

PRELIMINARY FINAL ENVIRONMENTAL IMPACT
STATEMENT

DURANGO, COLORADO

URANIUM MILL TAILINGS
REMEDIAL ACTION

- SECTION 6 -

PUBLIC AND AGENCY COMMENTS

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6.0 PUBLIC AND AGENCY COMMENTS

6.1 INTRODUCTION

This chapter discusses the comments made by private citizens, organizations, and government reviewers (Federal, state, and local) on the DEIS for remedial actions at the former Vanadium Corporation of America site in Durango, Colorado.

Comments on the DEIS were obtained from the public, citizens groups, and government agencies during two public hearings and a 101-day written-comment period. Two public hearings were held in Durango, Colorado, on December 18, 1984. A total of 29 persons presented oral statements on the DEIS. Comments were received from 562 individuals or organizations during the written-comment period. Table 6.1, at the conclusion of this section, lists the persons, groups or agencies that presented oral statements at the public hearings, or that submitted written comments.

To put all the comments in an easily accessible form, each oral statement (recorded by a certified stenographer) and letter was analyzed in detail to identify specific issues. A preliminary outline of this chapter was then prepared based on these issues. Notebooks were prepared in which all comments on a specific topic (e.g., ground water at the Long Hollow site) were consolidated. This system allowed the preparers of the FEIS to consider all comments received on a topic while revising the sections of the FEIS dealing with that topic.

As a result, comments have been grouped into 18 major topics that cover all the substantive comments received. Each of these topics deals with one or more issues which are listed in this section as part of the discussions of the 18 topics. Where the responses required changes in the text of the DEIS, they appear in the main text of this FEIS. For example, the State of Colorado disagreed with the extent of the wildlife mitigation measures presented in the DEIS. In responding to this comment, the DOE has met with the state to compare details of its more definitive mitigation plan with the ideas of the state and has presented a mitigation plan in Appendix L. Finally, a nineteenth section was added to include those comments that were not directly applicable to the DEIS, but which should be acknowledged, and in some instances, responded to.

*The EPA notice of availability of the DEIS was published in the Federal Register on November 16, 1984 (Vol. 49). This notice allowed a 56-day comment period, through January 11, 1985. The comment period was extended through February 25, 1985, by a Federal Register notice published February 7, 1985 (Vol. 50, p. 5295). A total of 101 days was officially allowed for public comment. However, written comments were received by the DOE until April 5, 1985; all were considered in this final environmental impact statement (FEIS).

Sections 6.2 and 6.3 discuss the legal basis of the proposed remedial action and the choice of alternatives. Sections 6.4 through 6.9 discuss the processing site and alternate sites, various matters related to the engineering designs of the alternatives, and the direct and indirect costs of the alternatives, including the requests for a more thorough economic analysis of the project.

Sections 6.10 through 6.18 discuss comments on the noneconomic impacts of the alternatives: the radiological and nonradiological impacts of the remedial actions, wildlife, transportation, land use, mineral resources, and air quality, historic and cultural resources, socioeconomics, and vicinity properties. Section 6.19 discusses those comments which are editorial in nature. Finally, Section 6.20 discusses the comments that dealt with topics considered to be outside the scope of the EIS.

Section 6.21 contains an alphabetical listing of individuals who gave oral testimony at the public hearing and the names of individuals, organizations, and others who submitted written comments.

Section 6.22 of this FEIS reproduces in full the written comments received on the DEIS. Transcripts of the public hearings are available for inspection at each of the public reading rooms and libraries listed at the beginning of Section 6.22. Numbers in the margins of written comments indicate the location in Section 6.0 where the issue is discussed.

6.2 COMPLIANCE WITH NEPA AND EPA STANDARDS

The compliance of the DEIS with the National Environmental Policy Act (NEPA) and with the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA was commented on in four written statements. The comments and responses are summarized below.

1. Comment

Several commenters said the DEIS did not comply with NEPA due to a lack of sufficient data or incomplete analysis. Two commenters (508 and 509) referred to the lack of core sample data from the tailings pile. Another cited a lack of ground-water data. (490)

Response

The intent of writing an EIS is to provide a document to be used in the decisionmaking process and which estimates the impacts of the alternatives under consideration. The CEQ regulations specifically direct that lengthy technical discussions are not appropriate for an EIS. The CEQ regulations also specify that when data or analyses are incomplete, that impact analyses must be conservative (i.e., over estimated) and must provide a realistic upper limit of the specific effect. The DOE believes that this has been the case. However, in recognition of the complexity of the issues involved, the DOE has collected additional data in several disciplines, including ground-water hydrology. These data are presented in the addendum to Appendix F, in revisions to the text of the EIS, as well as in Sections 6.4 through 6.7. DOE has been unable to obtain pile data as yet. Regardless, conservative safety factors have been applied in the various designs and no difficulties are anticipated during remedial action.

2. Comment

One written statement requested that a supplement to the DEIS be prepared and released to the public prior to issuance of the FEIS. This conclusion was based on the commenter's opinion that the DEIS should have included the use of an asphalt emulsion barrier as part of one or more of the alternatives, and that other details of the alternatives and proposed remedial action should be disclosed. (491)

Response

In selecting the alternatives for the DEIS, DOE was aware of the asphalt emulsion radon barrier concept from experience with the UMTRA Project Technology Development Program (DOE, 1985b). Other radon control techniques were also considered including chemical and thermal conditioning (DOE, 1985b). The DOE did not propose to use an asphalt emulsion barrier in any of the Durango alternatives because of the uncertainty of the longevity and durability of asphalt materials. The DOE believes that the com-

menter has not provide information that is new or was not previously known that would have a bearing on the decision and, thus, may warrant a supplement to the EIS.

3. Comment

The appendices provide incomplete, inaccurate, and often contradictory technical data which prevents a clear assessment of environmental impacts. The following areas are deficient for all alternatives:

- o Technical data for surface-water and ground-water hydrology.
- o Site specific geology, including lithology and structures.
- o Evaluation of the impact on surface-water and ground water of contamination at the present or in the future.
- o Source and cost estimates for reclamation topsoil. (554)

Response

The DOE disagrees with the claim that the DEIS is deficient in these areas. Although some information presented in the DEIS may not have been fully consistent or as complete as the reviewer would like, the DOE has endeavored to address these concerns by revising the DEIS with the issuance of this FEIS.

Specific questions on surface water are addressed in Sections 6.4.1, 6.5.1, 6.6.2 and 6.8. Ground water issues are discussed in Sections 6.4.2, 6.5.2, 6.6.2, 6.7.2, and 6.8.2. The question of topsoil availability and cost for the Long Hollow site is discussed in Section 6.7.3. Soil requirements for alternatives 2 and 3 are explained in Sections 4.5.1 and 5.4.2 of this FEIS.

4. Comment

With respect to the use of state radiation standards (which are more stringent than DOE standards by a factor of 10), what would implementation of the state standards mean in terms of 1) increased financial costs, 2) the amount of additional cover, and 3) costs and benefits for Alternatives 2 and 3. (549)

Response

In responding to this comment the DOE has assumed that the commenter is referring to the Colorado Department of Health, "Rules and Regulations Pertaining to Radiation Control." Comparison of the EPA standards with the State of Colorado standards does not support the commenter's claim that the state standards are more stringent by a factor of 10.

The Federal standards to which sites are decontaminated under the UMTRA Project are those promulgated by the EPA (40 CFR Part 192) for the cleanup of land and buildings (subpart B). The standards for land cleanup require the concentration of radium-226 averaged over an area of 100 square meters to not exceed the background levels by more than:

- o Five pCi/g, averaged over the first 15 cm of soil below the surface.
- o 15 pCi/g, averaged over 15-cm thick layers of soil more than 15 cm below the surface.

Background radium concentrations measured in the Durango area ranged from 1.0 to 3.0 pCi/g, averaging 1.6 pCi/g. Considering that surface radium-226 concentrations at a decontaminated site may be 5 pCi/g above background, in this case Federal standards allow surface radium-226 concentrations two to five times background in the Durango area.

In addition, the radon flux from a stabilized UMTRA Project pile must meet the design standard of 20 pCi/m²s. Using the conservative soils radium activity to radon flux conversion factor of 1 pCi per square meter per sec of radon for each pCi/g of radium in the soil, background fluxes in the Durango area are predicted to be about 1.6 pCi/m²s. Thus, the UMTRA Project radon flux standard is about a factor of 12 higher than background levels.

There are no comparable soil activity or flux standards for inactive processing sites administered by the State of Colorado. However, the State of Colorado does administer maximum permissible concentrations in water and air for occupational as well as environmental (general public) exposure. The primary radionuclide released from stabilized tailings is radon, which must not exceed 3×10^{-9} microCi/ml as an annual average in an unrestricted area. This is equivalent to 3 pCi/l outside of the site boundary. The corresponding UMTRA Project standard is related to the flux limit and limits the site boundary annual average radon concentration to less than 0.5 pCi/l above background. With background levels in Durango averaging about 0.5 pCi/l, this limits the total radon concentration to 1.0 pCi/l, a factor three times more stringent than Colorado state regulations.

The cost differential between implementing the state and EPA standards would depend greatly on the thickness of the cover that would be required by the state to be placed on the tailings and contaminated material. Regulations of the Colorado Department of Health grant a wide latitude in amount of the cover that could be required at a particular site. Because of the uncertainty in how the state would apply the regulations at Durango, it is not appropriate to speculate on the cost differential if another set of standards were to be imposed on the remedial action.

6.3 ALTERNATIVES

A number of commenters questioned the process used by DOE to select alternatives which were addressed in the DEIS. Some commenters were interested in alternatives that had been considered but were later rejected from further consideration, while other commenters suggested additional alternatives for consideration. Summaries of the comments and responses are given below.

1. Comment

Other alternative remedial actions should be considered in addition to the five that were examined in the DEIS. (445, 459, 463, 515, 467, 481) One commenter recommended the alternative of moving the tailings to the Durita facility near Naturita. (473) The DEIS failed to identify alternatives that were considered for stabilization in place but discarded. Appendix C, "Alternatives That Were Considered But Rejected," only includes sites that were considered and ultimately rejected. (515)

Response

For the UMTRA Project, DOE's proposed action (different from preferred alternative) is to conduct a remedial action, either stabilizing at the current designated site or relocating and stabilizing the tailings at another site. As expressed in Appendix C, nine sites were examined as possible alternatives to stabilizing on site. In this EIS, alternatives considered included various sites, reprocessing, and modes of transporting tailings to other sites. Prior to the development of Alternative 2, several design issues were examined that affected the final configuration of Alternative 2 including the fault through the raffinate ponds area, the identification of the ponds for location of a pump-house for the Animas-La Plata Project, the very limited area on and immediately off the site (beyond the raffinate ponds and up Lightner Creek), and the nearby location of Smelter Mountain. Given these design concerns, the concept described in the EIS for Alternative 2 was considered to be the best available as it offered minimum movement of tailings, occupied the least area, provided for the greatest setback from the Animas River, and allowed for a satisfactory safety factor with the given slopes.

Regarding the relocation of the Durango tailings to the Durita facility, this issue was fully examined in Section 3.2.7.3 of the DEIS.

2. Comment

The EIS should provide a clearer and more comprehensive statement of how selection of the preferred alternative was accomplished. (534) Two commenters felt that the basis for planning and selection (of the preferred alternative) should depend on factors such as cost, health effects, traffic accidents and deaths, and public opinion, and not on what were used in the DEIS (soils, wildlife, vegetation, and the like). (454, 521)

Response

The DOE, in consultation with the State of Colorado, selected Alternative 5 as the preferred alternative on the basis that the recovery of the mineral values may be economically viable, that the Long Hollow site is relatively remote, health effects would be low, wildlife would be minimally impacted, and that ground water and transportation impacts could be mitigated in an acceptable manner.

Since publication of the DEIS, it has become apparent that recovery of the mineral resources is not economically viable and that demonstration of compliance with ground-water standards at the Long Hollow site would be difficult given recently collected data (see Sections 6.7 and 6.8). Also, because stabilization in place would only meet the 200-year longevity standard, and would require more long-term maintenance, it became apparent that relocation to Bodo Canyon, all factors considered, was the best of the five alternatives examined in the EIS. Thus, Alternative 3, relocation to the Bodo Canyon site is DOE's preferred alternative.

