Appendix J
Areas of Uncertainty In Thermal Loading

Several areas of uncertainty were identified in the Systems Study and in the subsequent comments by the document reviewers. This appendix summarizes those specific uncertainties. However, there has been little or no adequate parametric analysis to indicate the degree of importance of many of these parameters and the range where changes in these parameters would result in significant changes in performance. This parametric study needs to be done and some of that work will be attempted in a follow-on study. The following list of items has been identified as uncertainties although this should not be taken as a complete list:

1. Bulk Permeability - The measure of this and the scale for the various stratigraphic units will determine the hydrologic flow and is of particular concern if permeabilities are greater than about 1 Darcy

2. The extent and degree to which nonequilibrium fracture flow occurs

3. The fracture size, number, and connectivity in the mountain

4. The extent and duration (both spatial and temporal) of the dry out region that occurs as a result of heating

5. The degree and time scales over which conduction dominates and whether or not convection is important at various thermal loadings

6. The thermo-mechanical properties of the rock

7. The degree to which ventilation can be employed to mitigate preclosure effects and remove moisture from the mountain

8. The percolation flux needs to be known and the changes that may occur as a function of climate change

9. The spatial heterogenieties that exist for many of the parameters mentioned such as permeability, fracture density, etc.

10. What thermal goal should be applied to the Paintbrush tuff member

11. Establishment of the container corrosion resistance for various thermal loads and water chemistries that might occur in the potential repository

12 The degree to which silica mobilization and precipitation occur and may influence the hydrology of the mountain at various thermal loads

13. Spent nuclear fuel variability, power output and radioactivity

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14. Performance monitoring issues - where, what data rate, and what instruments

15. A reevaluation of the thermal goals is needed

16. Geochemistry alterations as a function of thermal load - such issues as zeolite dehydration and transformation, mineralogic alteration of rock properties

17. Cost of various subcomponents of the system as a function of thermal load.