SECONDARY CONTAINMENT INTEGRITY

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.

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
DOCKET NO. 50-410

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 design basis accident loss of coolant accident (DBA-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 currently used for the radiological evaluation of a DBA-LOCA.

During a LOCA, radioactive steam is released from a pipe rupture which can pressurize the drywell. The steam is then directed by the downcomers to the suppression pool where the steam is quenched. No credit is currently taken for the pressure suppression pool as a fission product cleanup system. The pressurized primary containment can potentially release radioactive material to the environment, predominately through primary containment leakage, traversing incore probe (TIP) leakage, bypass leakage and, to a lesser extent, Engineered Safety Feature (ESF) systems 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 in secondary containment. The release of radioactivity prior to restoring SECONDARY CONTAINMENT INTEGRITY is the "drawdown release."

TIP leakage leaks primary containment atmosphere into secondary containment through the gap between the cable attached to the TIP and the penetration that carries the cable through the drywell wall. TIP leakage behaves and is treated in an identical manner as primary containment leakage. For the purpose of the radiological analyses in this submittal, reference to primary containment leakage includes the Technical Specification primary containment leakage and TIP leakage.

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." During this period 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.

ESF leakage occurs in secondary containment from emergency safety systems that draw water from the suppression pool after a LOCA. 50% of the core inventory of halogens are assumed to be mixed in the suppression pool. For any leakage of suppression pool water into secondary containment from ESF systems, a fraction of the halogens are assumed to become airborne immediately. ESF leakage was determined to be negligible with respect to containment leakage during the 6 minute drawdown period, and so, only post-drawdown ESF leakage doses were determined.

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 and is defined by 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." The source term is available for leakage from primary containment and from ESF systems at the onset of the DBA-LOCA.

Regulatory Position C.1.f of RG 1.3 allows no credit for retention of the iodine in the suppression pool.

Consistent with the RG 1.3 airborne source term, Standard Review Plan (SRP) Section 15.6.5, Appendix B stipulates that 50% of the core equilibrium iodine inventory should be assumed to be mixed in the sump water (i.e., suppression pool) recirculated through containment external piping systems, which is used for calculating doses from post-LOCA ESF systems leakage, as well as equipment qualification doses. The assumption that 50% of the iodines are mixed in the sump water provides the basis for suppression pool iodine source term.

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

The secondary containment drawdown 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. 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 protective clothing 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 the 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 new SGTS is a significantly more complex system than the current SGTS. The new design would have employed a two speed fan which would have operated in unison with an upstream variable pitch inlet vane damper to control secondary containment pressure. The current SGTS design employs a single speed fan with a recirculation line containing a variable position valve. For a SGTS, the use of a two speed fan inline with a variable pitch inlet vane damper would have been a prototype design.

   The removal and installation of the SGTS would have involved significant refueling outage activities. Refueling outage work would have included the installation of 5 miles of new cabling and 0.5 miles of seismically supported electrical conduit; disturbing 1300 electrical connections; breaching and resealing 200 penetrations for the control room and secondary containment pressure boundaries; and disruption of the control and relay rooms to permit installation of cabling under floor panels and modification of components inside electrical cabinets.

   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 (5 to 7.5 million dollars) would have been approximately 10 million dollars.

   The third refueling outage lasted 58 days and NMPC currently anticipates that the fourth refueling outage will last 55 days without installation of the new SGTS design. The fourth refueling outage would have required an increase of 10 to 15 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, (NMP2L 1368) 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.

   Accordingly, NMPC transmitted by letter dated April 27, 1994 (NMP2L 1468), to the Nuclear Regulatory Commission (NRC) an Application for Amendment to the NMP2 Operating License. Specifically, Niagara Mohawk proposed to revise the design basis radiological analysis and its source term to support an increase in the drawdown time by removing certain undue conservatisms related to the assumption of the immediate release of the source term specified in RG 1.3. During the course of its review, the Staff indicated that other alternatives should be considered.

4. Take credit for fission product scrubbing and retention by the suppression pool and for additional mixing within secondary containment prior to release of radioactivity to the environment. Niagara Mohawk's assessment of this option has determined that this approach provides an acceptable alternative to resolve the secondary containment drawdown issue as an alternative to the new SGTS design. The evaluation of this approach is presented below.