3. Comment

What were the reasons for rejecting the other six alternate disposal sites besides Long Hollow and Bodo Canyon? (424, 425)

Response

As stated in Appendix C, all nine sites were ranked based upon geotechnical considerations (Table C-1). Once ranked, a multidisciplinary site selection committee, appointed by the state, further evaluated each site considering factors such as reclamation potential, transportation, land use, political issues and the need for potential future maintenance. The following describes the reasons why each of the six sites was rejected (CGS, 1981).

The Junction site is geotechnically an excellent site. However, it is adjacent to an area that presently is being studied by the U.S. Bureau of Land Management as a possible wilderness area. The site also is irrigated agricultural land and is directly adjacent to recorded archaeological sites.

The Maggies Rock site also is an excellent site from a geotechnical standpoint; however, much of this site is owned by the Ute Mountain Tribe, and also is irrigated agricultural land.

The Mancos Valley site has a higher erosion potential and has a producing oil well on it; Mesa Verde National Park and other significant archaeological resources are only 0.5 mile from the site.

The Thompson Park site is highly visible from U.S. Highway 160. Visual impacts would occur while the project is in progress. This site also is irrigated agricultural land.

The State site is noticeably less desirable than other sites from a geotechnical standpoint. The State site is underlain by the Animas Formation, a "possibly suitable formation" that is locally an important source of ground water in the region.

Geotechnically, Mud Creek was similar to the Mancos Valley and Thompson Park sites. Long-term erosion potential was considered moderate and part of the site was potentially unstable.

4. Comment

Statements in the DEIS imply that the owner of the Long Hollow site may be opposed to the use of the site, forcing the government to condemn his land. Was the issue of landowner acceptability a factor in the site selection criteria? (477)

Response

The issue of land ownership (i.e., private, Federal, state, local) was considered in the evaluation of the nine candidate alternate disposal sites (Section C.1.1). However, the issue of land ownership acceptability was not considered.

In the event that the Long Hollow site were to be selected, the state would have at least two appraisals made of the value of the property. On the basis of these appraisals, the state, not the Federal Government, would negotiate a sale price with the owner of the Long Hollow site.

Comment

The EIS should clarify why the Rabbit Mountain alternative was eliminated considering that Rabbit Mountain and Bodo Canyon have similar subsurface geology. (490)

Response

Although the geology of the Rabbit Mountain and Bodo Canyon areas may indeed be similar, the Rabbit Mountain area was rejected for inclusion in the EIS by the state of Colorado because it is "...noticeably less desirable than other sites from a geotechnical standpoint..." it is underlain by "...a possibly suitable formation that is locally an important source of ground water..." and "...has a high erosion potential..." (CGS, 1981). These conclusions were reached based upon a detailed review of all available literature and a site reconnaissance.

6. Comment

The FEIS should address the alternative of disposing of the tailings in the abandoned underground mines in Smelter Mountain. (414, 519)

Response

Disposal within Smelter Mountain would be exceedingly expensive. Based on a continuous opening six feet high, an underground mine area of 175 acres would be required to accommodate the tailings and contaminated materials. It is unlikely that the mine in Smelter Mountain was this large, and it is also probable that most of the mine has caved in; thus, re-excavation of the mine workings would be necessary.

7. Comment

The concept of transporting the tailings by an aerial tram or through the Smelter Mountain mine tunnel should be given consideration in the FEIS. (519, 515, 487, 550) A slurry pipeline (using water) or carbon dioxide pipeline should be considered as a means of transporting the tailings to an alternate disposal site. (419, 424, 425, 439, 440, 458)

Response

The slurry pipeline concept is discussed in Section 3.2.7. The carbon dioxide pipeline has not been considered because the system has not yet been proven technically feasible. A rough cost estimate for transporting the tailings by aerial tram directly over Smelter Mountain to Bodo Canyon is \$5 million which is comparable to the cost for the truck system. This cost includes covers for the gondolas and a hopper for loading and unloading. It does not include contingency costs for loading and unloading, transportation to and from the pile, land-acquisition, engineering, construction management, and ongoing maintenance. This method of moving the tailings is not as commonly used as trucks or conveyors for material transport and there may be many unknown costs. For example, a maintenance road under the tram may need to be constructed to clean up any materials that are accidentally spilled on the tram route. Because a road cannot be constructed to go directly over Smelter Mountain, a more feasible place for the tram would be starting near the raffinate pond area and then going up the north drainage divide to the Bodo Canyon site. However this route would greatly increase the cost of the tram due to the turns required.

Maintenance is another potential problem with a tram system. If the tram breaks down it would virtually stop construction until repaired. Also, if spillage were to occur, the contaminated material would be carried in the air for a great distance since the gondolas would be high in the air. Mitigation measures would have to be studied and developed in order to minimize the probability and effect of such a spill. A system to control fugitive dust would also be required where the gondolas are loaded and unloaded.

The only foreseeable benefit of the tram system would be a reduction in truck traffic. However, a tram system would not completely eliminate truck traffic. An estimated 187,000 cy of soils would have to be transported to the Durango site and approximately 44,000 cy of riprap would have to be transported from the quarry site to the Bodo Canyon site. Also, any large contaminated materials found in the pile at Durango that would not fit in the gondola would have to be trucked to the Bodo Canyon site.

Further, a tram system may not reduce the amount of fugitive dust that would be generated during construction and might possibly increase it. The difference in costs between the trucking system alternative and the tram system that passes directly over Smelter Mountain with no maintenance road is slight. Considering the disadvantages of a tram transportation system, the DOE has selected the truck system and conveyor systems for detailed analysis in Alternative 3.

In reevaluating alternative transportation modes, tailings transport by conveyor has been found to be a viable alternative to truck transport. A relatively new type of conveyor referred to as a "pipe conveyor" appears to be particularly suitable for the Durango remedial action. Accordingly, the DOE has revised the FEIS to include a truck and conveyor option for Alternative 3, stabilization at Bodo Canyon.

8. Comment

In two (2) separate DOE contractor memos, it was stated that the DOE was not going to select a "preferred alternative." Why then did DOE select a preferred alternative in the DEIS without working with the county and local constituents first? (515)

Response

As with all large multidisciplinary projects, the Durango EIS was subject to much discussion both within DOE and with DOE contractor organizations, and with the State of Colorado. The memoranda referred to by the commenter were not intended to be the official position of DOE.

The DOE disagrees that county and local individuals and groups were not consulted throughout the process. DOE gave notice of its intent to prepare an EIS and invited public participation in a notice published in the Federal Register (46 FR 30383 - 30385), June 8, 1981. The notice announced three public scoping meetings which were held on June 30 and July 1, 1981. Announcement of the meeting also was widely publicized in the local media. The preferred alternative in the DEIS was selected based on comments received in the scoping meetings, technical factors, and in consultation with the state (see Section 6.3, response to comment 2). Also, see Section 4.12.8, Public Concerns About the Remedial Action Project.

9. Comment

The EIS should consider the alternative of stabilizing in place without moving any of the tailings. (545, 368, 369, 415, 515)

Response

This concept was considered; however, it was found to be unsuitable for achieving the long-term stability required by the EPA standard. Slopes of the piles would remain too steep (1 to 1.7 or 1.8) for the required level of safety.

10. Comment

Different levels of data were presented for each alternative in the DEIS, making evaluation and decisionmaking more difficult. Every reasonable effort should be made to provide detailed and comparable data so that the comparison of alternatives is meaningful. (554)

Response

The commenter is correct in the underlying assumption that alternatives in an EIS must be treated equally and that the basis of this treatment are the quality and magnitude of supporting data. The DOE believes that every reasonable attempt has been made to obtain site-specific data and provide quantitative analyses. In those case for which information is lacking, data from other tailings piles or regional data have been used. Further, analytical approaches used are conservative in that impacts are overestimated. Thus, for the legislated purpose of an EIS (i.e., provide input to the decisionmaking process), information and analyses in this FEIS are more than sufficient to compare alternatives.

6.4 GENERAL DESIGN CONSIDERATIONS

Comments which involved designs for more than one of the alternatives were collectively grouped within the General Design Considerations category. Written and oral statements were directed at broad issues including tailings covers, erosion protection, geologic and seismic stability, hydrologic conditions, and post remedial action maintenance. The comments are summarized below with the DOE's response.

6.4.1 General engineering design

1. Comment

Several comments were directed at the type of covers which were described in the DEIS.

o Comment a

The Colorado Department of Health recommended that a two-foot layer of gravel would be needed as the final pile cover layer for erosion protection with all of the action alternatives. (493) The Nuclear Regulatory Commission also expressed doubt that a re-vegetated cover would meet the longevity requirement of the EPA standards. (490) Another commenter suggested that the vegetative cover on the existing pile provides adequate erosion protection. (429)

o Response a

The DOE agrees with the Colorado Department of Health and has modified sections 1.3, 3.2.5, 3.2.6, and 5.0 accordingly. The cover will consist of a two-foot-thick rock layer ($1.0 \text{ inch} \leq D_{50} < 2.0 \text{ inches}$, $3.0 \text{ inches} < D_{100}$) on the top- and sideslopes. Vegetation is not believed to be as reliable as rock for providing long-term erosion protection. A drought could cause the vegetation to die out and leave the tailings cover susceptible to severe erosion.

o Comment b

One commenter recommended that the cover design should incorporate a capillary break to retard upward movement of water and salts. (491)

o Response b

It has not been deemed necessary to require a capillary break in cover systems design. The total cover would consist of two feet of rock underlain by six feet of compacted fine grained soil. This system would prevent deep drying of the soils and creation of high soil suctions.

o Comment c

The Colorado Department of Health and the New Mexico Environmental Improvement Division asked what measures would be taken to inhibit intrusion by burrowing animals or plant root penetration. (493, 485)

o Response c

The two-foot-thick rock erosion protection barrier and the six feet of compacted cover would discourage burrowing animal intrusion and plant establishment (DOE, 1985b). Additionally, any intrusion by burrowing animals observed during periodic surveillance inspections would be evaluated and corrected as part of maintenance as necessary. Any deep rooting plants would be removed if densities were high enough to cause potential problems.

o Comment d

It would be better to have a concave surface for the top of the pile under Alternatives 3, 4, and 5 in order to keep the clay cap moist. (493)

o Response d

The DOE disagrees. A concave surface would create excessive infiltration through the clay cap, possibly causing tailings leachate to develop and seep from the embankment. By having a rock layer over the clay, the radon barrier would maintain a higher long-term moisture content without causing excessive infiltration into the stabilized pile.

o Comment e

DOE should have addressed the use of an asphalt emulsion radon barrier. Conclusions of DOE's UMTRA Project Technology Development Program state that asphalt-emulsion barriers are more effective than soil radon barriers. (491)

o Response e

Asphalt emulsions have not been proven to last for hundreds of years. Deterioration and cracking of this type of cover would not be as selfhealing as would a natural soil cover. Research conducted by UMTRA Project Technology and Development Program (Hartley et al., 1981) found that asphalt emulsion and soil barriers both effectively limit radon emanation; however, the long-term reliability of asphalt barriers can not be assured.

o Comment f

Two commenters requested that the method used to calculate the radon cover thickness should be explained in greater detail. (493, 454)

o Response f

The cover thickness required for all alternatives was calculated using the single layer model, RAECO (DOE, 1982) (see Sections A.4.2.2, A.5.2.4, and A.7.2.4 of Volume II of the DEIS). The source terms for contaminated material used were for the estimated radium content of the tailings. The diffusion coefficients of both tailings and cover material were estimated as well. All estimates were based on typical values of these properties measured at other sites. The EIS does not attempt to present the detailed engineering of the covers, but rather performs an analysis of the health effects impacts assuming that the EPA standard of 20 pCi/m²sec is met after installation of whatever amount of cover material is required based on the detailed engineering design of the alternative selected.

