Staff Analysis of Proposed Colorado Alternative Soil Standards for the Uravan, Colorado Uranium Mill Site

Summary:

The State of Colorado submitted and the U.S. Nuclear Regulatory Commission (NRC or the Commission) staff has evaluated a proposal for alternative soil standards for four areas at the Uravan uranium mill site (State of Colorado Radioactive Materials License (RML) 660-02) (Agencywide Documents Access and Management System Accession (ADAMS) No. ML081150505). Colorado provided additional information to the NRC by letter dated March 20, 2009, to support the staff review of the proposed alternative standard (ML092820404). The State of Colorado concluded that the licensee, Umetco Mineral Corporation (Umetco), had conducted practical actions to remediate or reduce the soil contamination in these four areas. The staff's analysis concludes that the proposed alternative soil standards are reasonable and provide a level of protection of public health and safety and the environment that is more stringent than, the level which would be achieved by the standards in Title 10 of the *Code of Federal Regulations* (10 CFR), Part 40, "Domestic Licensing of Source Material," Appendix A, "Criteria Relating to the Operation of Uranium Mills and the Disposition of Tailings or Wastes Produced by the Extraction or Concentration of Source Material From Ores Processed Primarily for Their Source Content," and the State of Colorado's equivalent regulations found at Colorado Rules and Regulations Pertaining to Radiation Control, Title 6, *Code of Colorado Regulations* (6 CCR), 1007-1 Radiation Control, Part 18, Appendix A, Criterion 6 (6 CCR 1007-1, Part 18, Appendix A). The staff has prepared this analysis of the proposed alternative soil standards to support the Commission determination required in Section 274o of the Atomic Energy Act of 1954, as amended (the Act), and codified in 10 CFR 150.31(d).

Background:

The Uravan site began operations in 1912 as a radium mill and later expanded operations to include the extraction of other metals including uranium. Uravan was a licensed and operating mill at the time of the passage of the Uranium Mill Tailings Radiation Control Act of 1978, (UMTRCA) (November 1978). Therefore, the Uravan site is a Title II mill, even though some of the soil contamination is a result of practices going back to operations between the early 1900s and 1978. NUREG-0706, "Final Generic Environmental Impact Statement on Uranium Milling," (ML032751663, ML032751667, and ML032751669) specifically mentions contamination from operations prior to 1978 at existing licensed sites and the obligation for active programs to address residual contamination during the operational phase. The Colorado Department of Public Health and Environment (CDPHE) administers the UMTRCA Title II program for the State of Colorado including the oversight of the Uravan site. The Uravan mill ceased operations in 1984 and began decommissioning planning and implementation. The U.S. Environmental Protection Agency (EPA) listed the site on the National Priorities List (NPL) in 1986 because of chemical and radiological environmental contamination. A 1986 memorandum of agreement signed with EPA Region VIII designated CDPHE as the lead agency at this site.

The site covers over 500 acres (202 hectares), most of which is in very steep, rugged terrain, and the remainder is dominated by the San Miguel River valley. The licensee has completed its planned remediation activities, and the final cap is in place over the disposal areas.

Portions of the site will be titled to the U.S. Department of Energy (DOE) for legacy management. Other portions of the site without radiological concerns will be transferred to other Federal agencies (e.g., Bureau of Land Management (BLM)), to a land trust for institutional management, or to Montrose County. In addition, the Montrose County Road Y-11 right-of-way bisects the portion of the site to be transferred to DOE.

The CDPHE believes the licensee has remediated the site to the extent practical and has identified four discrete areas that are not in full compliance with the soil remediation standards in the 6 CCR 1007-1, Part 18, Appendix A, Criterion 6. The licensee has proposed, and the CDPHE agrees that it is not practical to conduct further remediation for these four areas (Colorado letters dated September 26, 2007 and March 20, 2009, ML081150505 and ML092820404).

