-002-00, at 6. Found at ML 12136AO65, Letter from Douglas R. Bauder, Site Vice President & Station Manager, San Onofre Nuclear Generating Station, Southern California Edison to NRC.

3 *See* Attachment 1, April 17, 1997 Letter from David A. Lochbaum, Nuclear Safety Engineer, Union of Concerned Scientists to Mr. S. Singh Bajwa, Acting Director, Project Directorate 1-1, Division of Reactor Projects – IAI, United States Nuclear Regulatory Commission.

4 *See* Attachment 2, Niagra Mohawk Power Corporation's Application to Amend License, July 2, 1997.

amendment No. 163 to the Nine Mile Point Unit 1 operating license.

Thus, it is apparent that *at minimum* there should be a modification to the design basis at San Onofre as the Steam Generator Program and its repair criteria purport to establish the line between safe and unsafe operation with degraded tubes. If SCE plugs more tubes than required by the plan in order to ensure safety, SCE could argue it has a legal basis for safe operation with degraded tubes (the current SG Program) but is actually employing different criteria for safety. Thus, the SG program as it is currently written under its TSs is likely not sufficient to ensure safety. Thus, a license amendment with opportunity for full public involvement is required.

If, despite this history and the publicly reported NRC staff finding that design deviations in the RSGs appear to be the source of the current technical problems, the Commission remains uncertain on the question of whether these changes required and still require a license amendment, the Commission could exercise its inherent authority to convene a public evidentiary hearing to consider this question before ruling on the contention raised in FOE's petition. But there can be no doubt that a Staff enforcement proceeding, which by definition seeks enforcement of the terms of an existing license, is legally insufficient for weighing the merits of a restart of one or both units at San Onofre that inherently involves amendment of the current operating license in order to ensure adequate protection of the public health and safety.

Thus, NRDC believes it in the interest of all the prospective parties for the Commission to determine that consideration and final determination of a restart of one or both units at San Onofre must take place in the context of a public license amendment proceeding.

**<u>Opportunity for Public Hearing Prior to Restart of Reactors</u>**

FOE's precise suggestions with respect to opportunities for a public hearing were that the

Commission either recognize that the current CAL process is in fact a license amendment proceeding under 10 C.F.R. § 2.309 and 42 U.S.C. § 2239, or convene such a license amendment proceeding under these authorities, or under the Commission's inherent supervisory authority over the nuclear industry. *See* FOE Petition at 2. We adopt and incorporate FOE's assertions and further note that given the compromised and uncertain heat rejection capacity of the impaired RSGs, any restart of one or both units at San Onofre will require a determination for each unit of whether recurrence of the recent rapid tube erosion phenomena can be precluded by a new reduced maximum safe operating thermal power limit that corresponds not only to the known impaired heat rejection capacity of the RSGs, but also a new safe operating point. It has not yet been determined that the units can be safely operated even at a reduced power level, an issue that will be among those vetted in the public hearings.

Further, if the NRC does determine there exists a new thermal power limit at which the units can be safely operated, it will almost certainly be less than that specified in the existing San Onofre license, and therefore a staff level enforcement proceeding based on the terms of the current license is no longer relevant, even in the unlikely event that the Commission should determine that the design changes to the RSGs do not rise to the level of requiring amendment of the existing license. The specification of a new maximum safe thermal power limit for an impaired commercial reactor must be open to the detailed technical justification and scrutiny of a public adjudicatory proceeding. The public cannot be assured that restart of one or both units at San Onofre can be achieved with adequate protection of the public health and safety without adequate participation in the review process as required under the Atomic Energy Act (AEA) and the Commission's rules. Reaching such a fully informed and reasoned judgment on whether a

new safe operating regime at reduced power can be identified and adequately supported by SCE and NRC Staff is precisely the objective of the public adjudicatory licensing proceeding in which FOE and now NRDC seek the opportunity for "party" status.