2. Comment

Several comments related to erosion control measures and projected flood conditions.

o Comment a

Four comments questioned the adequacy of erosion control measures in diversion channels at Bodo Canyon and Long Hollow. (485, 490 491, 554) The diversion channels as proposed in the DEIS may not be able to resist erosion during a PMP. Riprap should be required for both the channel sideslopes and bottoms. (491, 554) In addition, calculations and assumptions used in sizing the riprap protection and costs should be provided. (554)

o Response a

In reevaluating the calculated channel velocities, the DOE has decided that riprap would be placed in the channel bottoms and on the sideslopes. In the final design, riprap would be sized by analytical methods using appropriate calculated velocities during a PMP event which would vary depending upon the particular channel. Sections 1.3, 3.2, and others have been modified to reflect this change. An estimated cost for lining the channel sideslopes and bottoms with riprap in each alternative included in the revised Table 1.2.

o Comment b

Another comment stated that the potential for aggradation or filling in of the diversion channels around Long Hollow should be considered. (485)

o Response b

The diversion channels would be designed with sufficient size and slope to prevent long-term aggradation due to storm events from affecting the integrity of the channel capacities.

o Comment c

The drainage area at Bodo Canyon is half that of Long Hollow and would require less protection for the Probable Maximum Flood (PMF). (534)

o Response c

That the drainage area at Bodo Canyon is less than that of Long Hollow does not necessarily mean that less protection is required. The magnitude of design conditions resulting from a PMF event varies widely based upon slope, degree of saturation, times of concentration, concentration of drainage, in addition to the size of the drainage basin. Each drainage area was analyzed for PMP conditions, and the appropriate erosion protection measures have been incorporated into the conceptual design.

o Comment d

Median soil moisture conditions were used for the calculation of PMF flows (see page F-3). Current NRC guidance states that soils over the watershed area should be assumed to be saturated, or that conditions which would reduce surface runoff should be fully justified and documented. The analysis should therefore be performed assuming saturated conditions or justification provided for the degree of saturation assumed in calculating runoff values. (554)

o Response d

There are several parameters used in a flood analysis that can cause the results to vary widely based upon the judgement of the user. At the time the PMF analysis was performed for the Animas River, it was felt that median soil moisture conditions were conservative enough to assess the potential flood hazard. The flood hazard was determined to be major and constituted one of the primary factors in the decision to select Alternative 3 as the pre-

ferred alternative in the FEIS. At this point it is considered unnecessary to perform additional flood analysis using more conservative parameter values which would result in a somewhat larger projected flood.

o Comment e

The estimates presented in Appendix F for the Bodo Canyon and Long Hollow Probable Maximum Flood (PMF) do not describe the locations of the estimates. (554)

o Response e

Upstream from the tailings at the Durango site, the Animas River has a drainage area of approximately 770 square miles (492,800 acres), including that of Lightner Creek. These are well defined channels and would have significantly larger flows during a PMP event than at the Bodo Canyon or Long Hollow sites. To clarify the effects a PMP would have on these channel's water surface, elevations were presented at various locations along both Lightner Creek and the Animas River. However, at the Bodo Canyon and Long Hollow sites, the watersheds are comprised of relatively small drainage areas. There are no well defined channels that would justify the need for water surface elevations along the different drainage areas. Therefore, these elevations were not presented.

o Comment f

The EIS should address the durability of rock that may be utilized from the Bodo Canyon borrow site. (493)

o Response f

Rock durability will be addressed in the Remedial Action Plan in terms of design criteria for the Remedial Action Contractor (RAC). The conceptual design at this point assumes that the proposed source of rock will meet durability criteria and the sizing of the rock is based partially upon this. The final testing and evaluation of rock durability is the responsibility of the RAC.

Should any of the rock being evaluated for use as erosion protection not meet the recommended standards for acceptable rock durability, a new rock source would be identified and evaluated.

If an alternative rock source of better durability cannot be found, the size of the rock would be increased to take into account the degradation of the rock with time. The increase in size is subjective but it is proposed that the rock size be increased by the percentage that the rock fails a criteria.

3. Comment

Several commenters requested that the EIS contain much greater detail on the engineering designs than was presented in the DEIS. (490, 515)

Response

The intent of writing an EIS is to provide a document to be used as part of decisionmaking process and to estimate the impacts of the alternatives under consideration. The DOE believes that sufficient engineering details are provided to conservatively (in DOE's estimate) assess the impacts.

4. Comment

What methods are proposed for controlling windblown tailings at the pile during excavation or stabilization activities? What will prevent disturbed tailings from blowing around during the night or in periods of high winds, adverse weather conditions, on weekends, or during worker strikes? (517, 429, 487)

Response

An Air Pollutant Emission Notice and fugitive dust control plan will be submitted to the Colorado Department of Health prior to their issuance of an air emission permit. The permit will specify necessary dust control measures. Actions that will be considered for controlling windblown tailings at the pile include dampening exposed contaminated material or covering it with tarps or plastic sheeting to prevent blowing dust. There will also be a chemical dust palliative applied to minimize dust where necessary. As described in Sections 3.3.2 and 5.2.1, the specific emission controls would be developed during the final design stage.

5. Comment

Project impacts on present utilities at Durango, Bodo Canyon, and Long Hollow need to be addressed for all alternatives. (493)

Response

There will be minimal impact on present utilities. Water will be obtained from the Animas River, sewage will be relocated to the treatment plant, and the power requirements can be supplied by existing sources. Section 5.5 describes these impacts and resource requirements.

6. Comment

Will contaminated material underneath the pile be removed down to a point where radiation levels drop to EPA standards? How deep will this be? Is removal even possible? Could this add significantly to the cost? (487, 515)

Response

During excavation of the pile, all material exceeding the EPA soil concentration standards will be removed. The limits of excavation will be determined by field and laboratory measurements. Conservative estimates of the contaminant interface have been made based upon limited site characterization data. The exact interface will be determined by excavation control measurements used to determine when the limits of contamination have been reached. Excavation costs are directly dependent upon the extent of subpile contamination.

7. Comment

Two commenters stated that materials such as yellowcake, machinery, and the like, may be present in the tailings. During the remedial action, how would they be handled? (446, 177) Another commenter stated that the pile should be moved because there is a lot of high grade ore in the center of the pile. (541)

Response

High grade ore was the source and yellowcake the product, both valuable resources of the milling process, thus their presence in the tailings is not anticipated. However, radiation measurements taken during the remedial action will identify the presence of any such materials. If yellowcake or high grade ore are found in the tailings they will be blended so that uniform radiological properties of the tailings are obtained. At this time it is not anticipated that any yellowcake will be found during the remedial action. Section 3.2.3 has been revised for clarification. Machinery found in the tailings will be appropriately dismantled, reduced in size, and buried in the stabilized pile.

8. Comment

Have road profiles and cross-sections been prepared to determine the feasibility of putting in access roads to the tailings piles along the sides of Smelter Mountain at 30-foot intervals? Will these roads be able to be constructed at the required 35-foot width? What alternative means of excavation/disposal are available if construction of the access roads prove unfeasible? (483)

Response

Construction drawings for road profiles and cross-sections have not been completed and are not required for this EIS. However, the construction of the road is feasible. It should be noted that the on-site access roads do not have to be 35 feet wide. For example, the road along the face of Smelter Mountain may only have to be wide enough to support one way truck traffic, approximately 15 feet wide. The most cost effective road design will prevail and be designed accordingly during final design and construction. Another means of moving the tailings is by conveyor. The tailings could be conveyed from the tailings piles to the raffinate ponds for truck loadout or transported by conveyor from the existing piles to Bodo Canyon. Conveyor transport is discussed in more detail in Section 3.2.4 of this FEIS.

9. Comment

The utility of a two stage truck wash station is questionable. None was needed for the Naturita (Durita) project. (493)

Response

In order to prevent contaminated material from leaving the site, a truck wash and decontamination pad is needed. The Naturita tailings project was operated under a radioactive materials license issued by the State of Colorado and was conducted according to different radiation control standards than are currently in effect for remedial action at inactive uranium tailings sites.

10. Comment

The use of activated carbon for adsorption of radionuclides during the remedial action should be considered by DOE. (417, 418)

Response

Activated charcoal is used as a technique to measure radon flux from the tailings pile on a small scale, and for treatment of waste water in limited situations. It would be impractical to use activated charcoal as a means to filter or cleanse the air or water during remedial action construction activities.

6.4.2 General Hydrologic considerations

Seven written comments raised general issues in the areas of hydrology and water quality.

1. Comment

The NRC noted that Section F.2.2.3 infers that many of the ground-water parameters were elevated above background. What is "background" for the aquifers in question? Were state and Federal standards exceeded? (490)

Response

For the shallow aquifer beneath the tailings piles, none of the monitoring wells are located so as to yield true background samples of water quality. Well No. 22 is the furthest upgradient, however, its proximity to the small tailings pile prevents its consideration as "background." Therefore, concentrations reported as "elevated" (BFEC, 1983) and reiterated in the DEIS are elevated relative to Federal and state standards (Tables F.9 and F.10), not to background.

Well 7 is considered the background well in the raffinate ponds area for water entering the shallow system of the eastern portion of this site from South Creek (also referred to as "north drainage"). This well yielded ground-water samples (from November, 1982 to August, 1983) with average concentrations of 4400 umhos/cm conductance, 10 ppb uranium, and 2600 ppm sulfate (see Tables F.21 through F.24). True background water quality for the Menefee Formation (sandstone and coal layers) has not been established for this site. New analytical data for wells DUR-03-602 and 603 completed in Menefee coal seams at Bodo Canyon can be used to estimate background levels of key constituents for down-dip Menefee strata beneath the ponds. The key "background" parameters (averages) for the Menefee Formation wells are: 2250 ppm sulfate; 5.0 ppm iron; 0.6 ppm manganese; <0.01 ppm chromium; <0.005 ppm selenium; 9.3 ppm strontium; <0.01 ppm vanadium; <3 ppb total uranium; 7.3 pH; and 3800 umhos/cm conductance. Thus, as reported in Section 6.2 of the DEIS, elevated levels of chromium and selenium in the aquifers underlying the raffinate ponds area are above both local background levels, and state and Federal standards. Levels of uranium and vanadium are above background concentrations; however, there are no state or Federal drinking water standards for these elements.

2. Comment

It is not appropriate to consider radium-226 in the tailings piles to be in an insoluble form without experimental data. (493)

Response

GEOR (1982) presents data from core samples taken from the small tailings pile which indicate that radium may be moving downward within the piles with the leaching of sulfate salts. Radium may form soluble complexes with sulfate and chloride within the tailings solution; however, ample experimental and field data show that radium

is strongly adsorbed by most soil types (IAEA, 1984). Also, radium sulfate is likely to be precipitated at the base of the pile as it encounters well buffered neutralizing soils. Analytical results reported by Bendix for wells at the Durango mill site show levels of Ra-226 consistently below 2.0 pCi/l (BFEC, 1983). Therefore, radium may be in a soluble form within the tailings, but it is not mobile outside the acidic, oxidizing environment of the piles.

3. Comment

Site-specific, short-term water balances should be performed for all sites assessed in the EIS in order to obtain accurate estimates of infiltration through the stabilized tailings pile. It is not adequate to state that because annual evapotranspiration exceeds precipitation, that the potential for infiltration is small (as done in Section A.5.2.4 of the DEIS). (490, 554)

Response

It is true that snowmelt and heavy precipitation events may periodically cause infiltration to exceed evapotranspiration losses on a local, site-specific scale. However, the engineering design for both stabilization in place and relocation features a compacted clay cover with low hydraulic conductivity values (K) (on the order of 10^{-7} cm/sec) which will drastically limit infiltration rates into the materials. Assuming a vertical permeability of this order, a unit hydraulic gradient through the clay cover, and saturated flow conditions, then a highly conservative infiltration rate (Darcian velocity) through the cover would be 1.24 inches per year. Average annual precipitation recorded in Durango (1951-1973) is approximately 18.7 inches per year (NOAA, 1975). This vertical seepage rate thus represents 6.6 percent of average annual precipitation. The U.S. Geological Survey (USGS, 1983) estimates that only two percent of average annual precipitation infiltrates to the saturated zone within principal recharge areas of the Durango area (this would amount to only 0.4 inches per year). Infiltration rates will be much less through a cover designed to limit infiltration. A conservative estimate of infiltration into stabilized tailings materials, would be a value of 1.87 inches per year (10 percent of annual precipitation).

4. Comment

The tailings may be far more saturated than is presently believed and more complex bottom liners may be required to mitigate impacts on ground water for Alternatives 3 and 4. (493)

Response

Tailings relocated to either Bodo Canyon or Long Hollow would require transport, mixing, and moisture conditioning prior to placement. Therefore the moisture content of the tailings would be controlled and more complex liners would not be required.

5. Comment

How will water within the existing tailings piles be drained? (493)

Response

It has been assumed that the pile is unsaturated at the surface and partially-saturated in deeper layers. Draining the piles is not expected to be necessary as some moisture content is desirable for dust emission control and compaction. However, if necessary, during the remedial action a method of dewatering would be determined and implemented.

