<u>ATTACHMENT A</u>

NIAGARA MOHAWK POWER CORPORATION
LICENSE NO. NPF-69
DOCKET NO. 50-410

<u>Proposed change to Technical Specifications and Bases</u>

Replace existing pages xix, 3/4 6-39 and B3/4 6-6 with the attached revised pages. These pages have been retyped in their entirety with marginal markings to indicate changes. Page B3/4 6-7 is a new page.

BASES

SURVEILLANCE REQUIREMENTS

4.6.5.1 (Continued)

c. At least once per 18 months:

   1. Verifying that each standby gas treatment subsystem will draw down the secondary containment to greater than or equal to 0.25 inch of vacuum water gauge in less than or equal to 66.7 seconds by adjusting test conditions to drawdown analysis conditions when starting at a pressure no less than zero psig, and

   2. Operating one standby gas treatment subsystem for 1 hour and maintaining greater than or equal to 0.25 inch of vacuum water gauge in the secondary containment at an adjusted flow rate not exceeding 2670 cfm.

BASES

3/4.6.5 SECONDARY CONTAINMENT

Secondary containment is designed to minimize any ground level release of radioactive material which may result from an accident. The reactor building and associated structures provide secondary containment during normal operation when the drywell is sealed and in service. At other times, the drywell may be open and, when required, secondary containment integrity is specified.

Establishing and maintaining a subatmospheric condition in the reactor building with the standby gas treatment system once per 18 months, along with the surveillance of the doors, hatches, dampers, and valves, is adequate to ensure that there are no violations of the integrity of the secondary containment.

To prevent exfiltration, secondary containment inleakage is limited to less than 100 percent of the containment free air volume per day. Since the exhaust air flow rate is measured after it passes through the SGTS, the surveillance test result must be adjusted for the volumetric changes that occur as the exhaust air flows through the SGTS to reflect the volume of air exhausted from the building. In addition, the surveillance test result must be adjusted to account for the negative pressure present in the secondary containment during the surveillance test, which is normally more negative than the required -0.25 inch water gauge. Secondary containment inleakage varies with secondary containment air and outside air temperatures, with the highest inleakage occurring at the highest anticipated secondary containment temperature and at the lowest anticipated outside air temperature. The test data is adjusted to the limiting conditions of -20°F outside air and 105°F secondary containment air temperature to assure that the actual inleakage is within the design limit of secondary containment inleakage. These adjustments are discussed in USAR Section 6.2.3.4.

The drawdown time limit has been established considering the same fan performance as in the post-LOCA response analysis. The post-LOCA heat load is not considered in the surveillance drawdown time limit because the test is conducted when the plant is shutdown. In addition, the initial building vacuum is assumed to be zero to reflect the test condition. To assure that the SGTS is capable of meeting its function, the drawdown time limit is calculated as a function of actual inleakage that occurs during the surveillance test. Meeting this drawdown time verifies that the SGTS performance is consistent with the assumptions of the LOCA analysis. The methodology to determine the drawdown time is discussed in USAR Section 6.2.3.4.

The OPERABILITY of the standby gas treatment systems ensures that sufficient iodine removal capability will be available in the event of a LOCA. The reduction in containment iodine inventory reduces the resulting site boundary radiation doses associated with containment leakage. The operation of this system and resultant iodine removal capacity are consistent with the assumptions used in the LOCA analyses. Continuous operation of the system with the heaters operating for 10 hours during each 31-day period is sufficient to reduce the buildup of moisture on the adsorbers and high-efficiency particulate air (HEPA) filters.

BASES

3/4.6.6 PRIMARY CONTAINMENT ATMOSPHERE CONTROL

The OPERABILITY of the systems required for the detection and control of hydrogen gas ensures that these systems will be available to maintain the hydrogen concentration within the primary containment below its flammable limit during post-LOCA conditions. The drywell and suppression chamber hydrogen recombiner system is capable of controlling the expected hydrogen and oxygen generation associated with (1) zirconium-water reactions, (2) radiolytic decomposition of water, and (3) corrosion of metals within containment. The hydrogen control system is consistent with the recommendations of RG 1.7, "Control of Combustible Gas Concentrations in Containment Following a LOCA," March 1971.

ATTACHMENT B

NIAGARA MOHAWK POWER CORPORATION
LICENSE NO. NPF-69
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Supporting Information and No Significant Hazards Consideration Analysis

INTRODUCTION

The secondary containment completely surrounds the primary containment. During normal operation, the secondary containment is maintained at a pressure equal to or more negative than -0.25 inch water gauge (WG) with respect to the surrounding outside atmosphere by the use of the normal ventilation system which discharges air to the outside environment. This normal ventilation system is not capable of filtering out radioactivity. SECONDARY CONTAINMENT INTEGRITY, as defined by the Technical Specifications, requires this negative pressure. In addition, during normal and accident conditions, secondary containment air is cooled by water from Lake Ontario which is circulated through numerous unit coolers in secondary containment by the plant service water system.

Following a postulated Loss of Coolant Accident (LOCA), the normal ventilation system is automatically secured and the Standby Gas Treatment System (SGTS), which filters out radioactive material, is automatically initiated. The SGTS re-establishes and maintains secondary containment at a pressure equal to or more negative than -0.25 inch WG with respect to the surrounding atmosphere to prevent the uncontrolled and unfiltered release of radioactive material from the secondary containment. The accident scenario results in a change in the heat gain and heat removal capabilities in the secondary containment which, together with the startup delay times of the SGTS and the Category I unit coolers, cause an initial increase in secondary containment pressure. The SGTS then works in conjunction with the unit coolers to re-establish a pressure equal to or more negative than -0.25 inch WG.