The State of Colorado proposed alternative standards request is the first proposal for site-specific alternative standards to be submitted by an Agreement State (generic alternative standards were proposed and approved for Utah, SECY-04-0128, ML041940197 and SRM-SECY-04-0128, ML042170320). The provision for the alternative standards is in the introduction to Appendix A of 6 CCR 1007-1, Part 18 (equivalent to 10 CFR Part 40, Appendix A), which allows for "alternatives to the requirements with Commission approval." This is based on language found in Section 274o of the Act. Section 274o of the Act states in part,

> "… the State may adopt alternatives (including, where appropriate, site-specific alternatives) to the requirements adopted and enforced by the Commission for the same purpose if, after notice and opportunity for public hearing, the Commission determines that such alternatives will achieve a level of stabilization and containment of the sites concerned, and a level of protection for public health, safety, and the environment from radiological and nonradiological hazards associated with such sites, which is equivalent to, to the extent practicable, or more stringent than the level which would be achieved by standards and requirements adopted and enforced by the Commission for the same purpose and any final standards promulgated by the Administrator of the EPA in accordance with section 275. Such alternative State requirements may take into account local or regional conditions, including geology, topography, hydrology, and meteorology."

The requirement for a Commission determination for alternative standards in Agreement States is codified in the NRC's regulations at 10 CFR 150.31(d).

In 1981, the NRC staff developed a memorandum titled, "Use of Title I Supplemental Standards for Title II Sites" (ML111670171) that states, when a request for alternative standards is considered, the application of the supplemental standards process of 40 CFR 192.21 in 40 CFR 192, Subpart C, "Supplemental Standards" as guidance is appropriate. The Uravan Consent Decree and Remedial Action Plan approved by the U.S. District Court for the State of Colorado in 1987 included the possible use of applicable or relevant and appropriate requirements, which could include the Title I Supplemental Standards. If the Commission approves the alternative standards, the alternative standards could be used as part of the basis for the State and EPA to proceed with removal of the Uravan site from the NPL.

Discussion:

Four discrete areas (about 40 acres total (16 hectares)) of the site could not meet the soil cleanup requirements for radium-226 in soil, found in 6 CCR 1007-1, Part 18, Appendix A, Criterion 6. The four discrete areas that do not meet this standard are referred to as: the Mill Hillside area; A-Plant North area; River Ponds area; and County Road Y-11 area (see Attachment 1, Land Status Map, ML12059A448). The licensee remediated these areas to the extent practical. The licensee's report was submitted to the CDPHE (ML081150505). The licensee proposed to CDPHE that alternative soil standards be applied to these four areas of the Uravan site. The licensee proposed leaving the remaining materials in place and conducting no further remediation as an alternative standard for each area.

The CDPHE accepted the licensee's report, and believes the areas were remediated to the extent practical and are protective of public health and the environment. The acceptability of the proposed alternative standards is further demonstrated by applying criteria for Supplemental Standards in UMTRCA Title I standards in 40 CFR 192.21 and through dose calculations for reasonable future use given the status of the areas after the termination of the specific license and long-term care of the site by the DOE. The CDPHE recommended applying contemporary dose limits for restricted release, which are found in the License Termination Rule (LTR) in 10 CFR 20.1402 and in Colorado regulations at CCR 1007-04 § 61.3. Because the LTR explicitly excludes uranium milling facilities already subject to 10 CFR Part 40, Appendix A and because the licensee developed its proposed alternative standards using the Title I Supplemental Standards specifically for uranium milling facilities, the NRC staff does not recommend pursuing the use of the LTR standard for remediation of this uranium recovery facility.

The NRC staff concludes that Colorado provided sufficient information for the staff to proceed through the alternative standards evaluation process. The Colorado proposal is to leave the contaminated soil in place and conduct no additional remediation for the four discrete areas at the Uravan site.

The current soil cleanup standards are the protection requirements in 6 CCR 1007-1, Part 18, Appendix A, Criterion 6(6) (equivalent to the federal regulations in 10 CFR Part 40, Appendix A). Criterion 6(6) of the Colorado regulation states:

> "The design requirements in this criterion for longevity and control of radon releases apply to any portion of a licensed and/or disposal site unless such portion contains a concentration of radium in land, averaged over areas of 100 square meters, which, as a result of byproduct material, does not exceed the background level by more than: (i) 0.18 Becquerels (5 picocuries) per gram of radium-226, or in the case of thorium byproduct material, radium-228, averaged over the first 15 centimeters (cm) below the surface, and (ii) 0.56 Becquerels (15 pCi) of radium-226, or, in the case of thorium byproduct material, radium-228, averaged over 15-cm thick layers more than 15 cm below the surface."