6. Comment

How will runoff water from dust control efforts be handled? (429)
Will contaminated water be evaporated or treated and discharged?
The document is inconsistent on this issue. (454)

Response

Dust control efforts will optimize the amount of water applied to control dust emissions and avoid runoff of excess water. All contaminated water collected from dust control and storm runoff at the sites will be channeled to an on-site water retention reservoir which will be lined with an impermeable synthetic liner to minimize seepage losses. The reservoir will be sized to contain runoff from a 10-year 24-hour precipitation event. Once the remedial action process is complete, the contaminated water storage reservoirs will be retained until all the water has evaporated. Sections 3.2 and 3.3.2 have been revised.

7. Comment

What additional mitigation measures can be included to avoid or decrease siltation of the Animas River to decrease impacts to the fishery downstream from the pile? (549)

Response

During preparation of the final design, sediment control measures will be considered that would reduce sediment discharge to the

Animas River. Some of the measures are coffer dams, sediment traps, and mulching of newly graded areas. These measures would be in addition to directing runoff from contaminated areas to contaminated water storage reservoirs.

8. Comment

The discussion of the hydrologic regime at Bodo Canyon and Long Hollow should be revised to include recently collected ground-water data. (493)

Response

The addendum to Appendix F in this FEIS contains this information (see Tables F.42 to F.45, and Figures F.28 and F.29). These tables summarize data collected during recently completed JEG drilling programs at Bodo Canyon and Long Hollow. These data generally confirm hydrologic assessments made in the DEIS. Where new hydrologic interpretations are warranted, they are discussed in responses to several NRC comments in Sections 6.6 and 6.7.

6.4.3 General geologic considerations

Seven written statements, including those from the Colorado Department of Health, the NRC, and Citizens Concerned About Moving the Pile (CCAMP) questioned aspects of geomorphic stability, the seismic evaluation, and the geotechnical characteristics of the tailings piles.

1. Comment

An inadequate data base for the evaluation of seismic hazards was presented in the DEIS. Many seismic events which took place within 300 miles of Durango were not listed. (490, 412) Figure E-8 does not accurately present the seismic events that have occurred in the Durango area. (490)

Response

Seismic activity near Durango has been reevaluated using both deterministic and probabilistic approaches. Section 4.5.4 has been revised to incorporate summaries from the more recent evaluation which has been reproduced as Appendix M.

Figure E-8 depicts earthquakes that have occurred within a 200-mile radius of Durango, not a 300-mile radius as the commenter implies. As stated in the EIS, Table E-6 represents only the larger earthquakes that have occurred within a 200-mile radius. The NOAA file of all monitored seismic activity, from which Figure E-8 was derived has also been reproduced in Appendix M.

2. Comment

The northwest-trending faults between the Uncompahgre Uplift and Paradox Basin are stated to have Neogene displacement and are located 75 miles from Durango. Section E.2.1.3 provides no discussion of the fault parameters, the basis for stating that the faults are 75 miles from Durango, the basis for the Neogene displacement, or maps showing the faults' locations in relation to the site. (554)

Response

Appendix M of this FEIS addresses seismicity at the Durango sites and the issues raised by the commenter in detail.

3. Comment

What is the basis for the statement in Section E.2.1.3 that the closest approach of the Rio Grande Rift is 100 miles? From Figure E-7, it appears that normal faults related to the west side of the Rio Grande uplift come as close as 50 miles to Durango. (554)

Response

Appendix M has been prepared and addresses seismicity at the Durango sites in detail. The Rio Grande Rift and possibly some normal faulting associated with the Rio Grande Rift were found to approach within 51 miles of Durango.

4. Comment

What is the age of last movement on normal faults in the Durango area? Where are these faults located in relation to the site? (554)

Response

The normal faults associated with the Durango Anticline and the Perrins Peak Syncline are considered inactive (i.e., not having experienced movement in the past 10,000 years). As stated, these faults are located in the immediate vicinity of Durango, being approximately 0.25 and 0.5 mile distant from the processing site. The locations of these faults are shown in Figure E-5 of the DEIS.

5. Comment

In Section E.2.1.3, what is the age of last movement on the Ridges Basin Fault? What is meant by "no measurable displacement" of the Cliff House Sandstone? The basis for saying the fault dies out before reaching the site is weak and the DEIS should provide additional supporting data. (554)

Response

A field study was conducted to determine if active faulting exists in the Durango area (JEG, 1985b). No movement of any faults, including the Ridges Basin Fault, has occurred in the past 10,000 years (Holocene).

6. Comment

Where in relation to the three sites are the faults described in Section E.2.1.3 as north of the electrical substation? What is the basis for the statement that "The faults appear to be tight, and the possibility of ground-water movement along these faults is believed to be slight." (554)

Response

Figure E-5 in Appendix E of the DEIS shows the locations of these faults. Fault zones in sedimentary rocks often consist of finely ground rock and clay (gouge) which acts as a low-permeability barrier to ground-water flow.

7. Comment

Regional seismicity and projected maximum ground acceleration were the subject of five NRC comments.

o Comment a

Section E.2.3.2 estimates the maximum acceleration for events on potential earthquake sources (i.e., Uncompahgre boundary fault), using Schnabel and Seed, 1973 curves. What makes Schnabel and Seed's maximum acceleration versus distance curves superior over other available curves? (554)

o Response a

There are many attenuation curves available for use in the literature. These are developed upon various data bases. While a large variation in acceleration can be derived from the various curves and formulas in the near field, only minor differences exist for the distances considered at Durango.

o Comment b

No fault parameter data are provided to support the distances used to determine the maximum acceleration in Section E.2.3.2. (554)

o Response b

A detailed discussion of fault parameter data used to support the derived acceleration during seismic activity have been presented in Appendix M of this FEIS.

o Comment c

Docekal, 1970, discusses a seismic trend along a line from Wichita to Amarillo to the West Mountains. What impact does this seismic trend have on the analysis of seismic potential for the three sites? (554)

o Response c

This comment will be addressed after the Master's Thesis, cited by the commenter, has been obtained and reviewed.

o Comment d

Section E.2.3.3 should be revised to include a discussion of site-specific seismic activity, e.g., maximum ground motion used in site design and related impacts. (554)

o Response d

The maximum ground motion used in site design and related impacts is discussed in paragraph 3 of Section E.2.3.3. This discussion has been revised and expanded in Appendix M of this FEIS.

8. Comment

Several commenters stated that the DEIS did not present sufficient borehole or other data on the radioactive constituents and the geomorphic stability of the pile. DOE should obtain this information from Hecla Mining Company or collect new information for evaluation prior to the FEIS. (515, 508, 509, 513)

Response

The geomorphic stability of the tailings pile and the alternate sites has been addressed by the DOE (JEG, 1985c,d,e), using very conservative assumptions and knowledge from other existing tailings piles. The reports are summarized in Section 4.5.4.

Additional data on the radioactive constituents, principally the radium content of the pile and the extent of subpile contamination, will be obtained by the DOE prior to completing the final design of the remedial action. This information will be used to develop the

source term, radon barrier cover, and detailed stability analyses. Although the DOE recognizes that these data would be useful to refine the designs, this information is not necessary to estimate impacts because of the conservatism (i.e., over estimation of impacts) built into the impacts analyses presented in this EIS.

9. Comment

The Colorado Department of Health and three other commenters said the potential instability of the existing tailings piles should be addressed along with its potential to fail and slide into the river during remedial action for all of the alternatives addressed. (493, 508, 509, 513) Another commenter stated that the instability of the piles is justification to move the piles. (407)

Response

Due to lack of legal access to the Durango tailings pile, detailed analyses of stability based on pile data cannot be performed. Examination of the pile indicates that existing stability under static conditions is in excess of a 1.0 safety factor. There appears to be bulge on the slope of the large pile that may have indicated near instability under active milling conditions or may have been a construction feature. It is likely that the existing pile would be unstable under seismic loading conditions.

Since the existing pile is presently stable, removal of tailings during the remedial action process will lower the height of the tailings pile and increase pile stability. Temporary effects of construction equipment near the edge of the pile are not considered significant, as they will only approach loadings experienced by the embankment during construction of the tailings dike during milling operations.

10. Comment

The embankments associated with Alternatives 2 and 3 have been analyzed for stability using the STABL 2 computer program. However, the embankments for Alternatives 4 and 5 were analyzed by the infinite slope method; a simplified, quick method that is usually applied to long slopes of cohesionless materials. The use of this method is considered an inadequate assessment of stability. Consistency should be maintained by using the more appropriate methods as were applied to Alternatives 2 and 3. (490)

Response

The values presented for the slope stability analysis results, Long Hollow site (Alternatives 4 and 5), Table A-16, were also based on results of the STABL 2 computer program rather than the infinite slope method indicated in the text of Appendix A.

The infinite slope analysis which is applicable to long-term stability of cohesive slopes (Bowles, 1977) was used to verify that increasing the embankment height by several feet did not invalidate the original analysis.

11. Comment

Another NRC comment stated that Section E.2.1 has utilized regional geologic studies in order to draw conclusions on the site-specific geology, yet provides no supporting data for these conclusions. (554)

Response

Section E.2.1 was intended only to give an overview of regional and site-specific geology based on a review of the pertinent literature. Where given, references to site-specific lithology are discussed only in general terms based on available geologic logs. More detailed descriptions of site-specific geology and hydrostratigraphy are given in Sections F.2.2 through F.2.4. Site-specific conclusions regarding the ground-water systems within specific geologic strata are based on individual borehole logs derived from site-specific drilling programs. These logs are available for review in the UMTRA Project Office, Albuquerque, New Mexico. They include logs for the Durango mill site (BFEC, 1983), for Bodo Canyon (DOE, 1985c; Dames & Moore, 1983), and for Long Hollow (FMFA, 1978; DOE, 1985c).

6.4.4 Surveillance and maintenance

Several comments related to the plans for surveillance and maintenance following the remedial action. The summarized comments and the DOE's response follow.

1. Comment

The DOE should conduct a post remedial action monitoring program including an annual inspection for the first five years and an inspection once every five years for the following 45 years. Monitoring should also include measurements of radon flux at the pile surface and measurement of ambient radon at the site boundary. (491)

Response

The DOE agrees that surveillance and custodial maintenance will be necessary, regardless of the remedial action. Details of the plans for these activities are available in the draft, unpublished Project Surveillance and Maintenance Plan (DOE, 1985a), the draft, unpublished Project Licensing Plan (DOE, 1984a) and the Remedial Action Plan (DOE, 1985d). These documents will be or have been subject to

review and approval by the NRC and will be available to the public at the reading rooms and libraries listed at the beginning of Section 6.22.

The long-term site surveillance and maintenance plan will be designed to assure that the final site remains undisturbed and continues to function as designed. Although the frequency of periodic inspections will not be finalized until late in the remedial action as part of the NRC license, the DOE believes that most UMTRA Project sites will be inspected annually for ten years. After the inspection, in year 9, the need and frequency of site inspections will be reevaluated. Radon monitoring will be conducted prior to the remedial action, during the remedial action, and following the remedial action as part of the certification effort.

2. Comment

One written comment asked who has responsibilities for maintaining the site once stabilization has occurred? (513) Other written comments asked how routine maintenance will be done, what emergency procedures would be implemented, if necessary, and what preventive maintenance would be instituted. (515, 487)

Response

Section 1.7 of the FEIS explains that DOE has the responsibility for surveillance and maintenance of the stabilized disposal site until March 7, 1990. After that time the DOE or another agency to be designated by the President will maintain the site pursuant to a license issued by the NRC. Section 5.2.2 describes the level of maintenance that is anticipated. Additional information is available in the draft unpublished Project Surveillance and Maintenance Plan (DOE, 1985a) and the draft unpublished Project Licensing Plan (DOE, 1984a).

3. Comment

One commenter advised that having state or local governments perform cursory visual inspections of the stabilized tailings would allow more prompt recognition of damage by natural events than would be afforded by the proposed surveillance plan. (493)

Response

The draft unpublished UMTRA Project Surveillance and Maintenance Plan (DOE, 1985a) acknowledges that information from local government officials can provide valuable, timely information on damage to the tailings disposal facility from natural or man-caused events. Furthermore, the DOE encourages local individuals to notify the DOE when sudden natural phenomena threaten the integrity of a stabilized

site. This would supplement periodic surveillance by specialists that would be carried out by the DOE after completion of the remedial action.

4. Comment

What steps will DOE take to assure that the tailings are not removed for reprocessing after final stabilization? (487)

Response

A company interested in reprocessing uranium mill tailings is not likely to remove tailings from what would be a Federal Government disposal site without the authorization of the DOE. Before tailings can be legally reprocessed, a radioactive materials license must be obtained from the Colorado Department of Health (CDH). Both approval of the DOE and CDH would be necessary.