Under the AEA, the Commission must grant a hearing on a license application upon "the request of any person whose interest may be affected by the proceeding, and shall admit any such person as a party to such proceeding." 42 U.S.C. § 2239(a)(1)(A). In this particular matter, while there has been no application for an amendment to a license, it seems apparent that under 10 C.F.R. § 50.59, a licensee is required to obtain a license amendment if the proposed modification meets any one of eight criteria affecting the existing safety analysis as enumerated in subpart (c)(2) of §50.59. The criteria, in part, require an amendment when the proposed changes would: (1) create a possibility for an accident of a different type than any previously evaluated in the final safety analysis report [(FSAR)] (as updated); (2) create a possibility for a malfunction of an SSC [system, structure, or component] important to safety with a different result than any previously evaluated in the final safety analysis report (as updated); or (3) result in a departure from a method of evaluation described in the FSAR (as updated) used in establishing the design bases or in the safety analyses. As FOE demonstrated in its submission, the design of the replacement steam generators at San Onofre met the criteria that trigger a license amendment thirty-nine separate times. *See* Gundersen Expert Decl. at ¶ 32. Thus, replacement of the steam generators at San Onofre should have triggered an obligation that the NRC determine through a license amendment proceeding whether the new design was safe.

Now, however, with the current shut down of the units and the ongoing NRC investigation, there is an opportunity for both the NRC and the public to evaluate the effect of

such changes on the safety of the plant in a public proceeding so that the public may evaluate the safety risks and technical basis for proposals for restarting the reactors and offer the opinion of its own independent expert(s).

**<u>Notice of Intent to Participate and Standing</u>**

NRDC is a national non-profit environmental organization with offices in Washington, D.C., New York City, San Francisco, Chicago, Santa Monica, and Beijing. NRDC has a nationwide membership of over 357,000 (plus hundreds of thousands of online activists), including 63,996 members in California, at least 3,386 members living within 30 miles of San Onofre and approximately 440 members living within 10 miles of the facility. Among its missions, NRDC seeks to maintain and enhance environmental quality, to safeguard the natural world for present and future generations, and to foster the fundamental right of all people to have a voice in the decisions that affect their environment. Since its inception in 1970, NRDC has sought to improve the environmental, health, and safety conditions at the nuclear facilities operated by the Department of Energy and the civil nuclear facilities licensed by the NRC and their predecessor agencies. To that end, NRDC utilizes its institutional resources, including legislative advocacy, litigation, and public outreach and education, to minimize the risks that nuclear facilities pose to its members and to the general public.

By granting FOE the relief it requests and designating an adjudicatory hearing on the technical and safety basis for restarting the reactors, NRDC would have an opportunity to enter an appearance as a party, enter individual standing declarations, and obtain redress via a public, transparent and legally sufficient proceeding to protect NRDC members whose concrete interests may be harmed by the actions at San Onofre. *See Lujan v. Defenders of Wildlife*, 504 U.S. 555,

572, n.7 (1992) ("[P]rocedural rights are special: The person who has been accorded a procedural right to protect his concrete interests can assert that right without meeting all the normal standards for redressability and immediacy.") (internal quotations omitted). Thus, we write this day to serve notice that (1) we support FOE's Petition and Stay Application; (2) enter an appearance of counsel; and (3) officially notice the Commission that we intend to participate when a notice of hearing has been issued.

**Conclusion**

For the reasons stated above, prior to restart of one or both units at San Onofre, NRC Staff must determine that a new safe operating point exists capable of precluding a recurrence of the recent rapid tube erosion phenomena. If a new maximum safe thermal power limit is found to exist, then specification of such requires a license amendment and notice of opportunity for public hearing. Thus, NRDC requests that a public hearing be noticed and an opportunity to intervene be provided.