This criterion is commonly referred to as the 5/15 pCi/g (0.18/0.56 Becquerels (Bq) per gram (g)) soil cleanup requirements. EPA in establishing the soil cleanup requirements evaluated the direct gamma radiation levels and the radon concentration in a structure built on such lands (ML032751396). The level of protection provided by the EPA standards (which NRC adopted and the State of Colorado adopted) was calculated by EPA to be 61 mrem per year (0.61 mSv/year) direct gamma dose and 0.02 Working Levels (WL) for radon progeny in a

house built on contaminated soils. This level of protection was used by the staff as the benchmark for accepting/rejecting the proposed alternative standards.

The State of Colorado identified four areas that were not cleaned up to the soil cleanup requirements, or could not be verified that the soil cleanup requirements were met, due to practical reasons. The licensee proposed and the State agreed to an alternative soil standard of leaving the remaining contamination in place.

The justification for the alternative soil cleanup standards includes two determinations: (1) did the licensee conduct reasonable practical remediation(s), and (2) does the alternative standard provide a level of protection equivalent to or more stringent than the benchmark level of protection? The specific criteria/criterion used for each of the individual areas is discussed below.

Specific Analyses of the Alternative Soil Standards for Four Areas at the Uravan Title II UMTRCA Site:

Mill Hillside Area

The alternative soil standard proposed by the State of Colorado is to leave the residual radioactive contamination at this location in place.

The area consists of steep or near-vertical slopes that are the result of the down cutting of the San Miguel River into the geologic formation. The area is about 22 acres (9 hectares) in size and extends from the mesa rim to the valley floor with an elevation change of approximately 500 feet (152 meters).

The hillside was first used in the early 1900s for mining access and ore transport on a road that has since been removed. In the mid-1930s, a vanadium plant was constructed on the hillside. In the 1940s, the vanadium plant was expanded to include uranium extraction. New process works were constructed in the 1950s. After World War II, the original vanadium plant was shut down. Those mill structures were demolished and the foundations left in place.

Concrete foundations and contaminated soils were removed from the Mill Hillside area in 1999, 2001, and 2002. A total of approximately 46,000 cubic yards (35,200 cubic meters) of contaminated materials were removed from the Mill Hillside area and some contaminated soils still remain. To access and remove the remaining contaminated soils from the Mill Hillside area, approximately 27,600 cubic yards (21,100 cubic meters) of material would need to be excavated from the cliff face.

Further excavation of the steep slopes of the Mill Hillside area poses an unacceptable risk to workers and threatens to destabilize the slope. Additional excavation would require the use of heavy equipment in some areas, and hand excavation in others, as well as scaling crews (hanging on ropes of the cliff face) and vacuum trucks to access the materials. Workers would have to carry off by hand to a location where they could then be placed into containers. These remedial actions would be hazardous, entail risk to workers, and destabilize the existing slope. The use of heavy equipment to excavate these areas might in itself further destabilize the slope. In addition, destabilized slopes could be subject to accelerated mass wasting or rapid erosion and cause degradation of the water quality in the San Miguel River. Public health or safety would be increased by further remedial actions; however, the destabilization of the slopes that

would occur from efforts to satisfy the standard further would cause environmental damage in comparison to the relatively small environmental and public health benefits gained from the removal of additional contamination.

Field measurements indicated an average grid concentration of 22 picocuries per gram (pCi/g) or 0.81 becquerels per gram (Bq/g) of Ra-226 with a maximum activity of 173 pCi/g (6.4 Bq/g) for a single 10-by-10 meter grid. The highest readings were obtained from areas with slopes too steep to permit excavation during the remediation actions. Confirmatory soil samples indicated that the average Ra-226 value is 17.1 pCi/g (0.63 Bq/g), for the surface samples (0-15 cm), and 10.5 pCi/g (0.39 Bq/g), for the subsurface samples (15-30 cm). Radionuclides other than Ra-226 and its decay products are not present in sufficient quantities that they would pose a threat to public health or the environment.