5. Comment

The reasons for the remedial actions should be stated more clearly and should be given more emphasis, particularly the aspect of assuring that the tailings are not removed after final stabilization. (486)

Response

The purpose and need for the remedial actions are discussed in Section 2.0.

Regarding post-remedial action surveillance, the DOE or another agency designated will conduct periodic surveillance of the disposal site to verify that no intentional intrusion or removal of the tailings has occurred. Considering that the tailings and contaminated materials would be covered with several feet of soil and rock, the unauthorized removal of tailings would be very unlikely.

6. Comment

One commenter stated that geomorphic stability of the stabilized tailings would be difficult to monitor if the tailings were covered with soil and rock. (412)

Response

The DOE believes that geomorphic stability of the pile would be enhanced by placing a soil and rock cover on the tailings and contaminated material. Not being able to directly view the tailings is much less significant than constructing stable slopes and protecting the tailings from water erosion.

6.4.5 Schedule

1. Comment

The EIS is vague about the procedures that will be used to temporarily halt tailings handling or vicinity property cleanup during periods of high wind. (454, 515)

Response

The specific procedures that will be followed during periods of high winds or other unusual weather conditions will be included in the Environmental, Health, and Safety Plan to be prepared by the Remedial Action Contractor. An explanation of the overall concept is contained in Sections 3.2.2 and 5.2.1. Also, see Section 6.18 for discussion of this issue and vicinity properties.

2. Comment

Are time estimates (i.e., 12 months for Alternative 2, 18 months for Alternative 3) based upon consecutive months of work (e.g., April to April) and do they take into account anticipated "down time" due to adverse weather conditions? Or have anticipated stoppages in work due to bad weather not been included in the time estimates? Will one tourist season (May through September) or two be affected by the remedial action? (487, 513)

Response

The time estimates for completion of the remedial action are "Construction Months." This takes into account adverse weather conditions that may arise during construction and considers stoppage for winter months when compaction of soil and transportation of contaminated material is difficult. Table 1.3 of this FEIS has been revised for clarification.

6.5 DURANGO SITE: ENGINEERING, HYDROLOGIC, AND GEOLOGIC CONSIDERATIONS

The design for stabilization in place, Alternative 2, and the hydrologic and geologic site conditions were the subject of many comments. These comments are summarized below along with the DOE's responses.

6.5.1 Engineering design

1. Comment

Many commenters requested that DOE develop other designs for stabilizing the tailings at the Durango site. (1 through 350; 392 through 406, 408, 415, 424, 425, 426, 486, 515, 519) Other commenters said that stabilization of the tailings should be more oriented to landscaping and beautification of the tailings. (415, 615)

Response

At the Durango site, locations for placing the tailings are limited for several reasons. For example, near the raffinate ponds area there is a fault line that must be avoided. In addition, the area available within the designated site is insufficient in size. Also, a water intake structure and pump station has been planned for the raffinate ponds area by the Bureau of Reclamation as part of the Animas-La Plata Project. Considering the remaining lands within the designated site, the stabilization in place alternative has been optimally located to provide mild slopes and as stable as possible conditions given the existing geological and hydrological site surroundings. Also, the proposed location would minimize the quantity of contaminated material that would have to be moved. Section 3.2.3 has been revised to provide further clarification.

Various means of erosion protection for a Probable Maximum Precipitation (PMP) event and flood protection for a Probable Maximum Flood (PMF) also were evaluated. The use of a grouted mesh form (fabric form) instead of grouted riprap has been considered as a means to prevent river encroachment. Both concrete lined or grouted riprap lined channels are not long-term solutions and would require rather frequent long-term maintenance. However, since grout (fabric form) is less durable than grouted riprap and would have to be replaced more often, it has not been considered a viable solution and does not meet the intent of the EPA standards. The use of boulders in excess of 10 feet in diameter would reduce the long-term maintenance required for the grouted riprap. However, for the reasons explained in Section 5.21.9, the use of these boulders is not reasonable.

Use of an erosion control/vegetation mat on the pile slopes was also evaluated. However, a vegetation mat, no matter how well established, will not provide adequate erosion protection for the PMP.

Covering the stabilized pile (including riprap) with soil for a revegetation medium would increase the overall project cost without significantly improving the erosion protection to the pile.

As a result of these considerations, the design described for Alternative 2 is optimal given the technical concerns inherent with stabilization in place.

2. Comment

The NRC inquired as to the purpose of the grouted riprap blanket which is proposed for the interface between the stabilized tailings pile and the natural hillside. (490) The Southern Ute Indian Tribe asked whether surface water runoff would seep beneath the cover layers causing piping and erosion of the cover layers or tailings. (473)

Response

The grouted riprap serves as erosion protection for surface runoff from Smelter Mountain. It is possible that water could cause piping and erosion, however, filter layers would be designed to protect against piping based on design procedures adopted by the U.S. Army Corps of Engineers (COE, 1970).

3. Comment

One commenter noted that the DEIS suggests that the surface of the stabilized pile would be protected against erosion by covering the clay cap with a two-foot layer of gravel, cobbles, and boulders up to 14 inch in diameter. The commenter indicated that the 14-inches maximum size is not adequate for control of long-term erosion on the pile surface. (491)

Response

Based on the Stephenson method (Stephenson, 1979) for flow over a plane sloping bed, the two-foot layer of gravel, cobbles, and boulders up to 14 inches in diameter would be adequate for control of long-term erosion on the pile surface. The calculations are available at the UMTRA Project Office, in Albuquerque, New Mexico.

4. Comment

The Colorado Department of Health asked whether blasting would be required to quarry the huge boulders needed for river channel stabilization in Alternative 2. (493)

Response

Yes, blasting would be necessary to obtain the boulders for stabilization in place. However, if this alternative were to be implemented, grouted riprap would be used instead of boulders.

5. Comment

The Colorado Department of Health, NRC, and others questioned whether the design for stabilization in place at the Durango site would meet the EPA longevity requirements of 1000 years. Many commenters also questioned the longevity of the grouted riprap erosion protection and the rock lined drainage channels. They expressed the belief that the level of maintenance that would be required for stabilization in place is far greater than was intended by congress when passing the UMTRCA. Commenters also felt there was a strong likelihood that the Animas River might meander into the pile. (413, 490, 493, 454, 487)

Response

Riprap for river erosion control would require more frequent maintenance than would be required for the other alternatives. The cost estimate for maintenance of Alternative 2 is \$26,000,000 (1985 dollars), based on replacing 25 percent of the grout every 25 years for 1000 years following the completion of remedial action. This is one of the factors that led the DOE to select the Bodo Canyon alternative as the preferred alternative in this FEIS. River meander into the pile during a PMF flood would be prevented by use of grouted riprap.

6. Comment

Shear strength and unit weight parameters for all materials associated with Alternative 2 should be specified, along with the bases for selection of the parameters. In addition, the location of critical failure surfaces should be shown on Figure A-18. (554)

Response

It is inappropriate to present a detailed discussion of stability analyses in this FEIS. The data as presented are adequate for comparison of alternatives among the various concepts. Minor changes in design can affect the final stability numbers and will be addressed in detail in the final design documents if Alternative 2 were to be implemented.

7. Comment

A local citizens organization said that the five-foot-thick radon barrier proposed for Alternative 2 is an insufficient thickness to

reduce radon and gamma emissions. In comparison, the Sniprock pile, which has a lower level of radioactivity, will receive a seven foot soil radon barrier. (515) The citizens group and others expressed concern that insufficient borehole data had been obtained to characterize the radioactive constituents and other parameters of the pile. (508, 509, 513, 515)

Response

Since little information is available for the physical properties (tailings moisture porosity, radium content, diffusion coefficient and emanating fraction) which determine the cover thickness required to meet the 20 pCi/m²sec flux standard, conservative engineering estimates of these parameters were made based upon data for other tailings piles. It should be noted that cover thickness is primarily a function of the diffusion coefficient of the materials selected for the cover. At Sniprock, the available cover material is composed of a larger percentage sand fraction. This makes the cover diffusion coefficient larger and results in a relatively thicker depth required to meet the radon standard. At the Durango site, more well-graded soils containing relatively more clays are available, thus reducing the cover thickness required, even for tailings with a higher radium content than those at Sniprock. In addition, the FEIS does not contain the detailed engineering design of each alternative. Once an alternative is selected for implementation, many samples will be used to engineer a cover that will meet the 20 pCi/m²sec flux standard.

8. Comment

Two commenters asked if a more aesthetically appealing access barrier could be designed for Alternative 2 in place of three foot concrete posts and steel cable. (424, 425)

Response

Using more aesthetically appealing materials such as wood rather than concrete may not meet the project maintenance and longevity requirements. The concrete posts and steel cable barrier were chosen because they would allow wildlife to enter the area while still provide a warning to people that this area is not to be entered or disturbed. In addition, the concrete posts and steel cable will have a long design life and require minimal maintenance. Other designs that provide equivalent protection will be evaluated during the preparation of the final design.

6.5.2 Hydrologic considerations

The NRC, the Durango Task Force and others stated several concerns on water quality and potential future use of ground water at the Durango site.

1. Comment

The DEIS does not adequately discuss relevant Colorado State Water Quality Criteria and their application in the classification of ground waters potentially affected by remedial actions at Durango. (490)

Response

Section F.2.1.3, Volume II of the Durango DEIS, discusses regional water quality in aquifers potentially affected by the various remedial action alternatives. This discussion includes identification of those parameters which exceed state and/or Federal drinking water standards. Sections F.2.2.3 (Durango), F.2.3.3 (Bodo Canyon), and F.2.4.3 (Long Hollow) identify site-specific parameters which exceed Colorado drinking water standards, based on available analytical data from the sites.

Regarding state water-quality classification criteria, ground waters suitable for potable water supplies are classified as either Class 1 or Class 2. As noted beneath Table F.10, Class 1 ground waters are uncontaminated waters which meet all state water-quality standards without requiring treatment. Class 2 ground waters exceed one or more of the 22 parameter standards shown in Table F.10, and therefore would require some form of treatment to meet state domestic supply standards. Because all aquifers tested at Long Hollow and Bodo Canyon yielded water samples in exceedence of one or more of these standards (primarily TDS, sulfate, iron, and manganese), these ground waters would be classified as Class 2. These include waters associated with shaley alluvium/colluvium, the Cliff House Sandstone, the Menefee Formation, and the Lewis Shale. At the Durango processing sites (piles and ponds areas), ground waters in the shallow alluvial and gravel system are considered to be Class 2 waters at present due to elevated levels of some contaminants. Over time, contaminants in the shallow ground-water system would be completely flushed to the Animas River, and these waters conceivably could be reclassified later as Class 1. Ground waters from uncontaminated portions of the Point Lookout Sandstone and Menefee Formation beneath the ponds would be classified as Class 2, based on existing data (BFEC, 1983).

In addition to ground-water classification standards presented in Table F.10, the Colorado Department of Health has adopted standards for waters suitable for agricultural usage (irrigation and livestock watering). These standards are summarized below:

<u>Parameter</u>	<u>Agricultural limit (mg/l)</u>
Arsenic	0.1
Beryllium	0.1
Boron	0.75
Cadmium	0.01

Chromium	0.1
Copper	0.2
Cyanide	0.2
Lead	0.1
Manganese	0.2
Nickel	0.2
Nitrate (as N)	100
Selenium	0.02
Zinc	2.0

Ref. Colorado Water Quality Standards, CCR, Title 5, Chapter 1002, Article 8, as amended through May 10, 1983.

Additional classification of state waters is possible under the Colorado Department of Health regulations; however, these apply only to surface waters and to "waters currently of a quality higher than necessary to support primary contact recreation and propagation of fish and wildlife." These "high quality waters" would exclude ground water.

Water quality standards for radionuclides have also been established by the Colorado Department of Health:

"Special considerations for radioactive contaminants have been established by the Colorado statutes. Radioactive materials in surface waters and ground waters shall be maintained at the lowest practical level. In no case shall radioactive materials in surface waters be increased by any cause attributable to municipal, industrial, or agricultural practices or discharges so as to exceed the following levels (CDH, 1979):

- Cesium 134 - 80 picocuries per liter (pCi/l)
- Plutonium 238, 239, and 240 - 15 pCi/l
- Radium-226 and 228 - 5 pCi/l
- Strontium 90 - 8 pCi/l
- Thorium-230 and 232 - 60 pCi/l
- Tritium - 20,000 pCi/l."

