CONTAINMENT SYSTEMS

3/4 6 5 ICE CONDENSER

ICE BED

LIMITING CONDITION FOR OPERATION

3.6.5.1. The ice bed shall be OPERABLE with:

a. The stored ice having a boron concentration of ≥ 1800 ppm and ≤ 2500 ppm boron as sodium tetraborate and a pH of 9.0 to 9.5,

b. Flow channels through the ice condenser,

c A maximum ice bed temperature of less than or equal 27°F,

d. A total ice weight of at least 2,225,880 pounds at a 95% level of confidence, and

e. 1944 ice baskets.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

With the ice bed inoperable, restore the ice bed to OPERABLE status within 48 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.6.5.1 The ice condenser shall be determined OPERABLE:

a. At least once per 12 hours by verifying that the maximum ice bed temperature is less than or equal to 27°F.

b. At least once per 18 months by verifying, by visual inspection, accumulation of ice on structural members comprising flow channels through the ice bed is ≤ 15 percent blockage of the total flow area for each safety analysis section.

SURVEILLANCE REQUIREMENTS (Continued)

c. At least once per 40 months by lifting and visually inspecting the accessible portions of at least two ice baskets from each 1/3 of the ice condenser and verifying that the ice baskets are free of detrimental structural wear, cracks, corrosion or other damage. The ice baskets shall be raised at least 10 feet for this inspection.

d. At least once per 18 months by.

1. Deleted.

2. Weighing a representative sample of at least 144 ice baskets and verifying that each basket contains at least 1145 lbs of ice. The representative sample shall include 6 baskets from each of the 24 ice condenser bays and shall be constituted of one basket each from Radial Rows 1, 2, 4, 6, 8 and 9 (or from the same row of an adjacent bay if a basket from a designated row cannot be obtained for weighing) within each bay. If any basket is found to contain less than 1145 pounds of ice, a representative sample of 20 additional baskets from the same bay shall be weighed. The minimum average weight of ice from the 20 additional baskets and the discrepant basket shall not be less than 1145 pounds/basket at a 95% level of confidence.

   The ice condenser shall also be subdivided into 3 groups of baskets, as follows: Group 1 - bays 1 through 8, Group 2 - bays 9 through 16, and Group 3 - bays 17 through 24. The minimum average ice weight of the sample baskets from Radial Rows 1, 2, 4, 6, 8 and 9 in each group shall not be less than 1145 pounds/basket at a 95% level of confidence.

   The minimum total ice condenser ice weight at a 95% level of confidence shall be calculated using all ice basket weights determined during this weighing program and shall not be less than 2,225,880 pounds.

e. At least once per 54 months by chemical analysis of the stored ice in at least one randomly selected ice basket from each ice condenser bay verify:

1. Ice bed boron concentration is $\geq$ 1800 ppm and $\leq$ 2500 ppm as sodium tetraborate and;

2. pH is $\geq$ 9.0 and $\leq$ 9.5

NOTE: The requirements of this SR are satisfied if the boron concentration and pH values obtained from averaging the individual sample results are within the limits specified above.

f. Each ice addition verify, by chemical analysis, that ice added to the ice condenser meets the boron concentration and pH requirements of SR 4.6.5.1.e.

NOTE: The chemical analysis may be performed on either the liquid solution or the resulting ice.

3/4.6.4 COMBUSTIBLE GAS CONTROL

The OPERABILITY of the equipment and systems required for the detection and control of hydrogen gas ensures that this equipment will be available to maintain the hydrogen concentration within containment below its flammable limit during post-LOCA conditions Either recombiner unit or the hydrogen mitigation system, consisting of 68 hydrogen ignitions per unit, is capable of controlling the expected hydrogen generation associated with 1) zirconium-water reactions, 2) radiolytic decomposition of water and 3) corrosion of metals within containment. These hydrogen control systems are designed to mitigate the effects of an accident as described in Regulatory Guide 1.7, "Control of Combustible Gas Concentrations in Containment Following a LOCA", Revision 2 dated November 1978. The hydrogen monitors of Specification 3.6.4.1 are part of the accident monitoring instrumentation in Specification 3.3.3.7 and are designated as Type A, Category 1 in accordance with Regulatory Guide 1.97, Revision 2, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant Conditions During and Following an Accident," December 1980.

The Hydrogen Recombiner's thermocouples are provided for convenience in testing and periodic checkout of the recombiners. The temperature loop is not necessary for the associated Hydrogen Recombiner to be considered operable. The temperature loop's thermocouples and ambient temperature sensor located in containment were not designed to withstand a harsh environment and cannot be counted on to function following a LOCA. The thermocouples and thermocouple indicators are not part of the instrumentation addressed in SR 4.6.4.2.b.1.

The hydrogen mixing systems are provided to ensure adequate mixing of the containment atmosphere following a LOCA. This mixing action will prevent localized accumulations of hydrogen from exceeding the flammable limit.

The operability of at least 66 of 68 ignitors in the hydrogen mitigation system will maintain an effective coverage throughout the containment. This system of ignitors will initiate combustion of any significant amount of hydrogen released after a degraded core accident. This system is to ensure burning in a controlled manner as the hydrogen is released instead of allowing it to be ignited at high concentrations by a random ignition source.

3/4.6 5 ICE CONDENSER

The requirements associated with each of the components of the ice condenser ensure that the overall system will be available to provide sufficient pressure suppression capability to limit the containment peak pressure transient to less than 12 psig during LOCA conditions.

3/4.6.5.1 ICE BED

The OPERABILITY of the ice bed ensures that the required ice inventory will 1) be distributed evenly through the containment bays, 2) contain sufficient boron to preclude dilution of the containment sump following the LOCA and 3) contain sufficient heat removal capability to condense the reactor system volume released during a LOCA. These conditions are consistent with the assumptions used in the accident analyses.

The minimum weight figure of 1145 pounds of ice per basket contains a 15% conservative allowance for ice loss through sublimation which is a factor of 15 higher than assumed for the ice condenser design. The minimum weight figure of 2,225,880 pounds of ice also contains an additional 1% conservative allowance to account for systematic error in weighing instruments. In the