Where mass is one of two parameters being controlled, or where engineered controls prevent over batching, the mass of any single accumulations shall not exceed either: (1) 75 percent of the minimum critical mass; or (2) the safe mass limit derived using validated analytical methods and an approved MoS.

When experimental data from published handbooks are used for mass limits, the following assumptions are applicable to the minimum critical mass: (1) spherical geometry; (2) full water reflection; (3) optimal moderation content; and (4) maximum credible enrichment. In addition, the chemical and physical form specified in the handbook must be at consistent with, or more restrictive than, that which may be present in the actual system to which the limit will be applied.

5.4.4.2 Geometry

Geometry may be used for NCS control alone or in combination with other control methods. Favorable geometry is based on limiting dimensions of defined geometrical shapes to established subcritical limits. Full advantage may be taken of any nuclear characteristics of the process materials and equipment, consistent with ANSI/ANS 8.1 (Ref. 5-2) and other applicable license commitments. At the GLE Commercial Facility, favorable geometry is developed conservatively assuming full water or concrete equivalent reflection, optimal hydrogenous moderation, worst credible heterogeneity, and maximum credible enrichment. Examples of parameters used for engineered geometry controls include cylinder diameters, annulus inner and outer radii, slab thickness, and/or fixed volumes.

Subcritical limits for geometry controls may be derived using either validated analytical methods and an approved MoS or experimental data. Where experimental data are used, the margins of safety are 90 percent of the minimum critical cylinder diameter, 85 percent of the minimum critical slab thickness, and 75 percent of the minimum critical sphere volume.

Geometry control systems are analyzed and evaluated allowing for fabrication tolerances and dimensional changes that may likely occur through corrosion, wear, or mechanical distortion. Before beginning operations, dimensions and nuclear properties applicable to the geometry control are verified using appropriate instrumentation. The CM Program is used to maintain these applicable dimensions and/or nuclear properties within acceptable limits. Provisions are also made for periodic inspection, if credible conditions exist in which changes in the dimensions or nuclear properties of the equipment could occur, resulting in the inability to meet established NCS limits.

5.4.4.3 Enrichment

Enrichment control may be utilized to limit the weight percent ^{235}U within a process, vessel, or container, thus providing a method for NCS control. Enrichment controls may be used to segregate materials of different enrichment or to prevent material from being enriched above an NCS limit. Where enrichment is controlled, active engineered or administrative controls are required to measure or verify the enrichment, or to prevent the introduction of uranium at unacceptable enrichment levels within a defined subsystem. In cases where enrichment control is not utilized, the maximum credible enrichment for the particular process or subsystem is utilized in the CSA.