<u>DESCRIPTION OF PROPOSED CHANGE</u>

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:

<u>Current version of SR 4.6.5.1.c.1</u>

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

<u>Proposed change to SR 4.6.5.1.c.1</u>

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

<u>Current version of SR 4.6.5.1.c.2</u>

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.

<u>Proposed change to SR 4.6.5.1.c.2</u>

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 and 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 revised radiological evaluation for the DBA-LOCA demonstrates that doses remain below 10 CFR Part 100 guideline values and GDC 19 criteria. The revised evaluation reflects credit for fission product scrubbing and retention by the suppression pool, additional mixing of primary containment leakage with 50% of secondary containment free air volume prior to the release of radioactivity to the environment and an assumed drawdown time of 60 minutes. The revised radiological doses, in fact, are lower than the doses currently presented in the Updated Safety Analysis Report (USAR).

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 above changes to the radiological evaluation for the DBA-LOCA. The proposed change to these SRs establishes the performance requirements of the SGTS and the secondary containment to provide the basis for the evaluation that a secondary containment pressure of a -0.25 inch WG with respect to the outside surrounding atmosphere will be established in less than 60 minutes following a DBA-LOCA. The proposed change to the SRs and the revised radiological evaluation for the DBA-LOCA will allow a reduction in the required differential temperature between service water and secondary containment air from current values 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 SRs assure proper performance and continued operability of secondary containment and the SGTS. The NMP2 USAR will be revised to reflect the 60 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 use of the pressure suppression pool as a fission product cleanup system, additional mixing within secondary containment, the radiological analysis, inleakage testing and drawdown time testing supporting the proposed Technical Specification change are described below.

<u>Pressure Suppression Pool as a Fission Product Cleanup System</u>

Standard Review Plan (SRP), NUREG-0800, Section 6.5.5, provides guidance for taking credit for fission product scrubbing and retention by the suppression pool. In addition, this SRP section states that it replaces Regulatory Position C.1.f of RG 1.3, which states: "No credit should be given for retention of iodine in the suppression pool." Otherwise, the assumptions of RG 1.3 are used concerning the release of radioactivity during a DBA-LOCA.

The SRP provides criteria that must be met to receive credit for the pressure suppression pool as a fission product cleanup system. Specifically, the criteria from the SRP are:

1. The drywell and its penetrations are designed to ensure that, even with a single active failure, all releases from the reactor core must pass into the suppression pool, except for small bypass leakage.

2. The limiting bypass area for pool bypass leakage from the drywell to the suppression chamber must be no less than that accepted in the review under SRP Section 6.2.1.1.C. Using this limiting bypass area, the overall decontamination factor (DF) is calculated by using the equation provided in SRP Section 6.5.5.III.2.

3. Preoperational tests should ensure that the amount of leakage bypassing the pool is maintained consistent with the assumptions used in assessing the pool's effectiveness in fission product cleanup.

4. Technical Specifications should require periodic inspection to confirm suppression pool depth and drywell leak tightness are consistent with the pool bypass fraction used in computing the overall decontamination factor.

The evaluation of the pressure suppression pool as a fission product cleanup system for NMP2 is presented below. The above criteria of the SRP are met and therefore Niagara Mohawk can take credit for the pressure suppression pool as a fission product cleanup system.

The Primary Containment Isolation System includes the containment isolation valves and associated piping and penetrations necessary to isolate the primary containment in the event of a LOCA. Section 6.2.4 of the USAR describes the Primary Containment Isolation System and Table 6.2-56 identifies the containment isolation provisions for fluid lines and compliance to appropriate GDC requirements. This system is suitably designed to ensure that, even with a single active failure, all releases from the reactor core during a DBA-LOCA will pass through the suppression pool, except for small bypass leakage directly to the suppression chamber.

In accordance with the SRP, the pool bypass fraction is determined by considering the limiting bypass area for pool bypass leakage and the maximum suppression pool water level. The bypass fraction is that percentage of radioactivity in the drywell atmosphere bypassing the suppression pool by leaking to the suppression chamber. The limiting bypass area for pool bypass leakage is 0.054 ft^2. This number was established as a result of an evaluation performed by NMPC following the guidance of SRP Section 6.2.1.1.C. The Staff found this number to be acceptable in its Safety Evaluation Report, NUREG-1047, Section 6.2.1.8. Conservatively, considering the above limiting bypass area and a maximum suppression pool water level within the limits of Limiting Condition of Operation (LCO) 3.6.2.1.a.1, the pool bypass fraction for a DBA-LOCA is 0.003.