2. Comment

Section F.2.2.1 states that sandstone interbeds present in the Mancos Shale could provide pathways for contaminant migration at the Durango site. The EIS should present data on the depth, thickness, composition, and hydraulic properties of these interbeds. (554)

Response

The Mancos Shale beneath the tailings area was not cored or hydraulically tested, except within the upper five feet of its eroded surface (BFEC, 1983). No sandstone interbeds within the Mancos were encountered by the relatively shallow Bendix drill holes. Therefore, no data are available regarding the depth, thickness, and hydr-

aulic properties of these interbeds. Sandstone layers which may be present in the upper Mancos Shale are described as fine-grained argillaceous or shaley sandstones, which are generally low permeability units. Core samples of Mancos sandstone strata have reported values of horizontal hydraulic conductivity on the order of 10^{-5} cm/sec (USGS, 1983). Bendix has concluded that the Mancos Shale does not represent a potential aquifer in the tailings area (BFEC, 1983).

3. Comment

For Tables F.21 through F.25 to be meaningful, characteristics of the monitoring wells are needed. A summary table in the EIS should include data such as: well location, elevation, depth, screened interval, bentonite seal interval, filter pack interval, and well diameter and type. (554)

Response

Well locations are shown in Figures F.4, F.5, and F.6 in Appendix F of the DEIS.

Tables F.41 and F.42 in the addendum to Appendix F in this FEIS contain monitoring well data summaries.

4. Comment

Section 4.6.2 of the DEIS states that contaminants from the raffinate ponds are migrating downward through the fault zone toward the Point Lookout Sandstone and Menefee Formation. The EIS should assess the current extent of this contamination and actions planned to mitigate such contamination. (490, 554)

Response

Paragraph 6 of Section 4.6.2 has been revised to indicate that there is evidence of possible contamination of water-bearing zones in the Menefee Formation downgradient of the fault.

Recent analytical data from wells in the ponds area from March, 1985, indicate that contamination beneath the ponds area is present and concentrations of several contaminants continue to increase. Samples analyzed from well 2, located immediately downgradient of the old ponds and screened at approximately 50 to 70 feet in the Menefee Formation, illustrated the trend of contamination.

Analytical Results for Bendix Well 2

Date	U (ppb)	SO ₄ (ppm)	Spec. conductance (umhos)
November '82	12	4810	5500
April '83	26	6700	11960
June '83	38	7100	14400
August '83	500	13000	18000
March '85	986	17000	22270

The primary source of this contamination could be vertical seepage from overlying pond areas or down-dip migration of contaminated waters from the fault zone bisecting the site (see Figure 4.2). Contamination of the underlying Point Lookout Sandstone has not been detected, except in the immediate area of the fault zone along the footwall (western) side.

The environmental impacts of local ground-water contamination within the Menefee (primary water-bearing zones are sandstone and coal layers) would be minimal. Highly reducing zones occur within deeper Menefee strata (especially coal seams); such reducing zones will limit uranium mobility (BFEC, 1983).

A preliminary evaluation of local well records shows that the closest downgradient domestic wells (state permit nos. 038291 and 044712) are approximately two miles southeast of the site. Also, the source of contamination in the ponds area will be removed from the site, regardless of the alternative selected by DOE.

Installation of additional monitoring wells is being considered to more precisely define the limits of contamination in the Menefee Formation and to verify that the Point Lookout Sandstone is not contaminated. These data would be used to evaluate the need to mitigate the effects of the contamination. An examination of the need to conduct aquifer restoration will be included in the final RAP. A decision to conduct restoration will be based on the results of the evaluation.

5. Comment

The effect of remaining ground-water contamination, especially in the raffinate ponds area, on future development of the Durango site should be assessed in the EIS. (490)

Response

The potential effects of residual ground-water contamination on future land uses at the Durango sites will depend on specific land uses allowed and actual levels of remaining contaminants. Land uses

Response

The potential for ground-water contamination at Bodo Canyon has been evaluated using an analytical modeling approach adopted from Gilbert and others (DOE, 1983). Section F.3 (addendum to Appendix F in this FEIS) explains the analytical technique and the results.

A plan for ground-water monitoring and mitigation at Bodo Canyon, if necessary, will be included in the site-specific surveillance and maintenance plan, based on guidelines presented in the draft Project Surveillance and Maintenance Plan (DOE, 1985a).

8. Comment

Section F.2.3 of the DEIS states that all private wells in the Bodo Canyon area are upgradient of the site. However, well number 31279 (Figure F.7) appears to be downgradient. Its actual location should be clarified. (490)

Response

The location given in the DEIS for well 31279 is incorrect. According to the Ground Water Section of the State Engineer's Office, its correct location is within Range 8W, not 9W as it was reported in the DEIS. This puts the well approximately five miles east of Durango, far from the Bodo Canyon site. References to this well should be deleted from Section F.2.3, Table F.27 and Figure F.7 of the DEIS.

6.6.3 Geologic considerations

Written statements from the NRC, Colorado Department of Health, and three individuals focused on the geology and seismic activity of the Bodo Canyon site.

1. Comment

Section E.2.1.2 describes the Cliff House Sandstone initially as interbedded calcareous sandstones, siltstones and silty shales, and later as a sandy shale with sandstone beds. An accurate description of the lithology should be provided in the FEIS. (554)

Response

The initial description of the Cliff House Sandstone is a general description of the lithology (see Figure E-4 of the DEIS). The latter description is site-specific, referring only to the upper portion of the Cliff House Sandstone which constitutes the bedrock surface at the Bodo Canyon site. From available borehole logs, the Cliff House

Sandstone at Bodo Canyon consists primarily of sandy shale interbedded with occasional thin layers of fine-grained sandstone.

2. Comment

Commenters pointed out that a topographic lineament runs north to south across the Bodo Canyon site and requested that a study be conducted to determine if the lineament is a fault and if design changes would be needed. Further investigation should be conducted into the possible extension of the Ridges Basin Fault and other faults into the Bodo Canyon site. (490, 493, 424, 425, 554) What is the possibility of contaminants reaching the proposed Ridges Basin Reservoir of the Animas- La Plata Project via the fault or other geologic structures? (549)

Response

The seismic hazards and fault conditions at Bodo Canyon have been re-evaluated in the field and in the literature (JEG, 1985a,b). The field program determined that there is no active faulting at the Bodo Canyon site (JEG, 1985b).

The seismic study, Appendix M (JEG, 1985a), concluded that a maximum credible earthquake would cause in-rock acceleration of 0.12g.

6.7 LONG HOLLOW SITE: ENGINEERING, HYDROLOGIC, AND GEOLOGIC CONSIDERATIONS

Of the comments on Alternative 4, stabilization at Long Hollow, a few were directed at engineering factors; however, most comments focused on ground water. Summaries of the comments and related responses are given below. Additional comments and responses on the Long Hollow site are contained in Sections 6.4 and 6.8.

6.7.1 Engineering design

1. Comment

Four commenters questioned the longevity of the underdrain included in the design for Alternative 4. Commenters expressed the concern that the underdrain could eventually plug and become ineffective, or would provide an opportunity for erosion of the clay liner. Ground water could then rise into the stabilized tailings and become contaminated. (490, 442, 515, 491)

Response

If Alternative 4 were selected as the remedial action, the final design would include underdrain construction specifications that would meet the longevity requirements as set forth in the EPA Standards. The underdrain would be designed to ensure that plugging or erosion would not occur. Section 1.3.5 has been revised to clarify this point.

2. Comment

Additional analysis should be performed addressing the potential for gully erosion and the long-term alteration of surface drainage patterns at and near the Long Hollow site. (493, 424, 425)

Response

Currently, the nearest potential gully erosion is more than 800 feet from the Long Hollow site on the opposite side of a drainage divide. It is anticipated that the long-term drainage patterns would not differ to any great extent from the existing patterns. Therefore no additional analysis is required.

6.7.2 Hydrologic considerations

Comments were received addressing ground-water hydrology and water quality issues associated with Alternative 4, stabilization at Long Hollow. The comments came primarily from the NRC, the Colorado Department of Health, the New Mexico Environmental Improvement Division, the Durango

Uranium Mill Tailings Task Force, EPA, Environmental Defense Fund, and six individuals. The comments have been summarized and responses prepared as presented below.

1. Comment

Ground-water discharge rates at the Long Hollow site should be quantified in the EIS. Also, a water level contour map of the site should be included in the EIS in order to assess ground-water flow directions. (490)

Response

Using values of hydraulic conductivity from a 1978 geotechnical investigation of Long Hollow (FMFA, 1978) and recently collected water level data from the site, a range of ground-water discharge rates through the fractured Lewis Shale has been estimated. This information is presented in the addendum to Appendix F in this FEIS.

2. Comment

Section 4.6.2 of the DEIS reports that hydraulic conductivity values in the fractured shale zone at Long Hollow range from approximately 10^{-9} to 10^{-6} cm/sec. These represent unusually low values for a fractured medium. (490, 554)

Response

The range of permeability values reported for fractured Lewis Shale in the DEIS represent laboratory-determined values for core samples of mixed "clay and weathered shale" from four- to nine-foot depths (FMFA, 1978). These low values (10^{-9} to 10^{-6} cm/sec) are reasonable for unfractured clay-dominated cores. Hydraulic conductivity values reported by FMFA for packer-tested borehole intervals five to 48 feet deep are for "generally fractured" to "slightly fractured" Lewis Shale. These values range from <0.0014 ft/day to 2.30 ft/day (4.9×10^{-7} cm/sec to 8.1×10^{-4} cm/sec), with an average value of approximately 0.5 ft/day (1.8×10^{-4} cm/sec). Packer testing of a recently installed well at Long Hollow (DUR04-608) produced a conductivity of 0.88 ft/day (3.1×10^{-4} cm/sec) in moderately weathered Lewis Shale, 10 to 15 feet deep (see Table F.45 of this FEIS). On the basis of the above, field hydraulic conductivities of the water-bearing fractured shale zone at Long Hollow are on the order of 10^{-4} cm/sec.

Section 4.6.2 of this FEIS has been modified to reflect these data and analyses.

3. Comment

Several commenters expressed the belief that the ground-water interceptor trench would not prevent ground water from contacting the tailings because the ground water could move toward the tailings from the east and could move under the interceptor trench. (490, 485)

Response

The proposed two-foot compacted clay liner (see Figure A-33, page A-83 of the DEIS) would be two to three orders of magnitude less permeable than the Lewis Shale through which ground water may be flowing: 10^{-7} cm/sec vs. 10^{-4} to 10^{-5} cm/sec (FMFA, 1978). Thus, any flow from below or from the east would flow laterally towards the interceptor trench along the clay contact. Seasonal ground-water level data for Long Hollow, collected during 1985, will more precisely characterize local flow gradients which may influence the final interceptor trench design. If necessary, a sand/gravel capillary break could be installed between the Lewis Shale and the compacted clay to ensure lateral ground-water migration in the trench. Should Alternative 4 (or 5) become the preferred alternative, these design considerations would be evaluated.

4. Comment

The potential impact on private wells in the Long Hollow area needs to be identified. (493, 424, 425, 447)

Response

As shown in Figure F.7 of the DEIS, there are only four registered private wells within a two-mile radius of the Long Hollow site. All wells are hydrologically upgradient of the site and located in different drainage basins than the site. These wells would not be impacted.

5. Comment

The dilution factors determined for leachate influx to the proposed ground-water drainage blanket at Long Hollow appear to be incorrect (as reported in Section F.2.5) of the DEIS. Also, it is inappropriate to assume pore-water chemistry for the Durango tailings to be similar to Riverton tailings chemistry in performing the dilution calculations. (490, 554)

Response

Dilution factors cited in Section F.2.5 for initial and long-term leachate contributions to ground-water flow in the underdrain are

correct. However, the last sentence of paragraph 5 in Section F.2.5 should be corrected to read:

"Drainage from the tailings results in total inflow to the drainage blanket ranging from 2.48 cfs ($2.3 + 0.18$ cfs) during initial moisture redistribution to 2.31 cfs ($2.3 + 0.01$ cfs) over the long-term. The long-term steady flow rate from the base of the tailings (0.01 cfs) is equal to the net infiltration rate (one inch per year). This results in ground-water to leachate dilution ratios of 13:1 (initial) and 230:1 (long-term)."