The time interval between the beginning of the accident scenario and the re-establishing of a differential pressure of -0.25 inch WG is defined as the "drawdown time." This time interval is calculated using a drawdown analysis that models the pressure response of secondary containment to the changes in heat load and heat removal capabilities in addition to inleakage rate and SGTS performance during a LOCA.

The following postulated scenario is used for the radiological evaluation of a design basis LOCA.

During a LOCA, radioactive steam is released from a pipe rupture which can pressurize primary containment. The pressurized primary containment can potentially release radioactive material to the environment predominately through primary containment leakage and bypass leakage.

Primary containment, which is pressurized due to the LOCA, leaks radioactivity into secondary containment. Prior to the establishment of a -0.25 inch WG in secondary containment, it is assumed that radioactivity in primary containment is released directly to the environment, unfiltered and at ground level, without taking credit for mixing or holdup in secondary containment. The release of radioactivity prior to restoring SECONDARY CONTAINMENT INTEGRITY is the "drawdown release."

Once SECONDARY CONTAINMENT INTEGRITY has been re-established, primary containment leakage is assumed to mix in secondary containment and be released to the environment via the SGTS as a filtered and elevated release. The release of radioactivity after the establishment of SECONDARY CONTAINMENT INTEGRITY is defined as the "post-drawdown release." It is assumed that primary containment leakage mixes with 50% of secondary containment free volume prior to being drawn into the SGTS. The current radiological evaluation assumes a drawdown time of 6 minutes.

Bypass leakage is leakage from piping systems that either communicate with the reactor coolant pressure boundary or with the primary containment air space and terminate outside of secondary containment. Since this leakage bypasses secondary containment, it is unaffected by the drawdown time and the establishment of SECONDARY CONTAINMENT INTEGRITY. Therefore, bypass leakage is considered an unfiltered ground level release for the duration of the LOCA.

The source term specifies the amount and chemical form of the fission product species released as well as the characteristics or timing of the release. Regulatory Guide (RG) 1.3, Revision 2, entitled "Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss of Coolant Accident for Boiling Water Reactors," assumes the following source term:

1. Fifty percent of the equilibrium radioactive iodine inventory developed from maximum full power operation of the core is immediately available for leakage to the primary containment, 50% of which subsequently plates out. Ninety-one percent of the resulting 25% is in the form of elemental iodine, 5% of this 25% in the form of particulate iodine, and 4% of this 25% in the form of organic iodides.

2. One hundred percent of the equilibrium radioactive noble gas inventory developed from maximum full power operation of the core is immediately available for leakage from primary containment.

In addition, R.G. 1.3 takes no credit for retention of the iodine in the suppression pool.

The current radiological evaluation of a DBA-LOCA at NMP2 incorporates the above aspects of the drawdown and the post-drawdown release of primary containment leakage, a drawdown time of 6 minutes, a R.G. 1.3 source term and secondary containment bypass leakage in determining the radiological consequences of an accident. The current radiological evaluation, as described in USAR section 15.6.5 and Table 15.6-16b, demonstrates that the radiological doses are within the guidelines of 10 CFR Part 100 and General Design Criterion (GDC) 19 of 10 CFR 50, Appendix A.

__Secondary Containment Drawdown Issue__

This issue developed as a result of Niagara Mohawk Power Corporation (NMPC) discovering that the original drawdown analysis for NMP2 did not use the most limiting design assumptions. The original analysis did not appropriately reflect the effect of the differential temperature between secondary containment atmosphere and service water on drawdown time. In addition, the original analysis, consistent with the Standard Review Plan, assumed a LOCA concurrent with a loss-of-offsite power (LOOP) and a single active failure of a component (i.e., an emergency diesel generator) as producing the most severe design condition. However, a subsequent evaluation determined that the LOCA without a LOOP but with a loss of the Division II 600 volt bus produces the greatest heat load and consequently the longest drawdown time. NMPC's review also identified additional parameters affecting the drawdown time requiring additional changes to the original drawdown analysis. These parameters included service water temperature, secondary containment air temperature and outside air temperature.

In its letter dated August 26, 1988 (NMP2L 1159), NMPC transmitted to the NRC a revised secondary containment drawdown analysis. Additional information regarding the secondary containment drawdown issue was provided in subsequent transmittals to the Nuclear Regulatory Commission (NRC) dated June 7, 1990 (NMP2L 1238); September 7, 1990 (NMP2L 1251); January 10, 1991 (NMP2L 1274); June 1, 1992 (NMP2L 1346); and January 26, 1993 (NMP2L 1368) and in meetings on August 22, 1991 and October 22, 1992.

As an interim measure, NMPC has imposed certain compensatory measures through administrative controls to ensure that the radiological consequences of a DBA-LOCA remain within 10 CFR Part 100 guideline values and GDC 19 criteria. These controls include maintaining an adequate differential temperature between the air in secondary containment and service water pump discharge temperature and a more restrictive limitation on inleakage and drawdown time than currently exists in the Technical Specifications to ensure that a -0.25 inch WG is established in secondary containment in less than or equal to 6 minutes following a DBA-LOCA. In addition, deliberate heating of the secondary containment is required to maintain an adequate differential temperature during the warmer months of the year.

The plant Technical Specifications, in accordance with Limiting Conditions for Operation 3.7.1.1 for the service water system, permit unrestricted full power operation of NMP2 with service water temperatures up to and including 81°F. Typically, the drawdown analysis requires a differential temperature of up to 23°F between secondary containment air temperature and service water pump discharge temperature. Together, these requirements can result in secondary containment air temperatures of up to 104°F. Based upon experience, deliberate heating of secondary containment is required for approximately 6 months during a year to satisfy the drawdown analysis requirements.