The fraction of activity bypassing the suppression pool, i.e., pool bypass fraction, is conservatively calculated by taking the ratio of the amount of steam that has leaked through the limiting bypass area and the amount of steam that has passed through the downcomers during the first five minutes of the DBA-LOCA. In reality, the bulk of the activity that appears in the drywell at time 0 would be scrubbed and retained by the suppression pool within about a minute of a DBA-LOCA. Therefore, a realistic pool bypass fraction could be determined based on the ratio at about one minute into the DBA-LOCA.

The decontamination factor (DF) of the suppression pool is defined as the ratio of the amount of a contaminant entering the pool to the amount leaving. As indicated in the SRP, the Staff accepts a DF value of 10 or less for removal of particulates and elemental iodine for Mark II containments without the need to perform plant specific calculations. A review of industry data and staff sponsored research indicates that minimum suppression pool DFs of 100 to 1000 will be attained for subcooled pools, which is the case that applies to the NMP2 DBA-LOCA. A reduction in DF of one order of magnitude can be conservatively applied, resulting in minimum supportable suppression pool DFs of 10 to 100. Based on this data, application of a DF of 10 for elemental and particulate iodines is appropriate for NMP2. Therefore, NMPC has assumed a DF of 10 for NMP2 which has a Mark II containment. A DF value of one (no retention) is used for noble gases and for organic iodides. Using the equation provided in SRP Section 6.5.5.III.2, a pool bypass fraction of 0.003, a DF of 10 for the 96% of the iodines that are elemental or particulate and a DF of 1 for the 4% of the iodines that are organic, the calculated overall decontamination factor (D) is 7.21.

This value for D is used in the radiological evaluation to determine the consequences of a DBA-LOCA. Therefore, this evaluation takes credit for fission product scrubbing and retention by the suppression pool to lower the amount of radioactivity released during the drawdown period. However, no credit is taken for the pressure suppression pool as a fission product cleanup system for post-drawdown releases or for leakage paths which bypass secondary containment.

A preoperational leak test at the drywell to suppression chamber design pressure differential of 25 psid was performed at NMP2. The purpose of this test was to detect unacceptable leakage in the drywell to suppression chamber vent piping, penetrations, downcomers, vacuum breakers, floor seals, vent seals, and the diaphragm. The acceptance criteria of this test was less than 10% of the minimum bypass leakage capacity of 0.054 ft^2.

Technical Specification SRs were developed to detect unacceptable leakage in the drywell to suppression chamber vent piping, penetrations, downcomers, vacuum breakers, floor seals, and the diaphragm. The surveillance testing includes:

1. SR 4.6.2.1.d.2, low pressure leakage testing at each refueling outage at a differential pressure corresponding to approximately the submergence of the vents with an acceptance criteria of 10% of 0.054 ft^2;

2. SR 4.6.2.1.d.2, visual inspection of the exposed accessible interior and exterior surfaces of the suppression chamber, including each vacuum relief valve and associated piping during each refueling outage; and

3. SR 4.6.4.b.2, monthly operability testing of the drywell to suppression pool vacuum breakers by cycling valves and observation of control room position indication.

Furthermore, Technical Specification SR 4.6.2.1 demonstrates the operability of the suppression pool by verifying the suppression pool water volume to be within the limits specified by LCO 3.6.2.1.a.1. Therefore, NMPC concludes that preoperational and SR testing ensure that the pool depth and the amount of pool bypass leakage are maintained consistent with the assumptions used in assessing the suppression pool's effectiveness in fission product cleanup.

In accordance with the SRP, the use of the pressure suppression pool as a fission product cleanup system is not being used to justify the removal of the SGTS or other filtered exhaust system from their status as ESFs.

NMPC concludes the following based upon the above evaluation of the pressure suppression pool as a fission product cleanup system:

1. The pool will reduce the fission product content of the steam-gas mixture flowing through the pool following accidents.

2. The pool will decontaminate the flow by a factor of at least 10 for molecular iodine vapor and by a factor of at least 10 for particulate fission products.