Pore water concentrations for Durango tailings were estimated from water extract data for tailings core samples presented by Markos and Bush (GECR, 1982). Using GECR water extract data (maximum levels of water-soluble contaminants in core samples from the small tailings pile at Durango) to estimate tailings leachate chemistry, the initial and long-term contaminant concentrations in leachate ground water mixtures discharging from the Long Hollow underdrain can be calculated. The following table summarizes these results, and should replace the last paragraph of Section F.2.5 of this DEIS.

Constituent	Concentration in tailings leachate ^a	Average concentration in Long Hollow ground water	Conc. in drainage effluent	
			13:1 (initial)	230:1 (long-term)
U	7.0	0.02*	0.5*	0.05*
SO ₄	55000	5590*	9100	5800
V	1200	<0.1*	90*	5.3*
Fe	600	6.1*	50*	8.7*
Mn	12	0.7*	1.5*	0.75
Ba	140	<0.1	10	0.7
Pb	7.0	0.03	0.5*	0.06*
AS	30	<0.01	2.15	0.14

^a All concentrations in mg/l. Estimated from GECR, 1982 (Figure 6.7).

^b From data in Table F.39.

* Asterisks indicate those levels exceeding Federal drinking water MCL's.

6. Comment

Section 3.3.1 of the DEIS should state that the projected dilution of leachate at the Long Hollow site results in sulfate and iron concentrations that exceed National Secondary Drinking Water Standards. The DEIS should also identify other possible constituents which may be present in elevated concentrations in the resulting ground water. (490)

Response

Agreed. Section 3.3.1 (paragraph 6) of this FEIS has been modified to reflect these comments.

7. Comment

The possibility of future contamination of the planned Ridges Basin Reservoir due to tailings disposal at Long Hollow or Bodo Canyon should be addressed in the EIS. Of particular concern is the potential for ground-water contamination through the Ridges Basin Fault. (424, 425, 427, 490, 519, 549)

Response

The Long Hollow site is approximately three miles southwest of the proposed Ridges Basin Reservoir, and is separated from it by a regional surface drainage divide. The Long Hollow site will have no hydrologic impact on the proposed reservoir.

The Bodo Canyon site, although less than 0.5 mile from the proposed reservoir, also is separated from it by a surface drainage divide. Any potentially contaminated shallow ground water beneath Bodo Canyon will flow eastward towards the Animas River and have no impact on the reservoir. Deeper ground water at Bodo Canyon flows to the southeast, following the dip of bedrock strata; no impact to the proposed reservoir is expected.

A recently completed study of potential faulting at Bodo Canyon (JEG, 1985b) revealed that the Ridges Basin fault does not extend on to the Bodo Canyon alternate disposal site. Thus, the fault would not provide a route for contamination to migrate from Bodo Canyon to the proposed reservoir.

8. Comment

The ground-water discussion of Long Hollow in the DEIS should include: 1) an assessment of potential for contamination, 2) a more thorough study of preventative measures, 3) a plan for monitoring and correction or mitigation if contamination occurs in the future. (534, 535, 537, 485)

Response

If Alternative 4 or 5 were selected as the remedial action, numerous design features would be incorporated into the site plan to mitigate the potential for shallow ground-water contamination. For instance, moving the proposed tailings disposal area (see Figure A-22 of the DEIS) approximately 1000 feet to the east may be considered. Available water level data show that ground-water depths in this

location are generally greater than 10 feet. Other mitigative design features would be detailed in the Remedial Action Plan as well as this FEIS.

A site-specific monitoring and mitigation plan would be included in the site-specific surveillance and maintenance plan should one of the Long Hollow alternatives be selected. This plan would be based on guidelines given in the draft UMTRA Project Surveillance and Maintenance Plan (DOE, 1985a).

9. Comment

Ground-water discharge rates at the Long Hollow site should be quantified in the EIS. Also, a water level contour map of the site should be included in the EIS in order to assess ground-water flow directions. (490)

Response

Using values of hydraulic conductivity from a 1978 geotechnical investigation of Long Hollow (FMFA, 1978) and recently collected water level data from the site, a range of ground-water discharge rates through the fractured Lewis Shale has been estimated. See Section F.3, addendum to Appendix F in this FEIS)

10. Comment

What effect would use of the Long Hollow site have on the existing irrigation ditch and downstream residents currently using the ditch? (453)

Response

The existing irrigation ditch flows seasonally from the La Plata River to the northern portion of Long Hollow where hay is cultivated. According to site owner, Gary Farmer, water flows typically from May into June and sometimes in September (Farmer, 1985). It is likely that the existing ditch would be diverted so that it would flow to locations downgradient (south) of the Long Hollow disposal site.

11. Comment

The DEIS fails to state that the stock ponds at Long Hollow are fed by a small, spring-fed irrigation system. (537)

Response

The existence of this irrigation system had been previously unknown. See changes made to Section 1.4.3 of this FEIS.

12. Comment

Hydrologic conditions are unsuitable for use of the Long Hollow site as a remedial action site. The site crosses a drainage divide which could potentially pollute the Animas and La Plata drainages, the area is subject to flooding, and the Long Hollow stream volume is small. (537, 524)

Response

The site does not cross a drainage divide. The Long Hollow site is located within a shallow ground-water discharge area; however, Alternatives 4 and 5 incorporate measures to protect the shallow ground water. If Alternative 4 or 5 is selected by the DOE as the preferred alternative, more detailed ground-water mitigation measures would be presented in the follow-on RAP.

6.7.3 Geologic considerations

1. Comment

The EIS should address the potential for mudflows impacting the Long Hollow site in the future. (490)

Response

Mudflows occur only on the steeper slopes to the southeast of Long Hollow and extend to the valley floor (FOCERI, 1978); however, they do not reach the disposal pile. The Long Hollow site is located on a relatively flat area where there is no potential for future mudflows (see Section 4.5.2). Should the Long Hollow site be shifted to the south (see revised Section 3.3.1) away from the ground-water discharge area, there would also be no potential for mudflows.

2. Comment

Soils used for lining at the Long Hollow site are expansive, erosive, and possibly dispersive. Lining at the site would be subject to fast erosion and the ground would become desiccated. (537)

Response

Soil tests at the Long Hollow site have shown that the soils are not dispersive and therefore not erosive under the hydraulic gradients that would be encountered. The soils used for lining at the Long Hollow site are expansive, however, the expansion pressures are low and would be more than offset by the pressures exerted by the stabilized pile.

3. Comment

The borings taken at the Long Hollow site, which extend from depths of 19 to 48 feet, are too shallow to accurately identify subsurface materials that could be effected by construction of the facility. (491)

Response

All borings extended into the underlying Lewis Shale which is encountered at very shallow depths at the Long Hollow site. Additional borings have been drilled to depths of more than 50 feet, which give an accurate subsurface material identification for the purposes of this EIS. The underlying Lewis Shale is several hundred feet thick and is very uniform in character below the upper weathered layer (DOE, 1985c).

4. Comment

Section E.1.3 does not adequately discuss the source of topsoil for reclamation at the Long Hollow site. Alternatives to using the Arboles soil should be discussed. (554)

Response

It is common construction practice to strip and stockpile the top six inches of topsoil for later use in restoration. At the Long Hollow site the topsoil happens to consist of the Arboles soil series, but it presently supports the surrounding vegetation and is natural for this area. However, in the event that this material proves to be unsuitable for revegetation, topsoil could be obtained from the Bodo Canyon borrow areas.

6.8 REPROCESSING AT THE LONG HOLLOW SITE: ENGINEERING AND DESIGN CONSIDERATIONS

Engineering and design issues of Alternative 5, reprocessing at Long Hollow, were the subject of several comments. Most of the geologic concerns with the Long Hollow site were addressed in Section 6.7. Comments were received from the Colorado Department of Health, the NRC, the New Mexico Environmental Improvement Division, a local citizens group, and four other individuals.

6.8.1 Engineering design

1. Comment

No mention is made of the type of synthetic liner proposed for the Long Hollow site (i.e., will it resist the acid leachate). If the liner fails several years after final stabilization, how will the leak detection and recovery system be used to safely handle the leaking solutions? (485)

Response

The synthetic liner would be chosen to resist acid impregnated solutions. The detection system is planned to detect leaks only during reprocessing. After reprocessing, when the solutions have been removed, analyses have shown that little leachate would be generated. What little is generated would move laterally out of the system rather than downward.

2. Comment

For Alternative 5, some provision should be made for removing the leachate that would accumulate from tailings drainage over many years after reprocessing due to moisture redistribution and infiltration. (485)

Response

The stabilized pile would be effectively drained of solutions at the end of the reprocessing operations. As described in Section F.2.5.2 of the DEIS, leachate produced by infiltration after reprocessing would be minimal and would be diluted to background levels after mixing with ground water in the drainage blanket. There would be no need for a leachate collection system.

3. Comment

The EIS should address acquisition and disposal of the Durita mill equipment. (493)

Response

Sections 3.2.6 and A.7.3.1 of the DEIS describe how the acquisition of the Durita equipment would fit into the sequence of events for Alternative 5.

4. Comment

What problems were experienced at the Naturita (Durita) reprocessing facility in the operation of leach ponds and cleaning up of the site? Would the reprocessing buildings and equipment be moved off the Long Hollow site upon completion of the project and was that included in the cost estimate? (424, 425)

Response

The heap leaching operation at Naturita was the "Durita" facility operated by Ranchers Exploration and Development Corporation. The DOE is not aware of any problems encountered during operation of the facility.

Processing equipment and structures used at Long Hollow would be removed as a condition of final stabilization. The cost of such action is included in the cost estimate.

5. Comment

Alternative 5 would use already contaminated equipment from Naturita as well as the required transportation of thousands of gallons of acids and hazardous chemicals. What provisions will DOE take to ensure that the local population will not be affected by the transport and use of these materials? (515)

Response

Transportation of equipment from the Durita site near Naturita for Alternative 5 would be subject to the rules and regulations of the State of Colorado Department of Transportation. Residual contamination of the equipment is primarily in the form of coatings on equipment surface, and if an accident occurred during transportation, the possibility of effects to the local populace would be remote. Transportation of acid and other chemicals for reprocessing would be subject to compliance with the "Rules and Regulations Governing the Transportation of Hazardous Materials and Hazardous Wastes within Colorado" as established by the Public Utilities Commission.

6. Comment

The potential for ground-water problems could be reduced if the leach tanks could be made large enough to receive all contaminated material and the evaporation pond was not made into a disposal site. (493)

Response

Increasing the leach tanks and eliminating the evaporation pond would decrease the reprocessing efficiency and thus decrease the amount of uranium and vanadium produced. Because the cost estimate for Alternate 5 was based on the total project cost minus the value of uranium and vanadium produced, increasing the size of the leach tanks would increase the cost estimated for Alternative 5. Regardless of the costs, ground-water impacts would be minimized by the remedial action design presented in the DEIS.

7. Comment

Why would reprocessing at Long Hollow take longer than the reprocessing project took at Naturita? (493)

Response

There are approximately two times as many tailings at Durango than were processed at Durita. Therefore a longer reprocessing time would be required.

6.8.2 Hydrologic considerations

1. Comment

Several commenters requested that water usage, the means of water transport, and possible conflicts with existing water rights associated with Alternatives 4 and 5 be more clearly explained in the EIS. (454, 424, 425, 427, 515)

Response

No conflicts with existing water rights in the Long Hollow area are anticipated. Water pumped from the Animas or La Plata Rivers or from deep wells for use during remedial actions and not evaporated, would ultimately be returned to the river(s) (see Section 5.6.1 of the FEIS). Water would be transported by trucks or temporary pipe lines.

2. Comment

What would happen to the portion of the water used during reprocessing which would not be recycled? (490)

Response

The contaminated wash water would be pumped to the upper end of the Long Hollow site. Once the remedial action process is complete, the contaminated water storage reservoir would be retained until all the water has evaporated. The sides of the synthetic liner would then be folded in and a five-foot thick stabilization cover placed over the reservoir (see Sections 3.2.6 and 3.3.2 of this FEIS).

3. Comment

The condition of the tailings after reprocessing should be characterized more thoroughly to include such aspects as moisture content, pH, and concentration and solubility of radionuclides and heavy metals. (454)

Response

Little is known of the physical properties of the tailings such as bulk density, porosity, radium content, and the like. However, these parameters have been completely determined for numerous other tailings disposal sites which processed ore similar to (and in some cases the same ore) as was processed at Durango. The FEIS uses estimates of these parameters within the ranges of those found elsewhere. If reprocessing were selected, the physical properties of the tailings will be carefully determined throughout the activity. Even if reprocessing were not selected, the physical properties of the entire pile will be characterized as part of the RAP.

