APPENDIX J

TECHNICAL EVALUATION OF APPENDIX A CRITERIA

During the review process, U.S. Nuclear Regulatory Commission (NRC) staff will verify that specific criteria of 10 CFR Part 40, Appendix A have been met. It is suggested that the technical reviewer prepare a list of the specific technical criteria and the method or design used to meet these criteria to be included in the technical evaluation report. The example offered shows one method of documentation.

J1.0 EXAMPLE OF TECHNICAL EVALUATION OF APPENDIX A CRITERIA

The following text is from an NRC technical evaluation report for a uranium mill facility, and represents the type of conclusions related to meeting specific technical criteria in 10 CFR Part 40, Appendix A.

CONCLUSIONS RELATED TO MEETING APPENDIX A CRITERIA

The staff further concludes that the specific criteria of 10 CFR Part 40 Appendix A are met as follows.

J1.1 Criterion 1

Demonstrate that erosion, disturbance, and dispersion by natural forces over the long term are minimized.

The contaminated tailings will be protected from flooding and erosion by an engineered rock riprap layer. The riprap has been designed in accordance with the guidance suggested by the NRC staff (NRC, 1990). The staff considers that erosion protection that meets that guidance will provide adequate protection against erosion and dispersion by natural forces over the long term. As discussed in technical evaluation report Sections 4.3 and 4.5, adequate protection is provided by (1) selection of proper rainfall and flooding events, (2) selection of appropriate parameters for determining flood discharges, (3) computation of flood discharges using appropriate and/or conservative methods, (4) computation of appropriate flood levels and flood forces associated with the design discharge, (5) use of appropriate methods for determining erosion protection needed to resist the forces produced by the design discharge, (6) selection of a rock type for the riprap layer that will be durable and capable of providing the necessary erosion protection for a long period of time, and (7) placement of a riprap layer in accordance with accepted engineering practice and in accordance with appropriate testing and quality assurance controls.

Demonstrate that the tailings are disposed of in a manner that does not require active maintenance to preserve conditions at the site.

As discussed in technical evaluation report Sections 4.3 and 4.5, the staff considers that the riprap layers proposed will not require active maintenance over the 1,000-year design life, for the following reasons: (1) the riprap has been designed to protect the tailings from rainfall and flooding events which have very low probabilities of occurrence over a 1,000-year period, resulting in no damage to the layers from those rare events; (2) the rock proposed for the riprap layers is designed to be durable and is not expected to deteriorate significantly over the 1,000-year design life; and (3) during construction, the rock layers will be placed in accordance

with appropriate engineering and testing practices, minimizing the potential for damage, dispersion, and segregation of the rock.

J1.2 Criterion 4

Demonstrate that the upstream rainfall catchment areas are minimized to decrease erosion potential and the size of the floods that could erode or wash out sections of the tailings disposal area.

The site is located in an area that is flooded by off-site floods from Moab Wash and the Colorado River. However, as discussed in the technical evaluation report, the site is protected from direct on-site precipitation and flooding by engineered riprap layers for the top and side slopes; the tailings disposal cell will need this protection regardless of where it is located. The riprap for the side slopes and drainage ditches is large enough to resist flooding from the minimal flow velocities of floods occurring from a probable maximum flood on the Colorado River. A large rock apron has been provided to provide protection against the potential migration of Moab Wash and the Colorado River. The staff therefore concludes that the erosion potential at the site has been acceptably minimized, since any flooding at the site is mitigated by the erosion protection, and the forces associated with off-site floods are minimal.

Demonstrate that topographic features provide good wind protection.

The staff considers that the site is adequately protected from wind erosion by the placement of an engineered riprap layer that protects the tailings from surface water erosion. Studies performed for the NRC staff have shown that an engineered riprap layer designed to protect against water erosion will be capable of providing adequate protection against wind erosion.

Demonstrate that embankments and cover slopes are relatively flat after stabilization to minimize erosion potential and to provide conservative factors of safety assuring long-term stability.

The relatively flat top and side slopes of the covers will be protected from erosion by an engineered riprap layer which is designed to provide long-term stability (technical evaluation report Section 4.3). The erosion potential of the covers is minimized by the designing the rock to be sufficiently large to resist flooding and erosion, based on the slope selected. Thus, the staff concludes that the slopes, with their corresponding rock designs, are sufficiently flat to meet this criterion.

Demonstrate that the rock cover reduces wind and water erosion to negligible levels, including consideration of such factors as the shape, size, composition, and gradation of the rock particles; rock cover thickness and zoning of particle size; and steepness of underlying slopes. Demonstrate that rock fragments are dense, sound, and resistant to abrasion, and free from cracks, seams, and other defects.

The contaminated tailings will be protected from flooding and erosion by an engineered rock riprap layer. The riprap has been designed in accordance with the guidance suggested by the NRC staff (NRC, 1990). As discussed in Sections 4.3 and 4.5 of the technical evaluation

report, the staff considers that erosion protection which meets that guidance will provide adequate protection against erosion and dispersion by natural forces over the long term. Adequate protection is provided by (1) selection of proper rainfall and flooding events, (2) selection of appropriate parameters for determining flood discharges, (3) computation of flood discharges using appropriate and/or conservative methods, (4) computation of appropriate flood levels and flood forces associated with the design discharge, (5) use of appropriate methods for determining erosion protection needed to resist the forces produced by the design discharge, (6) selection of a rock type for the riprap layer that will be durable and capable of providing the necessary erosion protection for a long period of time, and (7) placement of a riprap layer in accordance with accepted engineering practice and in accordance with appropriate testing and quality assurance controls.

J1.3 Criterion 12

Demonstrate that active on-going maintenance is not necessary to preserve isolation.

As discussed in Sections 4.3 and 4.5 of the technical evaluation report, the staff considers that the erosion protection will not require active maintenance over the 1,000-year design life, for the following reasons: (1) the riprap has been designed to protect the tailings from rainfall and flooding events which have low probabilities of occurrence over a 1,000-year period, resulting in no damage to the layers from those rare events; (2) the rock proposed for the riprap layers is designed to be durable and is not expected to deteriorate significantly over the 1,000-year design life; and (3) during construction, the rock layers will be placed in accordance with appropriate engineering and testing practices, minimizing the potential for damage, dispersion, and segregation of the rock.