3.6 Protection Against Dynamic Effects Associated with the Postulated Rupture of Piping

The information in this section of the reference ABWR DCD, including all subsections, tables and figures, is incorporated by reference with the following supplements.

3.6.3 Leak-Before-Break Evaluation Procedures

The information in this subsection of the reference ABWR DCD, including all subsections, is incorporated by reference with the following site-specific supplement.

LBB methodology for pipe break postulation will not be used for the STP 3 & 4 ABWR plant design.

3.6.5 COL License Information

3.6.5.1 Details of Pipe Break Analysis Results and Protection Methods

The following standard supplemental information addresses COL License Information Item 3.16.

The details of pipe break analysis results and protection methods will be provided for NRC review as part of the ITAAC in the reference ABWR DCD Tier 1 Section 3.3.

The details and methods will include:

(1) ~~(1)~~A summary of the dynamic analyses applicable to high-energy piping systems in accordance with Subsection 3.6.2 of Regulatory Guide 1.206. This will include:

(a) ~~(a)~~A pipe break nonlinear time-history analysis which can be performed by the ANSYS, or other non-linear computer programs with quality assurance to generate a pipe break analysis report. The report will include sketches of applicable piping systems showing the location, size and orientation of postulated pipe breaks and the location of pipe whip restraints and jet impingement analyses.

(b) ~~(b)~~Piping Stress Reports that will include a summary of the data developed to select postulated break locations including calculated stress intensities, cumulative usage factors and stress ranges as delineated in BTP MEB 3-1, as modified by Subsection 3.6.1.1.1.

(2) ~~(2)~~For failure in the moderate-energy piping systems listed in Tables 3.6-5 and 3.6-6, pipe failure are limited to postulation of cracks in piping. These cracks affect the surrounding environmental conditions only and do not result in whipping of the cracked pipe. The flow from the crack opening is assumed to result in an environment that wets all unprotected components within the compartment, with consequent flooding in the compartment and communicating compartments, based on a conservatively estimated time period to effect corrective actions. The safety-related systems are protected

from the resulting jets, flooding and other adverse environmental effects by equipment shields, physical separation of piping, equipment, and instrumentation.

(3) ~~(3)~~By means of the design features such as separation, barriers, and pipe whip restraints, adequate protection will be provided against the effects of pipe break events for each of the systems listed in Tables 3.6-1 and 3.6-2 to an extent that their ability to shut down the plant safely or mitigate the consequences of the postulated pipe failure would not be impaired.

(4) ~~(4)~~The main steam isolation valves (MSIVs) will be designed for the effects of a line break. The details of how the MSIV valves functional capabilities are protected against the effects of these postulated pipe failures will be provided in a pipe break analysis report.

(5) ~~(5)~~The plant arrangement will provide physical separation to the extent practicable to maintain the independence of redundant essential systems (including their auxiliaries) in order to prevent the loss of safety function due to any single pipe break event. Physical separation between redundant essential systems with their related auxiliary supporting features, therefore, is the basic protective measure incorporated in the design to protect against the dynamic effects of a pipe break~~.~~ anywhere in high energy piping.

(6) ~~(6)~~The feedwater line check and feedwater isolation valves will be designed for the effects of a line break. The details of how the feedwater line check and feedwater isolation valves functional capabilities are protected against the effects of these postulated pipe failures will be provided in a pipe break analysis report.

(7) ~~(7)~~An inspection of the as-built high-energy pipe break mitigation features will be performed. The as-built inspection will confirm that systems, structures and components, that are required to be functional during and following an SSE, are protected against the dynamic effects associated with high-energy pipe breaks. For pipe whip restraints and jet shields, the location, orientation, size and clearances to allow for thermal expansion will be inspected.

(8) ~~(8)~~High-energy line separation analysis (HELSA) per the requirements of Subsection 3.6.1.3.2.2 will be performed to determine which high-energy lines meet the spatial separation requirements and which lines require further protection.

3.6.5.2 Leak-Before-Break Analysis Report

The following site-specific supplemental information addresses COL License Information Item 3.17.

LBB methodology for pipe break postulation will not be used for the STP 3 & 4 ABWR plant design.

3.6.5.3 Inservice Inspection of Piping in Containment Penetration Areas

The following standard supplemental information addresses COL License Information Item 3.18.

A 100% volumetric inservice examination of all accessible pipe welds in Containment Penetration Areas will be conducted during each inspection interval as defined in IWA-2400, ASME Code Section XI.