Despite the licensee's efforts to remediate this area, residual radiological contamination still exists at the site. But, as discussed above, the impacts associated with continued remediation activities pose additional public health and safety and environmental risks that outweigh the benefits of continued cleanup activities at the site. Leaving the residual radioactive contamination remaining in the cliff area under the proposed alternative soil standard would avoid environmental damage or harm to workers.

The alternative soil standard (leaving the material in place) takes into account local or regional conditions, including geology, topology, hydrology, and meteorology. The remote cliff face is not reasonably accessible by humans. The Mill Hillside area falls within DOE's long-term care site boundary and is to be maintained indefinitely under DOE's legacy management program.

Staff Conclusion for the Mill Hillside Area.

The alternative soil standard of leaving the residual radiological contamination in place has been proposed for the Mill Hillside area.

The alternative soil standard is applicable to the Mill Hillside area based on the following criteria from the Title I Supplemental Standards criteria which provides a basis for not conducting any additional remediation:

- Risk to Workers or the Public (40 CFR 192.21(a))
  Additional remedial activities in the Mill Hillside area would pose an unacceptable risk to worker safety because of the hazards associated with excavation of excessively steep slopes.

- Excessive Environmental Harm (40 CFR 192.21(b))
  Additional remedial actions performed in the Mill Hillside area could destabilize the slope, creating a risk for uncontrolled releases of sediment to the San Miguel River and long term instability of the cliff face.

The State of Colorado and the EPA have concurred that the application of the alternative soil standard is appropriate for the Mill Hillside area (State of Colorado letter dated September 26, 2007, ML081150505). The DOE will assume long-term stewardship of the area and will ensure that future land use activities are protective of public health and safety and the environment.

The licensee performed and the State verified dose estimates for reasonable future use of the Mill Hillside area. The dose estimate indicates that the expected dose for a recreational scenario would be a few millirem (mrem) per year (a few 0.01 milliSievert per year (mSv/yr)). The steepness of the slope and potential for slope instability as well as the institutional controls provided by DOE ownership make the Mill Hillside area not suitable for building. Therefore, the level of protection provided by the alternative standard for the Mill Hillside area is well below the benchmark protection level for the current standards. The staff concludes that the alternative soil standard for the Mill Hillside area achieves a level of protection for public health, safety, and the environment from hazards that is more stringent than the level that would be achieved by standards and requirements adopted and enforced by the Commission for the same purpose.

A-Plant North Area

The A-Plant North area encompasses about two acres (0.8 hectares) located on the northwestern part of the A-Plant area adjacent to the San Miguel River. The area includes riparian habitat in the flood plain of the San Miguel River. The area was a part of the A-Plant mill that produced uranium and vanadium, and it includes the former Joe Junior radium mill.

From 1994 through 1999, extensive decommissioning was performed at the A-Plant mill. These activities included the demolition, removal, and disposal of 91 mill buildings and assorted pieces of mill processing equipment. Additionally, 480,000 cubic yards (367,000 cubic meters) of contaminated soils were removed from the A-Plant area. Almost the entire mill area was stripped to bedrock and reclaimed using uncontaminated soil. Further remediation in the northern part of the A-Plant area removed additional contaminated soil in areas identified by postremediation surveys. This action resulted in the removal of an additional 43,000 cubic yards (33,000 cubic meters) of contaminated soils.

The licensee estimated that approximately 10,000 cubic yards (7600 cubic meters) of soils with elevated residual radioactivity remain within a small riparian area (approximately two acres (0.8 hectares)) in the flood plain of the San Miguel River. Field measurements indicate an average grid concentration of 5.37 pCi/g (0.2 Bq/g) Ra-226 with a maximum activity of 28.38 pCi/g (1.05 Bq/g) Ra-226 for a single 10-by-10 meter grid for near surface soils. Radionuclides other than Ra-226 and its decay products are not present in sufficient quantities to pose a threat to public health or the environment.