Respectfully Submitted,

(signed electronically)/ Geoffrey H. Fettus
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Filed this date of June 27, 2012

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UNION OF
CONCERNED
SCIENTISTS

April 17, 1997

Mr. S. Singh Bajwa, Acting Director
Project Directorate I-1
Division of Reactor Projects - I/II
United States Nuclear Regulatory Commission
Washington, DC 20555-0001

**SUBJECT: POTENTIAL UNANALYZED OPERATION OF NINE MILE POINT UNIT 1 WITH CORE SHROUD VERTICAL CRACKS**

Dear Mr. Bajwa:

UCS reviewed the letter dated April 8, 1997, from Niagara Mohawk Power Corporation (NMPC) to the Nuclear Regulatory Commission (NRC) regarding the core shroud at Nine Mile Point Unit 1 (NMP-1). We have identified an apparent violation of Section 50.59 to Title 10 of the Code of Federal Regulations. Specifically, it appears that NMPC is proposing to operate NMP-1 without obtaining a necessary change to the technical specifications on reactor coolant chemistry.

Enclosure 8 to NMPC's submittal dated April 8, 1997, contained a non-proprietary version of GE Report No. GE-NE-523-B13-01869-043 Rev. 0, "Assessment of the Vertical Weld Cracking on the NMP1 Shroud." Page 9 of this GE document states:

> "The experience in BWRs has shown that IGSCC [intergranular stress corrosion cracking] initiation and growth is related to operating time. The initiation process is a stochastic process and with time the probability of cracking increases. This process can be accelerated if the water conductivity is higher because impurities aid crack initiation and accelerate crack growth. The characteristics of the coolant environment are also known to promote IGSCC on both the outside and the inside of the shroud."

Clearly, water chemistry is an important factor in controlling shroud weld cracking caused by IGSCC.

On page iii of the GE document, it is stated that a "bounding crack growth rate of $5x10^{-5}$ inches per hour" was assumed in the analysis. On page 11 of the GE document, this bounding crack growth rate is stated to be "characteristic of higher reactor water conductivity environments (~0.3 μS/cm)." On page iii of the GE document, the bounding crack growth is said to be conservative because of excellent water chemistry at NMP-1 (<0.1μS/cm).[1]

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[1] According to a published conversion table, a seimen (S) can be converted to a mho by multiplying by 1.00. Therefore, all future references to conductivity will be in terms of μmho/cm for conformance with the NMP-1 technical specifications.

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NMPC's letter dated April 8, 1997, indicates that the enclosures, including the GE document, "establishes the acceptability of the as found vertical weld cracking for a minimum of 10,600 operating hours (above 200°F)."

The analysis supporting the proposed operating of NMP-1 with the core shroud vertical weld cracking appears to rely on reactor coolant chemistry limits that are significantly more limiting than the NMP-1 Technical Specifications. By letter dated July 14, 1993, the NRC issued Amendment No. 142 to the NMP-1 Operating License. Technical Specification 3.2.3 limits the reactor coolant conductivity to <2 μmho/cm with steaming rates less than 100,000 pounds per hour and to <5 μmho/cm with steaming rates greater than 100,000 pounds per hour.

Amendment No. 142 implemented some "cosmetic changes" (e.g., correction of typographical errors, repagination, etc.) to the NMP-1 Technical Specifications. The limits on reactor coolant chemistry remained unaffected by this amendment from the values implemented by issuance of Amendment No. 9 to the NMP-1 Operating License by NRC letter dated April 28, 1976.

Thus, the bounding crack growth rate assumed in GE's analysis appears to be based on reactor coolant chemistry limits that are over 10 times more restrictive than the NMP-1 Technical Specifications. It would seem that NMPC should obtain a license amendment before it operates NMP-1 with reliance on the 0.3 μmho/cm conductivity value.

According to the Bases for NMP-1 Technical Specification 3.2.3:

> "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 placed on chloride concentration to prevent stress corrosion cracking of the stainless steel."

Technical Specifications are intended to provide reasonable assurance that the facility can be operated safely. The core shroud crack growth rate analysis supports NMPC's conclusion that NMP-1 can be safely operated for a minimum of 10,600 hours with the identified cracking. Since the crack growth rate analysis relies on conductivity limits that are significantly more restrictive than the existing Technical Specification limits, it appears that an amendment is warranted.