Working in the hot environment of secondary containment impacts the performance of individuals performing tasks. The use of radiation protection measures, such as full body cotton coveralls, cotton gloves, cotton hoods, full body waterproof coveralls, rubber gloves, and rubber boots reduces the effectiveness of the body's cooling mechanism and further exacerbates the effect of the hot environment of secondary containment on worker performance. The deliberate heating of secondary containment, while assuring doses remain below 10 CFR Part 100 guidelines and GDC 19 criteria during a LOCA, creates a working environment which promotes decreased performance, increased radiation exposure, increased potential for worker injury, and an increased potential for personnel errors. In addition, deliberate heating adversely affects the service life of equipment within secondary containment. Ultimately, this results in more frequent replacement of equipment.

As the heat load in the spent fuel pool increases due to the offloading of spent fuel from the reactor during refueling outages, the required differential temperature also increases. With increasing differential temperature requirements, there exists an increasing likelihood that the plant may be shut down due to the inability to maintain an adequate differential temperature during hot summer months.

__Potential Solutions to the Secondary Containment Drawdown Issue__

NMPC has investigated several solutions to the Drawdown Issue. These potential solutions are evaluated below:

1. Replace the current SGTS with a new system of sufficient capacity that would eliminate any dependence on unit coolers to achieve and maintain SECONDARY CONTAINMENT INTEGRITY during a LOCA. The existing SGTS building is not large enough to contain the increased size of the SGTS. A new Category I building would need to be built. This solution was rejected due to cost.

2. Continue deliberate heating of secondary containment to satisfy the requirements of the drawdown analysis. This solution was rejected due to the above discussed concerns.

3. Replace the existing SGTS with a system of the largest possible capacity that can be accommodated by the existing SGTS building. NMPC's initial evaluation of this option was favorable and, accordingly, a detailed design was developed. In a letter dated June 1, 1992, NMPC provided to the Staff the analysis and design concepts of the new SGTS. In a meeting with the Staff on October 22, 1992, Niagara Mohawk discussed the new SGTS design and associated Technical Specification changes. The design and the removal/installation activities are discussed below.

   The new SGTS would have been composed of two 100% capacity subsystems. A new SGTS subsystem would have employed a two speed fan which would have operated in unison with an upstream variable vane damper. This damper would have been located between the two speed fan and the activated charcoal bed. The variable vane damper would have operated in conjunction with the two speed fan to control secondary containment pressure. For a SGTS, the use of a two speed fan inline with a variable vane damper would have been a prototype design.

   The new SGTS would have had one subsystem designated as lead and the other subsystem as lag. These subsystems would have automatically switched lead/lag designations depending on failure modes.

   The new SGTS subsystems would have replaced the existing simpler subsystems which employ a single speed fan immediately downstream of the activated charcoal bed. Currently, secondary containment pressure control is achieved by a recirculation line containing a variable position valve. This recirculation line circulates air from the discharge of the fan to the intake of the activated charcoal bed. The existing design has no lead/lag designation for either subsystem. Currently, each subsystem would continue to run during post accident conditions until manually secured by operator action, whereas, the new SGTS subsystem, designated as lag, would have automatically shut down.

The pre-outage work would have included:

a. installation of new conduit runs,

b. partial pulling of electrical cables,

c. rigging equipment setup and

d. erection of scaffold platforms.

Significant electrical work would have been required to remove and install the SGTS. This estimated work includes:

a. installation of 5 miles of new cabling,

b. removal of 1.5 miles of cabling,

c. repulling of 0.75 miles of cabling,

d. installation of 0.5 miles of seismically supported electrical conduit,

e. affecting 1300 electrical connections by lifting and reterminating existing electrical leads or by new electrical connections,

f. breaching and resealing 200 penetrations for the control room and secondary containment pressure boundary which provide air, water and/or fire barriers,

g. disruption of the control and relay rooms by:

  - removal of floor panels to allow work on cabling,

  - addition of and modification to components inside electrical cabinets (i.e., switches, relays, annunciators, etc.)

The total cost of the new SGTS considering labor (85,000 hours which equates to 4 million dollars), material and handling (1.6 million dollars, of which 0.3 million have already been spent), and lost generation costs (10 to 12.5 million dollars) would have been approximately 15 million dollars.

The third refueling outage lasted 58 days and NMPC currently anticipates that the fourth refueling outage will last 45 days without installation of the new SGTS design. The fourth refueling outage would have required an increase of 20 to 25 days to permit installation of the new SGTS design. The complexity and magnitude of the outage activities during the increased outage duration would have placed a significant burden on the outage team to manage shutdown risks.

In a letter dated January 26, 1993, NMPC informed the Staff of Niagara Mohawk's decision not to replace the SGTS during the third refueling outage. As discussed in that letter, this decision was based upon a preliminary assessment of the recently issued draft

NUREG-1465, "Accident Source Terms for Light Water Nuclear Power Plants," its potential for application to NMP2 and the possibility of resolving the drawdown issue without the financial and plant impact associated with the replacement of the SGTS.

4. Remove certain undue conservatisms of the source term specified in R.G. 1.3 to:

   - allow an extended drawdown time with doses continuing to remain below 10 CFR Part 100 guideline values and GDC 19 criteria, and

   - allow a reduction in the required differential temperature between service water and secondary containment air from current valves such that deliberate heating of secondary containment is no longer anticipated.