The A-Plant North area falls within DOE's long-term care site boundary for the Uravan site and is to be maintained indefinitely under the DOE's legacy management program.

Staff Conclusion for the A-Plant North Area.

The alternative soil standard of leaving the residual radiological contamination in place has been proposed for the A-Plant North area.

The alternative soil standard is applicable to the A-Plant North area based on the following criterion from the Title I Supplemental Standards criteria which provides a basis for not conducting any additional remediation:

- Excessive Environmental Harm (40 CFR 192.21(b))
  Additional remedial actions performed in the flood plain would require heavy engineering to divert the flow of the San Miguel River. These actions would cause significant

environmental damage, in comparison with the limited health and environmental benefits that would result from satisfying the standard, because remediation of the area would require the destruction of sensitive riparian or wetlands areas. The area can currently be described as stabilized because the soils are stabilized by vegetation and are subject to additional sedimentation by future flooding.

The State of Colorado and the EPA have concurred that the application of the alternative soil standard is appropriate for the A-Plant North area (State of Colorado letter dated September 26, 2007, ML081150505). DOE will assume long-term stewardship of the area and will ensure that future land-use activities are protective of public health and safety and the environment.

The licensee performed and the State verified a dose estimate for reasonable future use of the A-Plant North area. The dose estimate indicates that the expected dose for a recreational scenario would be a few mrem per year (a few 0.01 mSv/yr). The A-Plant North area is within the 100 year flood plain as well as under institutional controls provided by DOE ownership which make the area not suitable for building. Therefore, the level of protection provided by the alternative standard for the A-Plant North area is well below the benchmark protection level for the current standards. The staff concludes that the alternative soil standard for the A-Plant North area achieves a level of protection for public health, safety, and the environment from hazards that is more stringent than the level that would be achieved by standards and requirements adopted and enforced by the Commission for the same purpose.

River Ponds Area

The river ponds were constructed of mill tailings along the main channel of the San Miguel River. There were seven ponds, two on the northeast bank of the river and five on the southwest bank. These ponds were directly north of the A-Plant area and were used in the uranium and vanadium recovery operations including the former Joe Junior radium mill. The area routinely floods during spring runoff and contains diverse wildlife habitat.

During the mid-1990s, excavation, including removal of the ponds, was conducted during winter low-flows in the river and extended into natural soils beneath the tailings material. Excavation ceased when river water flooded the excavation areas. Workers excavated approximately 332,500 cubic yards (254,000 cubic meters) of material from the River Ponds area. Riprap dikes or groins 2 to 3 feet (0.6 to 0.9 meters) high were constructed across the excavated areas to the limits of the river channel. These groins protected the area against future erosion and promoted sediment deposition in the area.

Gamma exposure rates from 20 to 60 μR/hr (0.17 to 0.52 μSv/hr) indicated local hot spots in the cleanup area before the last excavation and subsequent sediment deposition. The licensee could not make final verification surveys because before a survey could be conducted the excavation area was flooded and sediments deposited. Areas of residual contamination were covered by 2 to 3 feet (0.6 to 0.9 meters) of alluvial sediment and eventually stabilized by riparian vegetation.

During the seasonal low-water period of the San Miguel River in 2007 (approximately 15 years after remediation), the licensee conducted a random walking survey in the north and south river ponds areas. Field measurements indicated an average grid concentration of 4.7 pCi/g (0.17 Bq/g) Ra-226 with a maximum activity of 6.8 pCi/g (0.25 Bq/g) Ra-226 for a single 10-by-10 meter grid for near surface soils. Radionuclides other than Ra-226 and its decay products

are not present in sufficient quantities that would pose a threat to public health or the environment.

Monitoring of water in the San Miguel River has been conducted quarterly since 1987 at stations above and below the River Ponds area. Monitoring results indicate that the River Ponds area does not contribute any significant contaminants to the San Miguel River and that there are no impacts on water quality from residual materials from the area. Because current exposure rates are within background ranges, there is no incremental health risk to the general public or future site workers from residual radiological materials within the River Ponds area.