NMPC could, of course, submit an evaluation of the crack growth rate using the reactor coolant conductivity limit in its current Technical Specifications. Based upon the qualitative analysis quoted from the GE document, it is reasonably assumed that the 10,600 hour minimum operating time could be significantly shortened. Without such an analysis, NMP-1 operation with reactor coolant conductivity above the 0.3 μmho/cm value assumed in the GE analysis represents an unanalyzed condition.

In any event, NMPC's restart of NMP-1 would seem to constitute a violation of Section 50.59 to Title 10 of the Code of Federal Regulations unless a license amendment is obtained to lower the Technical Specifications' limits on reactor coolant chemistry to the value assumed in the crack growth analysis or an analysis is performed of the crack growth rate at the current Technical Specifications' limit. The

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NRC should issue NMPC an order or a confirmatory action letter requiring that an amendment be obtained or an analysis be completed prior to restart of NMP-1.

UCS was unable to attend the public meeting in New York on April 14, 1997, due to the very short notice on the meeting's rescheduling from its original April 10, 1997, date. However, from discussions with individuals who were able to attend this meeting, it appears that the meeting produced three unanswered questions. UCS respectfully requests a formal response from the NRC to the following questions prior to the restart of NMP-1:

1) As indicated by Figure 5-6, "V-9 Crack Depth after 10,600 Hours," in GE's Report GE-NE-B13-01869-043 Rev. 0 (contained in Enclosure 8 to NMPC's April 8, 1997, submittal), it is expected that nearly 24 inches of continuous through-wall cracking will be encountered. Is the crack growth rate after progressing through-wall the same as prior to becoming through-wall? Does through-wall cracking create the potential for vibrations that can increase the propagation rate?

2) As indicated by Appendix C, "Shroud Inspection Summary," in GE's Report GE-NE-B13-01869-043 Rev. 0 (contained in Enclosure 8 to NMPC's April 8, 1997, submittal), the heat affected zones (HAZs) for the vertical welds were inspected during the current refueling outage. There is no indication that areas other than the HAZs were examined. During the public meeting, the question of crack propagation beyond the HAZs was posed. Were areas outside the HAZs inspected? If not, why not? Have cracks propagated beyond the HAZs?

3) Page iii of GE's Report GE-NE-B13-01869-043 Rev. 0 (contained in Enclosure 8 to NMPC's April 8, 1997, submittal) states that "no credit was taken for any portion of horizontal welds; it is assumed that each section of the shroud is a free standing cylinder." For the purposes of evaluating the integrity of the vertical welds, this appears to be a non-conservative assumption. If a horizontal weld were through-wall cracked its entire circumference except for two points that are 180° apart, then it is conceivable that forces acting on the shroud might tend to bow the shroud outward at the 90° and 270° locations since the intact weld portions would act to "pin" movement. If a vertical weld location coincided with these "bow" locations, the stress might be concentrated or higher than if the horizontal welds were totally non-existent as assumed in GE's analysis. Is GE's analysis non-conservative?

UCS understands that NMPC is anxious to resume operation of NMP-1, but we feel that the reactor coolant chemistry issue should be resolved and the above questions should be formally answered before this plant can be restarted safely.

Sincerely,

David A. Lochbaum
Nuclear Safety Engineer

Att. 2

NIAGARA MOHAWK
GENERATION
BUSINESS GROUP

NUCLEAR LEARNING CENTER, 450 LAKE ROAD, OSWEGO, NY 13126/TELEPHONE (315) 349-2882

E. RALPH SYLVIA
Executive Vice President
Electric Generation
Chief Nuclear Officer

July 2, 1997
NMP1L 1232

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

RE: Nine Mile Point Unit 1
Docket No. 50-220
DPR-63

Gentlemen:

During the 1997 refueling outage at Nine Mile Point Unit 1 (NMP1), inspection of the core shroud vertical welds revealed cracks in excess of the screening criteria. 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. By letter dated May 8, 1997, the NRC issued a Safety Evaluation approving the restart of NMP1 contingent on: 1) maintaining reactor coolant chemistry within the guidelines set forth in the Electric Power Research Institute (EPRI) technical report TR-103515-R1 (BWRVIP-29), "BWR Water Chemistry Guidelines - 1996 Revision," and 2) the requirement that NMPC submit an application for a license amendment to address the difference between the current TS conductivity limits for reactor coolant chemistry and the analysis assumptions for core shroud crack growth rates. The NRC approved the NMPC analysis predicated on the condition that NMP1 is operated in accordance with the BWR water chemistry guidelines. This application for amendment is being submitted to address the NRC's second contingency.