Niagara Mohawk's assessment of this option leads to the conclusion that it is safer and more prudent to resolve the secondary containment drawdown issue than utilization of the new SGTS design or implementation of any of the other alternatives considered. The evaluation of the revised source term approach is presented below.

DESCRIPTION OF PROPOSED CHANGE

NMPC proposes a change to Surveillance Requirements 4.6.5.1.c.1, drawdown time testing, 4.6.5.1.c.2, inleakage testing, for SECONDARY CONTAINMENT INTEGRITY and Bases Section B3/4.6.5, "Secondary Containment." The current version and the proposed change is:

Current version of SR 4.6.5.1.c.1

Verifying that each standby gas treatment subsystem will draw down the secondary containment to greater than or equal to 0.25 inch of vacuum water gauge in less than or equal to 120 seconds when starting at a pressure no less than zero psig, and

Proposed change to SR 4.6.5.1.c.1

Verifying that each standby gas treatment subsystem will draw down the secondary containment to greater than or equal to 0.25 inch of vacuum water gauge in less than or equal to 66.7 seconds by adjusting test conditions to drawdown analysis conditions when starting at a pressure no less than zero psig, and

Current version of SR 4.6.5.1.c.2

Operating one standby gas treatment subsystem for 1 hour and maintaining greater than or equal to 0.25 inch of vacuum water gauge in the secondary containment at a flow rate not exceeding 3190 cfm.

Proposed change to SR 4.6.5.1.c.2

Operating one standby gas treatment subsystem for 1 hour and maintaining greater than or equal to 0.25 inch of vacuum water gauge in the secondary containment at an adjusted flow rate not exceeding 2670 cfm.

Current version of Bases Section B3/4.6.5

The drawdown time limit has been established considering the same fan performance .. building inleakage assumptions as in the post-LOCA analysis except that, since the surveillance test is performed when the plant is shut down, (1) post-LOCA heat-loads are not present; (2) the initial secondary containment pressure is atmospheric; and (3) loss of offsite power is not assumed. Meeting this drawdown time verified that secondary containment leakage and fan performance are consistent with the assumptions of the LOCA analysis.

Proposed change to Bases Section B3/4.6.5

To prevent exfiltration, secondary containment inleakage is limited to less than 100 percent of the containment free air volume per day. Since the exhaust air flow rate is measured after it passes through the SGTS, the surveillance test result must be adjusted for the volumetric changes that occur as the exhaust air flows through the SGTS to reflect the volume of air exhausted from the building. In addition, the surveillance test result must be adjusted to account for the negative pressure present in the secondary containment during the surveillance test, which is normally more negative than the required -0.25 inch water gauge. Secondary containment inleakage varies with secondary containment air and outside air temperatures, with the highest inleakage occurring at the highest anticipated secondary containment temperature and at the lowest anticipated outside air temperature. The test data is adjusted to the limiting conditions of -20°F outside air and 105°F secondary containment air temperature to assure that the actual inleakage is within the design limit of secondary containment inleakage. These adjustments are discussed in USAR Section 6.2.3.4.

The drawdown time limit has been established considering the same fan performance as in the post-LOCA response analysis. The post-LOCA heat load is not considered in the surveillance drawdown time limit because the test is conducted when the plant is shutdown. In addition, the initial building vacuum is assumed to be zero to reflect the test condition. To assure that the SGTS is capable of meeting its function, the drawdown time limit is calculated as a function of actual inleakage that occurs during the surveillance test. Meeting this drawdown time verifies that the SGTS performance is consistent with the assumptions of the LOCA analysis. The methodology to determine the drawdown time is discussed in USAR Section 6.2.3.4.

EVALUATION

The radiological evaluation for the design basis LOCA, which reflects a revised source term and an assumed drawdown time of 40 minutes, demonstrates that doses remain below 10 CFR Part 100 guideline values and GDC 19 criteria. Even though the radiological doses for the revised source term increase, they are comparable to the doses for the R.G. 1.3 source term. The revised source term removes some of the undue conservatism from the source term of R.G. 1.3 while continuing to provide a conservative representation of the timing and the release of radioactivity during the accident. The revised source term is based on documented NRC sponsored research from the past several years.

The proposed change to the drawdown time of SR 4.6.5.1.c.1 and to the secondary containment inleakage limit of SR 4.6.5.1.c.2 have been established based on consideration of the revised source term. The proposed change to these SRs establishes the performance requirements of the Standby Gas Treatment System and the Secondary Containment to provide assurance that a secondary containment pressure of a -0.25 inch water gauge with respect to the outside surrounding atmosphere will be established in less than 40 minutes following a Design Basis Loss of Coolant Accident. The proposed change to the SRs and the use of a revised source term will allow a reduction in the required differential temperature between service water and secondary containment air from current valves such that deliberate heating of secondary containment is no longer anticipated.

The proposed Technical Specification change considers the absence of post DBA-LOCA heat loads during the performance of surveillance testing. Furthermore, adjustments have been provided to account for variations in test conditions. The Surveillance Requirements assure proper performance and continued operability of secondary containment and the Standby Gas Treatment System. The NMP2 USAR will be revised to reflect the 40 minute drawdown time. The USAR will also be revised to include a discussion of the performance of surveillance testing, including the adjustments to test data.

The revised source term, inleakage testing and drawdown time testing are described below.

Revised Source Term

NMPC proposes to revise its design basis LOCA radiological analysis, to support resolution of the drawdown issue by altering the assumed immediate (t=0) release of the R.G. 1.3 source term. Instead, the release of fuel fission product inventory is phased over the first forty minutes of the postulated accident. The revised source term is based on NRC sponsored research from the past several years, and subsequently reflected in draft NUREG-1465. The essence of the proposed source term revision is to phase in the TID-14844 fission product release to containment over a forty minute period, using available technical documentation to determine appropriate timing and release magnitude.