3. No significant decontamination of noble gases and organic iodides will occur in the pool.

4. The system is largely passive in nature, and the active components are suitably redundant so that the suppression pool's fission product attenuation function can be accomplished assuming a single active failure. Therefore, the system meets the requirements of GDC 41 with respect to the iodine removal function following a postulated LOCA.

5. The preoperational and surveillance tests ensure a continued state of readiness, and that the bypass of the pool is unlikely to exceed the assumptions used in the dose assessments;

6. Since the primary containment is accessible during refueling outages to permit appropriate inspection of important components, the system meets the requirements of GDC 42 with respect to the capability for periodic inspection of the system.

7. Since the system is designed to permit low pressure leakage testing during refueling outages and to permit monthly operability testing of the vacuum breakers, the system meets the requirements of GDC 43 with respect to the capability for periodic testing of the system.

Therefore, NMPC has determined that the use of the pressure suppression pool as a fission product cleanup system in the radiological evaluation of a DBA-LOCA is acceptable.

<u>Mixing Within Secondary Containment</u>

Consistent with the guidance of RG 1.3, radioactivity is assumed to be immediately released to the primary containment during a DBA-LOCA. Currently, the radiological analysis assumes mixing of primary containment leakage with 50% of secondary containment free air volume after a -0.25 inch WG is achieved in secondary containment. This current assumption of the application of post-drawdown mixing was reviewed and approved by the Staff prior to the issuance of the Operating License.

The timing assumption for the onset of mixing was made to be consistent with the establishment of SECONDARY CONTAINMENT INTEGRITY (i.e., -0.25 inch WG). After further review of this matter, NMPC has determined that delaying credit for secondary mixing is overly conservative. The timing of the onset of mixing is not dependent upon achieving a -0.25 inch WC, i.e., operation of the SGTS, but rather upon the degree of air movement within secondary containment, i.e., operation of the emergency recirculation unit coolers. The proposed change in the application of mixing within secondary containment in the revised radiological analysis extends mixing such that it is assumed to occur at the onset of the DBA-LOCA. The basis for this proposed change, i.e., additional mixing, is provided below.

Immediately following a DBA-LOCA, one of two 100% capacity, Class 1E powered, safety related, emergency recirculation unit coolers automatically starts. Each emergency recirculation unit cooler takes suction through a network of air ductwork from each floor level below the refueling floor. The air suction ductwork below the refueling floor has distributed openings on each level of the reactor building. Air supply is provided to the reactor building from the discharge of each emergency recirculation unit cooler through supply ductwork located on each level of the reactor building with the exception of the floor immediately below the refueling floor. Through this system of suction and supply ductwork, air is drawn through the hoist spaces on each floor in the reactor building. The Emergency Recirculation System together with local area unit coolers ensure a high degree of mixing within the reactor building. Therefore, NMPC concludes, based on the above evaluation, that instantaneous mixing of radioactive leakage into secondary containment with 50% of the secondary containment free air volume at the onset of a DBA-LOCA is conservative and acceptable.

The revised radiological analysis assumes that the secondary containment leaks at 2670 cfm for the duration of the drawdown period. This leakage from secondary containment is treated as an unfiltered ground level release and is the drawdown release. The basis for this leakage assumption is provided below.

The secondary containment is a seismically designed structure which, in conjunction with the SGTS, provides the means of controlling and minimizing leakage from the primary containment to the outside atmosphere. Immediately following a DBA-LOCA, the normal supply and exhaust air systems are automatically shut down, the supply and exhaust air isolation dampers are closed, and the SGTS is started. The SGTS operates to re-establish a -0.25 inch WG within secondary containment. As secondary containment pressure changes from atmospheric to subatmospheric conditions, the release of radioactivity from secondary containment outleakage as an unfiltered release begins to decrease. Finally, at -0.25 inch WG within secondary containment, the unfiltered ground level release is assumed to be zero since all effluents from secondary containment are processed through the SGTS. Therefore, assuming secondary containment leaks at a constant rate as an unfiltered ground level release during the drawdown period is conservative.