The River Ponds area falls within the DOE's long-term care site boundary for the Uravan site and is to be maintained indefinitely under the DOE legacy management program.

Staff Conclusion for the River Ponds Area.

The alternative soil standard of leaving the residual radiological contamination in place has been proposed for the River Ponds area.

The alternative soil standard is applicable to the River Ponds area based on the following criterion from the Title I Supplemental Standards criteria:

- Excessive Environmental Harm (40 CFR 192.21(b))
  The area is a habitat for both aquatic and terrestrial species, including both small and large game species. Additional remedial actions performed in the River Ponds area would require stripping the area of all riparian vegetation and excavating 2 to 3 feet (0.6 to 0.9 meters) of clean alluvial sediments. Excavation of contaminated soils would require the removal of all riparian vegetation from the banks of the San Miguel River. These actions would cause significant environmental damage, in comparison with the limited health and environmental benefits that would result from satisfying the standard. The area can currently be described as stabilized because the soils are stabilized by vegetation and are subject to additional sedimentation by future flooding.

The State of Colorado and EPA have concurred that the application of the alternative soil standard is appropriate for the River Ponds area (State of Colorado letter dated September 26, 2007, ML081150505). DOE will assume long-term stewardship of the area and will ensure that future land use activities are protective of public health and safety and the environment.

The licensee performed and the State verified a dose estimate for reasonable future use of the River Ponds area. The dose estimate indicates that the expected dose for a recreational scenario would be a few mrem per year (a few 0.01 mSv/yr). The River Ponds area is within the 100 year flood plain as well as under institutional controls provided by DOE ownership which make the area not suitable for building. Therefore, the level of protection provided by the alternative standard for the River Ponds area is well below the benchmark protection level for the current standards. The staff concludes that the alternative soil standard for the River Ponds area achieves a level of protection for public health, safety, and the environment from hazards that is more stringent than the level that would be achieved by standards and requirements adopted and enforced by the Commission for the same purpose.

County Road Y-11 Area

The County Road Y-11 area is located in Montrose County along the southwestern side of the San Miguel River. The County Road Y-11 area consists of a 5,800-foot (1,770 meter) section of road between the County Road Y-11 Bridge and the Old Iron Bridge. County Road Y-11 is composed of natural earthen materials used in construction of the road. These natural earthen materials include naturally occurring radioactive material in the form of overburden and waste rock. In addition, some tailings were used in the right of way for the road. The roadway is relatively flat and follows the gentle down gradient direction of the San Miguel River.

The licensee initiated removal activities in 1998 as a part of the cleanup of the Town Dump area, and additional contaminated soils were excavated in 2006. A total of approximately 8,200 cubic yards (6,300 cubic meters) of contaminated materials were removed from the roadway. These previous remedial activities have been conducted to ensure that routine maintenance along the roadway can be conducted without creating exposures to workers.

Radioactively contaminated soils may exist at a depth greater than 3 feet (0.9 meters) beneath the roadway. Studies conducted along the roadway after reclamation activities showed exposure readings within background ranges and pose no additional or incremental risk to the health of people traveling on the road. Field measurements indicate an average grid concentration of 4.6 pCi/g (0.17 Bq/g) of Ra-226 with a maximum activity of 20.2 pCi/g (0.75 Bq/g) of Ra-226 for a single 10-by-10 meter grid for near surface soils. Radionuclides other than Ra-226 and its decay products are not present in sufficient quantities to pose a threat to public health or the environment.

County Road Y-11 is currently controlled by Montrose County through the right-of-way on the property. Institutional controls agreed to by Montrose County and DOE will control future integrity of the road. DOE will ensure that no unacceptable activities occur in this area as part of its long-term surveillance program. The public will have access to and use of the county road.

Staff Conclusion for the County Road Y-11 area.

The State of Colorado has proposed the alternative soil standard of leaving the residual radiological contamination in place for the County Road Y-11 area.