A summary of the proposed changes to the design basis is:

1. All pathways other than primary containment leakage continue to use the R.G. 1.3 source term at t=0; therefore, doses from these pathways remain unaffected and the leak rate from primary containment is unchanged from that currently assumed;

2. A source term equivalent to 10% of the TID-14844 source term is modeled as a puff release to primary containment at t=0;

3. An additional source term equivalent to 30% of the TID-14844 source term is applied at t=30 minutes, and is modeled as a puff release to primary containment;

4. An additional source term equivalent to 60% of the TID-14844 source term is applied at t=40 minutes post-LOCA, and is modeled as a puff release to primary containment;

5. No credit for secondary containment is taken for the first 40 minutes post-LOCA.

6. All analyses reflect the proposed power uprate for NMP2 in NMPC's letter to the NRC dated July 22, 1993 (NMP2L 1397).

Basis for Source Term Revision

Current industry and NMP2 accident source terms are based on TID-14844, entitled "Calculation of Distance Factors for Power and Test Reactor Sites," March 1962, and R.G. 1.3, entitled, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss of Coolant Accident," revision 2, 1974. Over the past 30 years, a continually developing understanding of reactor accident phenomena and the mechanisms affecting the release of radionuclides during reactor accidents has allowed more detailed and realistic estimates to be made of the effects of postulated accidents at light water reactors (LWRs).

NUREG/CR-4881, entitled, "Fission Product Release Characteristics Into Containment Under Design Basis and Severe Accident Conditions;" NUREG/CR-5747, entitled, "Estimate of Radionuclide Release Characteristics Into Containment Under Severe Accident Conditions;" NUREG/CR-4624, entitled, "Radionuclide Calculations for Selected Severe Accident Scenarios;" WASH-1400, entitled, "Reactor Safety Study;" and NUREG-1150, successor to WASH-1400, entitled, "Severe Accident Risks: An Assessment for Five U.S. Nuclear Power Plants," are among the more significant and recent NRC sponsored source term literature. These documents discuss possible revisions to the magnitude, timing, and composition of radionuclide releases into containment as compared to the guidelines set forth in TID-14844 and R.G. 1.3.

The most recent development regarding accident source terms was the issuance of the NRC's draft NUREG-1465, "Accident Source Terms for Light-Water Nuclear Power Plants," in June 1992. NUREG-1465 is based on calculations for risk significant scenarios, and draws heavily on NUREG/CR-4881 and NUREG/CR-5747. The stated purpose of the draft is "to form the basis for the development of regulatory guidance, primarily for future LWRs." The NUREG also specifically identifies that it "will be made available to existing reactor licensees and can serve as a basis for possible changes to current requirements." The final NUREG-1465 has not yet been issued; however, NMPC believes that the accumulated information on fission product behavior and mechanisms affecting their release are sufficiently developed to permit their application in revising the radiological design basis of the plant. Coupled with the other NUREGs cited previously, a sound technical basis exists for an analytical assumption that delays the initial release of a portion of the TID-14844 source term for at least 30 minutes and completing the release at 40 minutes.

NUREG/CR-4881, NUREG/CR-5747, NUREG/CR-4624 and WASH-1400 describe a "gap" release that occurs following the onset of a postulated LOCA. The gap release consists of activity accumulated in the fuel rod gap that is released when heat generated in the core begins to cause cladding failure. This release consists of small percentages of the more volatile nuclides in the core, while the bulk of the fission products are retained in the fuel matrix.

When the core-wide temperature of the fuel increases to the point where more significant amounts of the fuel fission product inventory can no longer be retained, a second, or "in-vessel," release phase begins. The in-vessel release phase refers to the period of time during which the reactor core is damaged and begins to melt, but is still retained within the vessel. This phase constitutes the design basis for ultimate fission product release magnitude.

NUREG/CR-4881 was issued in 1988 with the objective of reviewing the available light water reactor source term information and formulating a revised approach for estimating radiological releases to containment for fuel damage accidents. Studies of gap releases to containment from simulated, trace irradiated and actual reactor fuel were examined and compared to the gap releases predicted by the study's proposed empirical model.

These estimates and observations were compared to the estimates of gap releases from the CORSOR code of the Source Term Code Package (STCP). The NUREG also incorporated information developed in NUREG/CR-4624 for a BWR large break LOCA scenario (V-sequence), which provides data that is specifically applicable to NMP2's large break LOCA design basis event. Figure 1 presents the normalized iodine release fractions with respect to time for the BWR V-sequence large break LOCA scenario in NUREG/CR-4624 and the proposed NMP2 release fractions.

NMP2's proposed revision to the timing of the TID-14844 source term release, i.e., 10% at t=0, 30% additional at t=30 minutes, and 60% additional at t=40 minutes, is consistent with, and bounds the NUREG/CR-4624 values for normalized iodine release for a representative BWR large break LOCA (reference Figure 1). The revised source term completely bounds the V-sequence source term in that the integrated release at any given period in time is greater than the V-sequence integrated release. The proposed fission product release timing is significantly earlier than the one hour value proposed in draft NUREG-1465, and the initial puff release is fully consistent with NUREG/CR-4881 values for gap releases. In addition, NMPC's detailed review of NUREG/CR-5747 and WASH-1400 indicates no inconsistencies with the proposed revision to NMP2's design basis source term.