NMPC hereby transmits an Application for Amendment to NMP1 Operating License DPR-63. Also enclosed as Attachment A is the proposed change to the Technical Specifications (TS) set forth in Appendix A to the above mentioned license. Supporting information and analyses which demonstrate that the proposed change involves no significant hazards consideration pursuant to 10CFR50.92 are included as Attachment B. A marked-up copy of the affected TS pages is provided as Attachment C to assist your review.

The proposed change revises Sections 3.2.3 and 4.2.3 to reflect the BWR water chemistry guidelines. In addition, the Bases for 3.2.3 and 4.2.3, "Coolant Chemistry", has been revised. These changes address the differences between the current TS conductivity limits for reactor coolant chemistry and the analysis assumptions for core shroud crack growth rates.

Pursuant to 10CFR50.91(b)(1), NMPC has provided a copy of this license amendment request and the associated analysis regarding no significant hazards consideration to the appropriate state representative.

Very truly yours,

B. R. Sylvia
Chief Nuclear Officer

BRS/TRE/cmk
Attachments

xc: Mr. H. J. Miller, NRC Regional Administrator
Mr. A. W. Dromerick, Acting Director, Project Directorate, I-1, NRR
Mr. B. S. Norris, Senior Resident Inspector
Mr. D. S. Hood, Senior Project Manager, NRR
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Records Management

## UNITED STATES NUCLEAR REGULATORY COMMISSION

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| In the Matter of | ) | |
| | ) | |
| Niagara Mohawk Power Corporation | ) | Docket No. 50-220 |
| | ) | |
| Nine Mile Point Unit 1 | ) | |

## APPLICATION FOR AMENDMENT TO OPERATING LICENSE

Pursuant to Section 50.90 of the Regulations of the Nuclear Regulatory Commission, Niagara Mohawk Power Corporation (NMPC), holder of Facility Operating License No. DPR-63, hereby requests that Section 3.2.3 and the associated surveillance Section 4.2.3 of the Technical Specifications (TS) set forth in Appendix A to that license be amended. The proposed changes have been reviewed in accordance with Section 6.5, "Review and Audit," of the Nine Mile Point Unit 1 (NMP1) TS.

The proposed change revises the NMP1 TS Section 3.2.3 to reflect the "BWR water chemistry guidelines, 1996 revision" (EPRI TR-103515-R1, BWRVIP-29). Sections 3.2.3a and 3.2.3b define new conductivity limits when the reactor water is ≥ 200 degrees F and thermal power is ≤ 10%, and when thermal power is > 10%. The new conductivity limit is now 1 μmho/cm compared to the existing limits of 2 μmho/cm and 5 μmho/cm. The chloride ion limit from Section 3.2.3a remains at the same level but it is listed as 100 ppb instead of 0.1 ppm. The chloride ion limit from Section 3.2.3b is changed from 0.2 ppm to 20 ppb. Sulfate ion limits are added to Sections 3.2.3a and 3.2.3b at 100 ppb and 20 ppb, respectively. From Section 3.2.3c the maximum conductivity limit is changed from 10 μmho/cm to 5 μmho/cm, the maximum chloride ion concentration limit is changed from 0.5 ppm to 100 ppb and 200 ppb, and the maximum sulfate ion concentration of 100 ppb and 200 ppb is added.

The proposed change revises NMP1 TS Section 4.2.3 to include sulfate ions as a component to be included in the sample analysis.