The alternative soil standard is applicable to the County Road Y-11 area based on the following criterion from the Title I Supplemental Standards criteria:

- Unreasonably High Costs Relative to Benefits (40 CFR 192.21(c))
  The cost of cleanup of residual radioactive materials costs of land cleanup would be high relative to the long-term benefits. The residual radioactive materials do not pose a clear present or future hazard. Because the area is located along a county maintained roadway, the county does not want to expend funds for limited reduction in dose. Institutional controls agreed to by Montrose County and DOE will control the future integrity of the road since the road bisects the land to be transferred to DOE for long-term care.

The State of Colorado and the EPA have concurred that the application of the alternative soil standard is appropriate for the County Road Y-11 area (State of Colorado letter dated

September 26, 2007, ML081150505). DOE will monitor the County Road Y-11 area as part of its long-term stewardship activities.

This area has been remediated to the extent practical. The licensee performed and the State verified a dose estimate for reasonable future use of the County Road Y-11 area. The dose estimate indicates that the expected dose for several different scenarios would be a few mrem per year (a few 0.01 mSv/yr). The County Road Y-11 area is within the 100 year flood plain as well as under institutional controls provided by DOE ownership which make the area not suitable for building. Therefore, the level of protection provided by the alternative standard for the County Road Y-11 area is well below the benchmark protection level for the current standards. The staff concludes that the alternative soil standard for the County Road Y-11 area achieves a level of protection for public health, safety, and the environment from hazards that is more stringent than the level that would be achieved by standards and requirements adopted and enforced by the Commission for the same purpose.

Overall Staff Conclusion for the Four Alternate Standards Areas of the Uravan Site:

As stated above, the justification for the alternative soil cleanup standards includes two determinations: (1) did the licensee conduct reasonable practical remediation(s), and (2) does the alternative standard provide a level of protection equivalent to or more stringent than the benchmark level of protection?

(1) Did the licensee conduct reasonable practical remediation(s)?

The licensee conducted extensive remediation at the Uravan site over a 20-year period. The licensee ceased remediation in the four areas identified for alternative standards based on the risk to workers and/or potential environmental damage if additional remediation were to be conducted. The licensee used the supplemental standards criteria from 40 CFR 192.21 as guidance in developing the rationale for discontinuing additional remediation. The staff agrees that the use of the 40 CFR 192.21 criteria would be reasonable for these areas and additional remediation could adversely affect public health and safety and the environment.

(2) Does the alternative standard provide a level of protection equivalent to or more stringent than the benchmark level of protection?

The licensee evaluated through dose assessments the impact of no further remediation and leaving the contamination in place. The State of Colorado evaluated and agreed with the licensee's dose assessments. The Uravan site including these four areas will be transferred to DOE for long-term care under the general license in 10 CFR 40.28 under the DOE legacy management program. The DOE site ownership limits the availability of the site for development or the building of structures in addition to the physical limitations of the alternative standards areas (steep slopes and location in the 100 year flood plain). The staff reviewed the dose assessment assumptions and agrees that the doses from gamma radiation and radon in structures for the no additional remediation proposal are well below the benchmark levels for the regulatory requirements in 6 CCR 1007-1, Part 18, Appendix A, Criterion 6(6) (equivalent to the federal regulations in 10 CFR Part 40, Appendix A).

The staff has concluded that proposed alternative soil standards are protective even if the institutional controls fail in the future. The staff bases this conclusion on two assumptions: (1) the cliff face will not be developed for residential uses because of the steep slopes and

continuous sloughing of rock from the cliff face, and (2) the San Miguel River will not be relocated because of the bedrock channel that defines the canyon floor maintaining the current 100 year flood plain. Both of these assumptions are considered realistic by the NRC.

The staff concludes that the proposed alternative soil cleanup standards for portions of the Uravan uranium mill site provide a level of protection that is more stringent than the federal standards implemented by the NRC for the same purposes. The licensee, Umetco, proposed alternative standards only after it remediated the four areas to the extent practical. Further remediation of the areas affected by the alternative standards would either put workers at unreasonable risk or cause significant environmental harm greater than the benefits to be achieved by additional remediation. In addition, the areas affected will be under the control of the DOE as part of the long-term care of the Uravan disposal site.