Based on the review of the above information in the NUREGs and the WASH report, the proposed change to the Nine Mile Point Unit 2 design basis source term is technically justified, is consistent with published literature, and is conservative with respect to the NRC's draft NUREG-1465 for revised source terms.

Radiological Analysis Employing the Revised Source Term

The design basis LOCA was reanalyzed employing the revised source term. The revised analysis retains all of the design basis assumptions, including 50% iodine deposition in primary containment, and input parameters of the original analysis with the exception of the source term revisions for the primary containment leakage release path and the drawdown duration, during which secondary containment is considered unavailable. The new DBA LOCA doses based on the revised source term are presented below, along with the current doses from USAR Table 15.6-16b for comparison purposes. The control room and low population zone (LPZ) doses are for a 30 day duration, and the exclusion area boundary (EAB) doses are for a 2 hour duration. The doses and limits are expressed in rem.

TABLE 1 RADIOLOGICAL DOSES			
Receptor	Current LOCA Dose	Revised LOCA Dose	Dose Limits
CONTROL ROOM			
Thyroid	15.5	15.7	30
Gamma	1.6	1.6	5
Beta	22.9	22.9	30
EAB			
Thyroid	232	271.4	300
Gamma	6.3	5.8	25
Beta	4.2	3.7	None
LPZ			
Thyroid	56.1	59.4	300
Gamma	2.6	2.5	25
Beta	1.9	1.8	None

The current DBA LOCA scenario presented in USAR Section 15.6.5 results in control room, EAB, and LPZ doses that are below the applicable criteria of GDC 19 and 10 CFR 100. The proposed change to the source term results in doses that are somewhat higher, but comparable to, the current doses, and are also within their respective limits.

The results are nearly the same for the two scenarios in spite of the significantly longer drawdown time (40 minutes vs 6 minutes) due to the nearly compensating effect of the revised source term. Previously, 100% of the TID-14844 source term was available for the 6 minute drawdown period. The proposed revision effectively has 10% of the source term available for 40 minutes and an additional 30% of the source term available for 10 minutes (t = 30 to t = 40 minutes). From 40 minutes on the releases are consistent with TID-14844. The dose impacts of the increased drawdown time and the delayed source term release are nearly compensating, resulting in only small increases in overall doses.

The DBA-LOCA also serves as a basis for calculating equipment qualification doses. NMPC evaluated the impact of the revised source term on both airborne and waterborne equipment qualification doses. Niagara Mohawk has determined that the equipment qualification doses using the current DBA-LOCA are bounding with respect to the doses from the revised LOCA analysis. The equipment qualification doses from the current DBA-LOCA are conservative and do not need to be recalculated to reflect the change in the source term.

The DBA-LOCA also serves as the basis for addressing vital area access concerns. Because the source term change in the revised LOCA analysis is limited to the first hour post-LOCA, and the vital area access doses are all calculated from 1 hour and beyond, the revised LOCA analysis does not impact vital area access doses.

The revised LOCA analysis has been performed utilizing the same design basis assumptions and data as the current analysis, with the exceptions noted above. Although conservatism has been maintained with respect to the timing of fission product releases as described in draft

NUREG-1465, NMPC has considered the balance of the draft NUREG to ensure that other aspects of the core damage accident progression and fission product release discussed in draft NUREG-1465 would not lead to higher off-site or control room doses than those corresponding to the revised R.G. 1.3 DBA source term. The following items have been considered as they might affect the proper use of revised release timing:

1. Impact of other radionuclides, e.g., tellurium, on the dose assessment;

2. Time dependent particulate deposition vs instantaneous plateout in containment;

3. Impact of deposition models for bypass flowpaths; and

4. Impact of iodine re-evolution for that fraction that settles out of the containment atmosphere during the early part of the dose assessment.

NMPC has concluded that the revised R.G. 1.3 approach is conservative compared to a complete application of draft NUREG-1465.

Additionally, other available options to mitigate drawdown impacts have not been applied. This maintains a significant level of conservatism in the approach to resolving the drawdown issue, while operating within the envelope of published technical information. Examples of such conservatisms include:

1. no credit for suppression pool scrubbing has been taken;

2. all other paths, including bypass leakage, retain the current design basis source term;

3. the analysis of attainable drawdown duration contains conservatism with respect to unit cooler performance and spent fuel pool heat loads.

Conclusions Regarding the Revised Source Term

The decision to use the revised source term in lieu of the new SGTS or other alternatives is based on the following:

1. The proposed change in the source term is technically justifiable, continues to provide a conservative representation of the timing and the release of radioactivity during a DBA-LOCA and is consistent with ongoing industry and Staff source term revision efforts.

2. The proposed change in the source term, assuming a drawdown time of 40 minutes, will produce radiological doses which:

    a. are within the guideline values of 10 CFR Part 100,

    b. meet the criteria of GDC 19 and

    c. increase somewhat but are comparable to those currently depicted in USAR Table 15.6-16b.

3. Deliberate heating of secondary containment during the summer months is no longer anticipated and thereby:

   a. improves worker safety,

   b. improves worker efficiency and productivity and as a result:

      - reduces radiation exposure and

      - decreases plant operating costs

   c. reduces potential for human errors

   d. reduces the adverse effect on the service life of equipment.

4. There are potential risks associated with the originally proposed new SGTS due to the complexity and magnitude of the removal and installation activities. These risks include the potential for injury to plant personnel and damage to plant equipment. The installation of a new SGTS would have placed a significant burden on the outage team to manage refueling outage shutdown risks. The proposed change to the source term eliminates these risks and the challenges to the management of shutdown risks during a refueling outage.