Included in this TS change is a change to the Bases for 3.2.3 and 4.2.3, "Coolant Chemistry". The Bases has been changed to reflect the purpose of the specification which is to limit intergranular stress corrosion cracking (IGSCC) crack growth rates through the control of reactor coolant chemistry. The Bases describes the NMP1 operating philosophy of maintaining average levels for conductivity and chloride and sulfate concentrations over an operating cycle. Operation of the plant within these average values will ensure that the crack growth rate is bounded by the core shroud analysis.

The proposed change will not authorize any change in the types of effluents or in the authorized power level of the facility in conjunction with this Application for License Amendment. Supporting information and analyses which demonstrate no significant hazards considerations pursuant to 10CFR50.92, are included as Attachment B.

WHEREFORE, Applicant respectfully requests that Appendix A to Facility Operating License No. DPR-63 be amended in the form attached hereto as Attachment A.

NIAGARA MOHAWK POWER CORPORATION

By ______________________
B. R. Sylvia
Chief Nuclear Officer

Subscribed and Sworn to before me
on this 2nd day of July 1997.

______________________
NOTARY PUBLIC

BEVERLY W. RIPKA
Notary Public State of New York
Qual. in Orange Co. No. 4844079
My Commission Exp. Mar. 30 19 2/28/98

**ATTACHMENT A**

**NIAGARA MOHAWK POWER CORPORATION**

**LICENSE NO. DPR-63**

**DOCKET NO. 50-220**

**Proposed Changes to Technical Specifications**

Replace the existing pages 96, 97, and 98 with the attached revised pages 96, 97, and 98. The pages have been retyped in their entirety with marginal markings to indicate changes.

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

<u>**Supporting Information and No Significant Hazards Consideration Analysis**</u>

## 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 $\mu$mho/cm has been chosen for conductivity which is less than the BWR guideline action level 1 value for conductivity of 0.3 $\mu$mho/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 $< 0.2$ $\mu$mho/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**

No Significant Hazards Consideration Analysis

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:

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.

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.

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.

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.

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.

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.

### 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 |



### 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~~ within ten hours. and reactor coolant temperature be reduced to < 200 degrees F

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

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 effect 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~~. 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 ~~the cold~~ shutdown condition. ~~The major benefit of cold shutdown 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 ~~of~~ 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 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 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 ~~changes significantly~~ becomes abnormal (>0.2 μmho/cm), chloride and sulfate measurements will be made to assure that the ~~chloride limits of Specification 3.2.3 are not exceeded~~ normal (<5 ppb of chlorides and sulfate) is maintained.

# 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.

NIAGARA MOHAWK
GENERATION
BUSINESS GROUP

NUCLEAR LEARNING CENTER, 450 LAKE ROAD, OSWEGO, NY 13126/TELEPHONE (315) 349-2882

B. RALPH SYLVIA
Executive Vice President
Electric Generation
Chief Nuclear Officer

July 2, 1997
NMP1L 1232

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

RE: Nine Mile Point Unit 1
Docket No. 50-220
DPR-63

Gentlemen:

During the 1997 refueling outage at Nine Mile Point Unit 1 (NMP1), inspection of the core shroud vertical welds revealed cracks in excess of the screening criteria. 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. By letter dated May 8, 1997, the NRC issued a Safety Evaluation approving the restart of NMP1 contingent on: 1) maintaining reactor coolant chemistry within the guidelines set forth in the Electric Power Research Institute (EPRI) technical report TR-103515-R1 (BWRVIP-29), "BWR Water Chemistry Guidelines - 1996 Revision," and 2) the requirement that NMPC submit an application for a license amendment to address the difference between the current TS conductivity limits for reactor coolant chemistry and the analysis assumptions for core shroud crack growth rates. The NRC approved the NMPC analysis predicated on the condition that NMP1 is operated in accordance with the BWR water chemistry guidelines. This application for amendment is being submitted to address the NRC's second contingency.