During a DBA-LOCA less than 20 scfm of primary containment atmosphere leaks into a secondary containment with a free air volume of approximately 4 million ft^3. This is equivalent to the Technical Specification maximum leakage rate of 1.1% per day of primary containment volume at standard temperature and pressure conditions. In addition, a small amount of leakage enters secondary containment as TIP and ESF leakage. The average air expansion due to the head load within the secondary containment during the 60 minute drawdown period is estimated to be less than 100 cfm. Therefore, assuming an outleakage from secondary containment of 2670 cfm during the drawdown period is conservative when considering the combined inleakage rate into secondary containment from primary containment, TIP and ESF systems and air expansion within the secondary containment.

Accordingly, NMPC concludes, based on the above evaluation, that an assumed leakage rate of 2670 cfm from secondary containment to the outside environment for the duration of the drawdown period is conservative and acceptable.

Radiological Analysis

The DBA-LOCA was reanalyzed employing the pressure suppression pool as a fission product cleanup system and assuming mixing of primary containment leakage and ESF leakage in secondary containment during the drawdown period. The changes in the design basis LOCA assumptions regarding suppression pool scrubbing and the increase in the assumed drawdown time impact the conclusion in the current analysis that ESF leakage is negligible during the drawdown period. That is, because ESF leakage halogen activity is not scrubbed by the suppression pool, the halogen reduction assumed for primary containment leakage is not applicable to ESF leakage. So, as the halogen activity from the drawdown period primary containment leakage decreases due to scrubbing, the halogen activity from the ESF leakage which is not scrubbed can no longer be judged to be negligible by comparison. The increased ESF leakage doses during the 60 minute drawdown period have been included in the revised DBA-LOCA radiological evaluation.

The DBA-LOCA radiological evaluation also extends the drawdown period from 6 to 60 minutes. In addition, the revised radiological evaluation reflects the proposed power uprate for NMP2 in NMPC's letter to the NRC dated July 22, 1993 (NMP2L 1397). Otherwise, the revised analysis retains all of the design basis assumptions, including 50% iodine deposition in primary containment and the input parameters of the original analysis.

The new DBA-LOCA doses 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.

TABLE 1 RADIOLOGICAL DOSES (REM)			
Receptor	Current LOCA Dose	Revised LOCA Dose	Dose Limits
CONTROL ROOM			
Thyroid	15.5	14.0	30
Gamma	1.6	1.59	5
Beta	22.9	22.8	30
EAB			
Thyroid	232	22.8	300
Gamma	6.3	4.45	25
Beta	4.2	3.2	None
LPZ			
Thyroid	56.1	35.9	300
Gamma	2.6	2.4	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 reanalyzed DBA-LOCA results in doses that are lower than those presented in the USAR.

The DBA-LOCA also serves as a basis for calculating equipment qualification doses. The equipment qualification design basis waterborne source term, in particular the iodines in the suppression pool, is developed in accordance with NUREG-0588 as discussed in USAR Section 1.10, Part II.B.2. Any safety related equipment exposed to post-LOCA suppression pool fluid is qualified by conservatively assuming that 50% of the core halogens are uniformly mixed in the suppression pool. The equipment qualification waterborne source term is developed independently of and conservatively with respect to the source term used for determining offsite dose compliance with 10 CFR 100 guideline values. The equipment qualification waterborne source term is still conservative taking into account suppression pool scrubbing. Therefore, the equipment qualification doses from the current DBA-LOCA do not need to be recalculated to reflect fission product scrubbing and retention in the suppression pool. Accordingly, safety related equipment will continue to be OPERABLE in the radioactive environment of secondary containment to mitigate the consequences of a DBA-LOCA.

The DBA-LOCA also serves as the basis for addressing vital area access concerns. All systems while drawing a suction from the suppression pool are totally enclosed within secondary containment. There are no vital areas inside secondary containment. The release of activity from secondary containment to the environment is reduced due to the credit for suppression pool scrubbing and secondary containment mixing making existing vital area analyses bounding. Therefore, the revised DBA-LOCA radiological analysis does not impact vital area access concerns.

Conservatism has been maintained with respect to the timing of fission product releases as described in RG 1.3. Additional conservatisms include:

1. The secondary containment bypass leakage paths do not take credit for fission product scrubbing and retention by the suppression pool.

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

The decision to use the pressure suppression pool as a fission product cleanup system and mixing within secondary containment is based on the following:

1. The proposed change to the radiological analysis is technically justifiable and continues to provide a conservative representation of the timing and the release of radioactivity from secondary containment during a DBA-LOCA.