5. The new SGTS would have required significant changes to operating, maintenance and instrumentation and control procedures. The new SGTS would have required changes to 11 surveillances, whereas the revised source term requires changes to only 2 surveillances. Furthermore, training would be required for operators and technicians to support the operation of the new SGTS design. The use of a revised source term eliminates the need for significant procedure changes and training.

6. The proposed change in the source term eliminates the use of a prototype SGTS design and reliance on a more complex design.

7. The significant economic hardship associated with the use of the new SGTS is eliminated. Implementation of the revised source term requires a very small fraction of the total cost of the new SGTS.

In summary, the revised LOCA analysis, including the application of the phased-in source term release for the 40 minute drawdown duration, results in control room, EAB and LPZ doses that are within applicable limits and increase somewhat but are comparable to the current LOCA doses presented in the USAR. The revised LOCA analysis does not adversely impact equipment qualification or vital area access.

Inleakage Testing

The current inleakage limit of 3190 cfm in Technical Specification SR 4.6.5.1.c.2 was based on non-limiting parameters. These non-limiting parameters included an overestimated secondary containment free air volume and excluded air density adjustments for outside air temperature.

Furthermore, the current inleakage limit of 3190 cfm did not reflect consideration of variable test conditions, which are discussed below.

Since the exhaust air flow rate is measured after it passes through the SGTS, the surveillance test result must be adjusted for the volumetric changes that occur as the exhaust air flows through the SGTS system to reflect the volume of air exhausted from the building. In addition, the surveillance test result must be adjusted to account for the negative pressure present in the secondary containment during the surveillance test, which is normally more negative than the required -0.25 inch WG. Secondary containment inleakage varies with secondary containment air and outside air temperatures, with the highest inleakage occurring at the highest anticipated secondary containment temperature and at the lowest anticipated outside air temperature. The test data is adjusted to the limiting conditions of -20°F outside air temperature and 105°F secondary containment air temperature to assure that the actual inleakage is within the design limit of secondary containment inleakage. Updated Safety Analysis Report (USAR) Section 6.2.3.4 will be revised to include a discussion of these adjustments and the methodology used to determine the inleakage rate.

As an interim measure, NMPC has imposed certain compensatory measures through administrative controls to ensure that the radiological consequences of a DBA-LOCA remain within 10 CFR Part 100 guideline values and GDC 19 criteria. These controls include maintaining an adequate differential temperature between service water and secondary containment air by deliberate heating of secondary containment and a more restrictive limitation on inleakage than currently exists in the Technical Specifications. Presently, the secondary containment inleakage for the fourth operating cycle is restricted to less than or equal to 1800 cfm at 40°F outside air temperature, which is equivalent to 2060 cfm at -20°F outside air temperature. The proposed maximum inleakage of 2670 cfm at -20°F is approximately 6% less than one change of secondary containment free air volume per day, which is equivalent to 2850 cfm. In accordance with NUREG-0800, "Standard Review Plan," Section 6.2.3, secondary containment inleakage can be no more than one change of secondary containment free air volume per day. Therefore, a maximum allowable inleakage value of 2670 cfm is acceptable.

Drawdown Time Testing

The current drawdown time limit of 120 seconds in Technical Specification SR 4.6.5.1.c.1 was based on a maximum inleakage limit of 3190 cfm. However, as discussed above, the inleakage limit was based on non-limiting parameters and did not reflect consideration of variable test conditions.

As an interim measure, NMPC has procedurally imposed a more restrictive drawdown time limit than currently exists in the Technical Specifications to ensure that the radiological consequences of a DBA-LOCA remain within 10 CFR Part 100 guideline values and GDC 19 criteria. Presently, the maximum allowable drawdown time for the fourth operating cycle is restricted to 57 seconds, assuming a maximum allowable inleakage of 2290 cfm at -20°F outside air temperature. Considering the proposed change to the inleakage limit and the variable test conditions, the new drawdown time limit is 66.7 seconds. The drawdown time limit has been established considering the same fan performance as in the post-LOCA response analysis. The post-LOCA heat load is not considered in the drawdown time limit because the test is conducted when the plant is shutdown. In addition, the initial building vacuum is assumed to be zero to reflect the test condition. To assure that the SGTS is capable of meeting its function, the drawdown time limit is calculated as a function of actual inleakage that occurs during the surveillance test. Meeting this drawdown time verifies that the SGTS performance is consistent with the assumptions of the LOCA analysis. USAR Section 6.2.3.4 will be revised to include a discussion of these adjustments and the methodology used to determine the drawdown time.

CONCLUSION

NMP2 is currently operating with limitations on the allowable differential temperature between secondary containment air and service water. These limits assure compliance with the required secondary containment post-LOCA drawdown time by maintaining adequate heat removal capability for secondary containment unit coolers. Compliance with these limits requires heating of the secondary containment during the warmer months resulting in elevated temperatures which (1) impact habitability within the secondary containment and thereby affect worker performance, (2) impact the service life of equipment and (3) have the potential to force a plant shutdown should cooling water temperatures approach or exceed historical levels. The proposed Technical Specification change will allow a reduction in the required differential temperature from current values such that deliberate heating of the secondary containment is no longer anticipated.

The current Technical Specifications are based on a required 6 minute post-LOCA secondary containment drawdown time and the source term provided by R.G. 1.3. The proposed Technical Specification change is based on a revised source term which phases in the R.G. 1.3 source term for containment leakage pathways over the first 40 minutes of the DBA-LOCA. The post-drawdown release, which commences at 40 minutes after the onset of the DBA-LOCA, follows the source term assumptions of R.G. 1.3. With the exception of the drawdown release, all other release pathways, such as bypass leakage, also follow the source term assumptions of R.G. 1.3. The revised source term removes some of the undue conservatism from the R.G. 1.3 source term while continuing to provide a conservative representation of the timing and the composition of the release of radioactivity from a DBA-LOCA.