NMPC hereby transmits an Application for Amendment to NMP1 Operating License DPR-63. Also enclosed as Attachment A is the proposed change to the Technical Specifications (TS) set forth in Appendix A to the above mentioned license. Supporting information and analyses which demonstrate that the proposed change involves no significant hazards consideration pursuant to 10CFR50.92 are included as Attachment B. A marked-up copy of the affected TS pages is provided as Attachment C to assist your review.

The proposed change revises Sections 3.2.3 and 4.2.3 to reflect the BWR water chemistry guidelines. In addition, the Bases for 3.2.3 and 4.2.3, "Coolant Chemistry", has been revised. These changes address the differences between the current TS conductivity limits for reactor coolant chemistry and the analysis assumptions for core shroud crack growth rates.

Pursuant to 10CFR50.91(b)(1), NMPC has provided a copy of this license amendment request and the associated analysis regarding no significant hazards consideration to the appropriate state representative.

Very truly yours,

B. R. Sylvia
Chief Nuclear Officer

BRS/TRE/cmk
Attachments

xc: Mr. H. J. Miller, NRC Regional Administrator
Mr. A. W. Dromerick, Acting Director, Project Directorate, I-1, NRR
Mr. B. S. Norris, Senior Resident Inspector
Mr. D. S. Hood, Senior Project Manager, NRR
Mr. J. P. Spath
NYSERDA
2 Empire Plaza, Suite 1901
Albany, NY 12223-1253
Records Management

UNITED STATES NUCLEAR REGULATORY COMMISSION

| | | |
|---|---|---|
| In the Matter of | ) | |
| | ) | |
| Niagara Mohawk Power Corporation | ) | Docket No. 50-220 |
| | ) | |
| Nine Mile Point Unit 1 | ) | |

APPLICATION FOR AMENDMENT TO OPERATING LICENSE

Pursuant to Section 50.90 of the Regulations of the Nuclear Regulatory Commission, Niagara Mohawk Power Corporation (NMPC), holder of Facility Operating License No. DPR-63, hereby requests that Section 3.2.3 and the associated surveillance Section 4.2.3 of the Technical Specifications (TS) set forth in Appendix A to that license be amended. The proposed changes have been reviewed in accordance with Section 6.5, "Review and Audit," of the Nine Mile Point Unit 1 (NMP1) TS.

The proposed change revises the NMP1 TS Section 3.2.3 to reflect the "BWR water chemistry guidelines, 1996 revision" (EPRI TR-103515-R1, BWRVIP-29). Sections 3.2.3a and 3.2.3b define new conductivity limits when the reactor water is $\geq$ 200 degrees F and thermal power is $\leq$ 10%, and when thermal power is > 10%. The new conductivity limit is now 1 $\mu$mho/cm compared to the existing limits of 2 $\mu$mho/cm and 5 $\mu$mho/cm. The chloride ion limit from Section 3.2.3a remains at the same level but it is listed as 100 ppb instead of 0.1 ppm. The chloride ion limit from Section 3.2.3b is changed from 0.2 ppm to 20 ppb. Sulfate ion limits are added to Sections 3.2.3a and 3.2.3b at 100 ppb and 20 ppb, respectively. From Section 3.2.3c the maximum conductivity limit is changed from 10 $\mu$mho/cm to 5 $\mu$mho/cm, the maximum chloride ion concentration limit is changed from 0.5 ppm to 100 ppb and 200 ppb, and the maximum sulfate ion concentration of 100 ppb and 200 ppb is added.

The proposed change revises NMP1 TS Section 4.2.3 to include sulfate ions as a component to be included in the sample analysis.

Included in this TS change is a change to the Bases for 3.2.3 and 4.2.3, "Coolant Chemistry". The Bases has been changed to reflect the purpose of the specification which is to limit intergranular stress corrosion cracking (IGSCC) crack growth rates through the control of reactor coolant chemistry. The Bases describes the NMP1 operating philosophy of maintaining average levels for conductivity and chloride and sulfate concentrations over an operating cycle. Operation of the plant within these average values will ensure that the crack growth rate is bounded by the core shroud analysis.