2. The reanalyzed design basis radiological analysis, assuming a drawdown time of 60 minutes, produces radiological doses which:

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

    b. meet the criteria of GDC 19 and

    c. are lower than the doses currently depicted on 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. Due to the complexity and magnitude of the removal and installation activities, there are potential risks associated with the originally proposed new SGTS. 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 DBA-LOCA radiological analysis eliminates these risks and the challenges to the management of shutdown risks during a refueling outage.

5. The new SGTS would have required changes to 11 surveillances, whereas this proposed approach 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 the suppression pool as a fission product cleanup system and credit for mixing within secondary containment eliminates the need for significant procedure changes and training.

6. The proposed change to the DBA-LOCA radiological analysis eliminates the use of a complex prototype SGTS design.

7. The significant economic hardship associated with the use of the new SGTS is eliminated. Implementation of this proposed amendment requires a very small fraction of the total cost of the new SGTS.

In summary, the revised LOCA analysis results in control room, EAB and LPZ doses that are within applicable limits and lower than 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 does 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. 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 maximum allowable secondary containment inleakage for the fourth operating cycle is 2290 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, SRP 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 conditions. 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. The proposed Technical Specification change is based on a reanalyzed DBA-LOCA radiological analysis assuming a 60 minute drawdown time. This reanalyzed analysis takes credit for fission product scrubbing and retention by the suppression pool. In addition, at the onset of the DBA-LOCA, credit is taken for mixing of primary conta[illegible]kage and ESF systems leakage with 50% of the secondary containment [illegible] volume prior to the release of radioactivity to the environment. However, no credit is taken for the pressure suppression pool as a fission product cleanup system for post-drawdown release or for secondary containment bypass leakage paths. The revised radiological analysis follows the source term assumptions of RG 1.3, with the exception of regulatory position C.1.f as permitted by SRP Section 6.5.5, and continues to provide a conservative representation of the timing and the composition of the release of radioactivity from secondary containment during a DBA-LOCA.

The proposed changes to the Technical Specifications revises existing surveillances for drawdown time and inleakage testing for secondary containment to reflect the revised drawdown analysis and the maximum allowable secondary containment inleakage. Adjustments have been provided to account for variations in test conditions. Together, these SRs 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 in less than 60 minutes. By assuming a drawdown time of 60 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.

<u>NO SIGNIFICANT HAZARDS CONSIDERATION ANALYSIS</u>

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 suppression pool and secondary containment are largely passive in nature, and the active components are suitably redundant. Therefore, their fission product attenuation functions can be accomplished assuming a single failure.

Currently, using 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 pressure suppression pool as a fission product cleanup system, additional mixing within secondary containment and an assumed secondary containment drawdown time of 60 minutes, are lower than the previously calculated doses. The new doses are below 10 CFR Part 100 guideline values and GDC 19 criteria. The revised radiological analysis follows the source term assumptions of RG 1.3, with the exception of regulatory position C.1.f as permitted by SRP Section 6.5.5, and continues to provide a conservative representation of the timing and the composition of the release of radioactivity from secondary containment during a DBA-LOCA.

The Technical Specification SRs will ensure a continued state of readiness for the SGTS, the secondary containment, the suppression pool and the suppression chamber/drywell vacuum breakers. Therefore, the assumptions used in the dose assessment will continue to bound the actual bypass of the suppression pool and the mixing in secondary containment during a DBA-LOCA. 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, page 14 of 20, 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. The proposed change to the surveillances reflect consideration of the pressure suppression pool as a fission product cleanup system and credit for additional mixing in secondary containment. The suppression pool will continue to perform its safety functions as a pressure suppression pool and as a source of water to support emergency core cooling system operation during a DBA-LOCA. In addition, secondary containment will continue to perform its safety function of controlling and minimizing radioactive leakage to the outside atmosphere during a DBA-LOCA. Safety related equipment will continue to be OPERABLE in the radioactive environment of secondary containment to mitigate the consequences of a DBA-LOCA. Accordingly, the proposed Technical Specification change will not create the possibility of a new or different kind of accident from any accident previously evaluated.

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

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., credit for fission product scrubbing and retention by the suppression pool and credit for additional mixing within secondary containment. 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 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 in less than 60 minutes following a postulated DBA-LOCA. Achieving -0.25 inch WG within 60 minutes assures that radiological doses will remain below regulatory limits (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.