The proposed change to the Technical Specifications revises existing surveillances for drawdown time and inleakage testing for secondary containment to reflect the revised drawdown analysis, the revised source term and the maximum allowable secondary containment inleakage. Adjustments have been provided to account for variations in test conditions. Together, these Surveillance Requirements assure proper performance and continued operability of secondary containment and the SGTS. The SGTS will be able to achieve and maintain the required -0.25 inch WG within secondary containment within the required 40 minutes. By maintaining a drawdown time of 40 minutes, radiological doses will remain below 10 CFR Part 100 guideline values and GDC 19 criteria and deliberate heating of secondary containment will no longer be anticipated. For these reasons, there is reasonable assurance that the change that would be authorized by the proposed amendment can be implemented without endangering the health and safety of the public and is consistent with the common defense and security.

NO SIGNIFICANT HAZARDS CONSIDERATION ANALYSIS

10 CFR 50.91 requires that at the time a licensee requests an amendment, it must provide to the Commission its analysis using the standards in 10 CFR 50.92 concerning the issue of no significant hazards consideration. Therefore, in accordance with 10 CFR 50.91, the following analysis has been performed:

<u>The operation of Nine Mile Point Unit 2, in accordance with the proposed amendment, will not involve a significant increase in the probability or consequences of an accident previously evaluated.</u>

Secondary containment and the SGTS are not initiators or precursors to an accident. Secondary containment provides a pressure boundary, with limited inleakage, for the purpose of establishing a negative pressure to prevent a ground level unfiltered release of radioactivity. SGTS responds to accidents involving a release of radioactivity to the secondary containment by establishing and maintaining a negative pressure inside secondary containment and by providing an elevated filtered release. Therefore, changes to SECONDARY CONTAINMENT INTEGRITY surveillances cannot affect the probability of a previously evaluated accident.

The revised source term removes some of the undue conservatism from the R.G. 1.3 source term while continuing to provide a conservative representation of the timing and release of radioactivity during a DBA-LOCA. In addition, the revised source term is consistent with current industry and NRC sponsored literature regarding source term revision efforts.

Currently, using the source term assumptions of R.G. 1.3 and an assumed drawdown time of 6 minutes, the radiological doses for a DBA-LOCA are below the guidelines of 10 CFR Part 100 and GDC 19 criteria. The calculated doses, considering the revised source term and an assumed secondary containment drawdown time of 40 minutes, are not significantly higher than the previously calculated doses. The new doses are below 10 CFR Part 100 guideline values and GDC 19 criteria.

The proposed changes to the surveillances provide assurance that the performance of the SGTS and secondary containment supports the radiological analysis. Accordingly, as shown in Table 1, operation with the SGTS and the proposed change to the surveillances for secondary containment will not significantly increase the consequences of an accident previously evaluated.

<u>The operation of Nine Mile Point Unit 2, 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 proposed change to the surveillances ensures that the SGTS and secondary containment will be available to respond to an accident such that the guidelines of 10 CFR Part 100 and the limits of GDC 19 are not exceeded. Accordingly, the proposed Technical Specification change will not create the possibility of a new or different kind of accident from any accident previously evaluated.

The operation of Nine Mile Point Unit 2, in accordance with proposed amendment, will not involve a significant reduction in a margin of safety.

The SGTS exhausts the secondary containment atmosphere to the environment through the filtration system. To verify the SGTS has not degraded, SR 4.6.5.1.c.1 verifies that each SGTS subsystem will establish and maintain a pressure in the secondary containment that is equal to or more negative than -0.25 inch WG within the required time limit. To verify secondary containment is intact, SR 4.6.5.1.c.2 demonstrates that one SGTS subsystem can maintain a pressure which is equal to or more negative than -0.25 inch WG for 1 hour at a flow rate less than or equal to the maximum allowed inleakage. The 1 hour test period allows secondary containment to be in thermal equilibrium at steady state conditions. Furthermore, as an interim measure, NMPC implemented certain compensatory measures through administrative controls to ensure that the radiological consequences of a DBA-LOCA would remain within regulatory criteria. Together, these tests and the compensatory measures assure SGTS performance and secondary containment boundary integrity.

The proposed change to these surveillances incorporate changes to the design basis, i.e., a revised source term. The new inleakage is 2670 cfm which is less than one change of the secondary containment free air volume per day. The new drawdown time limit reflects consideration of the revised source term and the proposed change in the secondary containment inleakage limit. Due to the effects of service water temperature, inside and outside temperature, flow measurement inaccuracies and actual test pressures, meeting the current SRs does not by itself assure adequate SGTS performance. Therefore, the surveillances' results are adjusted to account for actual test conditions. Compliance with the proposed surveillances assures that the SGTS can achieve and maintain -0.25 inch WG within 40 minutes following a postulated DBA-LOCA. Achieving -0.25 inch WG within 40 minutes assures that radiological doses will remain below regulatory limits and will be comparable to the doses set forth in the USAR (see Table 1). Therefore, the proposed surveillances, together with the proposed adjustments, provide adequate assurance of SGTS performance and secondary containment boundary integrity. Accordingly, the proposed Technical Specification change will not involve a significant reduction in a margin of safety.

Therefore, as determined by the analysis above, this proposed amendment involves no significant hazards consideration.

(FIGURE 1)

NORMALIZED IODINE RELEASE FRACTION VS TIME AFTER DBA LOCA