The proposed change will not authorize any change in the types of effluents or in the authorized power level of the facility in conjunction with this Application for License Amendment. Supporting information and analyses which demonstrate no significant hazards considerations pursuant to 10CFR50.92, are included as Attachment B.

WHEREFORE, Applicant respectfully requests that Appendix A to Facility Operating License No. DPR-63 be amended in the form attached hereto as Attachment A.

NIAGARA MOHAWK POWER CORPORATION

By [signature]
B. R. Sylvia
Chief Nuclear Officer

Subscribed and Sworn to before me
on this 2nd day of July 1997.

[signature]
NOTARY PUBLIC

BEVERLY W. RIPKA
Notary Public State of New York
Qual. in Oswego Co. No. [illegible]
My Commission Exp. ~~Mar. 30-1[illegible]~~ 2/28/98

**ATTACHMENT A**

**NIAGARA MOHAWK POWER CORPORATION**

**LICENSE NO. DPR-63**

**DOCKET NO. 50-220**

**Proposed Changes to Technical Specifications**

Replace the existing pages 96, 97, and 98 with the attached revised pages 96, 97, and 98. The pages have been retyped in their entirety with marginal markings to indicate 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 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 |

## 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, 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:<br><br>1. With reactor coolant temperature ≥ 200 degrees F, the conductivity has a maximum limit of 5μmho/cm, or<br><br>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<br><br>3. With reactor thermal power > 10%, the maximum limit of chloride or sulfate ion concentration is 100 ppb.<br><br>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.<br><br>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**

<u>**Supporting Information and No Significant Hazards Consideration Analysis**</u>

## 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 $\mu$mho/cm has been chosen for conductivity which is less than the BWR guideline action level 1 value for conductivity of 0.3 $\mu$mho/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 $< 0.2$ $\mu$mho/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 $\mu$mho/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 $\mu$mho/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 10,500 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**

No Significant Hazards Consideration Analysis

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:

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.

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.

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.

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.

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.

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**

**<u>Marked Copy of Proposed Changes to Current Technical Specification</u>**

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 | 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 ~~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 |

## 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 $\geq$ 200 degrees F, the conductivity has a maximum limit of 5 µmho/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 ~~in the cold~~ shutdown ~~condition~~ within ten hours and reactor coolant temperature be reduced to < 200 degrees F.

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 effect 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.~~ 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 ~~the cold~~ shutdown condition. The major benefit of ~~cold shutdown~~ 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 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 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 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 ~~changes significantly~~ becomes abnormal (>0.2 μmho/cm), chloride and sulfate measurements will be made to assure that the ~~chloride limits of Specification 3.2.3 are not exceeded~~ normal (<5 ppb of chlorides and sulfate) is maintained.

# 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.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

**BEFORE THE COMMISSION**

| | | |
|---|---|---|
| **In the Matter of:** | ) | |
| | ) | |
| **SOUTHERN CALIFORNIA EDISON** | ) | **License No. 50-361** |
| | ) | **License No. 50-362** |
| **(San Onofre Nuclear Generating Station, Units 2 and 3)** | ) | |

## NOTICE OF APPEARANCE OF GEOFFREY H. FETTUS

The undersigned, being an attorney at law in good standing admitted to practice before the court of the District of Columbia, hereby submits this notice of appearance in the above-captioned matter to indicate that he is counsel for Natural Resource Defense Council, Inc. (1152 15th Street NW, Suite 300, Washington, DC 20005).

Respectfully submitted,

Executed in Accord with 10 C.F.R. §2.304(d)

/Signed (electronically) by Geoffrey H. Fettus

Geoffrey H. Fettus
Senior Attorney
Natural Resources Defense Council
1152 15th Street, NW
Suite 300
Washington, DC 20005
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June 27, 2012

**CERTIFICATE OF SERVICE**

I hereby certify that copies of the foregoing NRDC's Response in Support of FOE's Petition to Intervene and NRDC's Notice of Intent to Participate in this matter were served via electronic mail to the addresses listed below on the 27th day of June 2012.

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