6.9 COSTS

A number of individuals criticized the DEIS preferred alternative, reprocessing at Long Hollow, because the cost would be much higher than for the other alternatives. Other comments disputed the accuracy or completeness of the DOE's cost estimates. Issues raised in the comments are summarized below as are the DOE's responses.

1. Comment

Why does DOE propose to select the alternative with the highest cost? (429)

Response

Alternative 5 was selected jointly by the DOE and the state because of the potential for mineral recovery. Since Hecla Mining Company, the current owner, has stated that reprocessing is not feasible at this time, the preferred alternative described in the FEIS is Alternative 3, decontamination of the Durango site and stabilization of the contaminated material at a site in Bodo Canyon. This alternative is less costly than either Alternative 4 or 5.

2. Comment

The contingency costs in the DEIS are 10 to 20 percent lower than industry standards. This would lead to cost overruns and inadequate construction supervision. (537)

Response

For purposes of comparing alternatives, with an estimate with the amount of detail shown, a contingency of 15 percent is acceptable. Detailed project cost breakdowns are available at the UMTRA Project Office in Albuquerque, New Mexico.

3. Comment

One commenter requested that the road construction and maintenance costs for all alternatives be included in the EIS. (493)

Response

The road construction costs including road maintenance for the alternatives are as follows:

On-site stabilization	\$ 772,000
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Stabilization at Bodo Canyon	
Truck option	\$ 890,000
Conveyor option	\$
Long Hollow (Alternatives 4 and 5)	\$1,946,000

The costs estimated in Table 1-2 of this FEIS include these costs.

4. Comment

One commenter expressed concern that the state legislators may not support the more costly Long Hollow alternative in favor of less costly alternatives that may be less desirable environmentally. (477)

Response

There are many factors which must be considered when choosing a preferred alternative. The commenters concern that cost not be an overriding factor is noted. Although cost must be considered, other environmental impacts and mitigation measures weigh heavily in the Department of Energy's selection procedure.

5. Comment

Cost, as a criteria for selecting a preferred alternative, should consider costs to the public for treating and maintaining potential cancer victims. (530) The cost to the public of medical care for future cancer victims should be considered in selecting the remedial action. (530)

Response

The DOE believes that costs associated with medical treatment, income loss, and other "what might have been costs" from cancer-induced deaths over 1000 years cannot be estimated with any degree of confidence.

6. Comment

The cost estimates for the various alternatives should include the costs for implementing wildlife mitigation. (551)

Response

The DOE estimated costs for implementation of all mitigation measures proposed in the draft wildlife impact mitigation plan for Alternative 3 are shown in Table L.4.1 of Appendix L in this FEIS. At this time, only relative wildlife mitigation cost comparisons are available; Alternative 3 would have the highest costs followed by Alternatives 5, 4, and 2.

7. Comment

Several commenters requested that land values from official appraisals be included in the cost assessments. (428, 493, 515)

Response

Appraisals of land values are performed for the State of Colorado by the U.S. Army Corps of Engineers. These appraisals are not yet completed, and therefore, are not included in this FEIS.

8. Comment

Many commenters requested that the long-term maintenance costs be included in the EIS for each of the alternatives. (490, 515, 534) Commenters expressed the belief that the high level of maintenance costs for stabilization in place would make it less cost effective than it appears by simply comparing the remedial action costs of the alternatives. Another commenter requested that the cost for maintaining the tailings in place (no action) be included in the cost estimate. The commenter also asked who or what entity would have the responsibility for future maintenance and what the source for meeting these expenses would be. (534)

Response

DOE agrees that the surveillance and maintenance costs should be included in the cost estimates. For Alternative 2 (stabilization in place) the cost of maintaining the grouted riprap for 1000 years would be \$26,000,000 (1985 dollars) if 25 percent of the grout is replaced every 25 years. All of the other action alternatives are designed to last 1000 years without maintenance.

The estimated cost for maintaining the tailings in place (no action alternative) is \$300,000. This cost estimate is only for establishing and maintaining a better vegetation cover on the tailings pile. However, under the no action alternative, the site does not meet the EPA standards and does not meet the requirements of UMTRCA.

The DOE or another Federal agency to be designated by the President would have the responsibility for future surveillance and maintenance. Future costs would be provided by Congressional appropriation. Table 1.2 has been revised to include these costs, as appropriate.

9. Comment

The costs for Alternatives 2 and 3 are biased because they do not reflect adequate control for river and gully erosion. (493)

Response

The DEIS included a design and cost estimate for Alternative 2 (stabilization in place) that provides for protection against a PMF event. Maintenance costs required for river erosion control for 1000 years would be \$26,000,000 based on 1985 dollars assuming that 25 percent of the grout would be replaced at 25-year intervals. Alternative 3 (Bodo Canyon) calculations for gully erosion have been prepared. The cost estimate for this rock erosion protection is \$400,000. The cost estimates for Alternatives 2 and 3 are for construction only and exclude the costs for land, engineering, and construction management. Table 1.2 and other sections of this FEIS have been revised.

10. Comment

The cost of the Long Hollow site should include cost of a new road; County Road 141 should not be used. (455)

Response

Both Alternatives 4 and 5 were modified to include the construction of a haul road parallel to County Road 141. County Road 141 would not be used by haul trucks. The cost estimate for the Long Hollow haul road is \$300,000. This cost is for construction only and excludes the costs for land, engineering, and construction management. Table 1.2 of this FEIS has been revised as have other sections of the text.

11. Comment

Two commenters said that an adjustment in the specific location of the Long Hollow site within the Long Hollow basin could alter the costs of this alternative and could significantly affect the preferred alternative. (492) Another commenter suggested that the design for disposal at the Long Hollow site could be altered to reduce the cost. (493)

Response

Location adjustments have a minor impact on costs and will not affect the estimated cost for the Long Hollow alternatives.

6.10 RADIATION EXPOSURES AND HEALTH EFFECTS

This section addresses a broad spectrum of issues ranging from health risks in the Durango community to the status of radiation surveys to techniques for protecting remedial action workers. Many of the comments expressed a fear of the dangers of low level radiation while others offered specific technical criticism of the radiation health risk evaluation methods.

6.10.1 Radiation monitoring

Several written statements concerned the adequacy or appropriateness of radiation monitoring that has been conducted or should be conducted prior to the remedial action.

1. Comment

The validity of the Durango site airborne particulate sampling results is questionable when compared with the Bodo Canyon results. Airborne concentrations of U, Th-230, and Ra-226 near the Durango site are two and three orders of magnitude greater than the Bodo Canyon concentrations. Additional data should be collected. (490)

Response

Prior to remedial action, an environmental monitoring program will be conducted at the project site and surrounding area. The program will proceed through the pre-operational, operational, and post-operational phases. Continuous air particulate sampling will be required at points around the existing site boundary, at a background location, and at the potential alternate site. Sampling will commence at least one month before remedial action to initially characterize background levels. Operational data will then provide documentation of off-site contamination generated by remedial action activities.

2. Comment

Section 4.2 of the EIS should explain the extent of contamination in the Animas River sediment and dry washes near the processing site. This information should also be shown in Figure 3.1. (490)

Response

The extent and depth of windblown contamination and water-transported contamination (in dry washes) in the vicinity of the tailings piles were determined during a radiological characterization survey (BFEC, 1984). There are few dry washes in the vicinity of the processing site.

which exclude the development of ground-water resources should be encouraged. Darcian analysis of current flow in shallow aquifers (based on Bendix data) predicts that non-reactive contaminants (e.g., sulfate) are being flushed to the Animas River at a maximum rate of 1.2 feet per day beneath the tailings pile (through alluvium) and 1.9 feet per day in the ponds area (via the fault zone). Reactive contaminants (e.g., radium and certain metals) will be adsorbed onto soils and geologic materials or precipitate out of solution at variable rates which depend on site-specific geochemical characteristics. The times required to completely flush these contaminants from the local aquifers can not be predicted without data on quantities of disposed solids and liquids, contaminant concentrations within the wastes, and site-specific distribution coefficients (K_d 's) for individual compounds.

New evidence of ground-water contamination 50 to 70 feet deep in the Menefee Formation beneath the ponds may necessitate the installation of additional monitor wells downgradient of the site, or at least restrictions on local ground-water development. The DOE would work with the State of Colorado, Department of Health to assure that prospective buyers of the Durango sites are cautioned against developing wells as a source of water for human consumption. Additionally, the Colorado Division of Water Resources would be notified and advised to examine the latest water-quality analyses prior to issuing water well permits for the Durango sites.

6. Comment

Additional information on the ground-water conditions at the two Durango sites (tailings piles and raffinate ponds) should be provided in the EIS, including geologic cross-sections, water table contour maps, and plume delineation maps for key contaminants. These are necessary in order to fully evaluate environmental impacts. (490, 554)

Response

Figures F.22 and F.23, in the addendum to Appendix F in this FEIS, present geologic cross-sections through the two sites based on lithologic logs for Bendix boreholes (BFEC, 1983). Since DOE was denied on-pile access, the precise tailings soil interface is unknown, as are water levels within and below the piles.

Water table contour maps for the two sites were developed from numerical flow simulations conducted by Bendix using the Illinois State Water Survey Flow Model (BFEC, 1983). These maps are given in Figures F.26 and F.27 in the addendum to Appendix F in this FEIS. The simulated water table surfaces generally agree with water level data collected at the sites (see Table F.41 in the addendum to Appendix F). These water level data also illustrate the hydrologic connection between the Animas River and shallow alluvial/gravel aquifer beneath the tailings piles. Hydrographs for Bendix wells 12, 14-16, 18, and 19 reflect Animas River stages as recorded at the

gaging station less than one mile upstream of the piles. The Animas River seasonally (in early summer) recharges the shallow aquifer at least along the river bank area between the tailings piles and the Animas River.

The delineation of discrete contaminant plumes originating at the tailings piles and ponds area is difficult (and not meaningful) because the shallow aquifer flows directly to the Animas River, where contaminant levels are diluted to background levels. For deeper water-bearing zones in the raffinate ponds area, the definition of contaminant plumes (if present) would require additional downgradient monitoring wells. Darcian analysis of shallow ground-water flow beneath the two Durango sites was completed and is found in the addendum to Appendix F, in the FEIS.

7. Comment

The Durango Task Force requested, in the event the tailings are stabilized in place by using an alternative engineering design which permits landscaping and beautifying the pile, an evaluation of the possible dangers to ground-water contamination by virtue of precipitation or watering of the landscaped surface which may result in the leaching of contamination into the water table. (519)

Response

Sprinkling or irrigating the stabilized pile to perpetuate vegetation would not be wise due to the possibility of leachate generation. However, the stabilized pile would be designed so that precipitation and surface runoff are diverted from the pile's surface without significant infiltration, and, thus, the potential for leachate generation in this circumstance would be minimal.

8. Comment

Gross alpha levels measured from Animas River water samples (shown in Table F.11, page F-16 (Volume II) in the DEIS), show too great a variation to be accurate. (507)

Response

The water samples in question were collected all on the same day at three locations, immediately upstream of the site, immediately downstream of the site, and several miles downstream. The analytical results reported were 30.8, 6.3, and 0.0 pCi/l, respectively. The counting accuracy associated with these three measurements is 3.6, 21.3, and 17.2 pCi/l. The difference between the first and third values (the greatest difference) is not significantly different than zero at the 90 percent confidence level. This is due to the large uncertainties in the reported values. The gross alpha levels themselves are typical of those found in rivers of the western United States (EPA, 1973).

6.5.3 Geologic considerations

1. Comment

Section F.2.2.1 describes the Point Lookout Sandstone as a gray-black shale, silty shale, and sandy shale. A more detailed lithologic description should be provided in the EIS, including its hydraulic properties. (554)

Response

Bendix lithologic logs describe the lower member of the Point Lookout Sandstone as "finely laminated gray to black shales, silty shales, and sandy shales (BFEC, 1983)." Bail-testing of an open borehole drilled 63 feet into the Point Lookout Sandstone (hole DR-82-03) yielded a hydraulic conductivity value of only 0.0062 ft/day (2.2×10^{-6} cm/sec). No significant flow of ground water is expected within the Point Lookout bedrock beneath the western portion of the raffinate ponds area (BFEC, 1983).

2. Comment

What is the basis for concluding on page 88 of the DEIS that the fault underlying the raffinate ponds is inactive? (554)

Response

Trenches were excavated at the raffinate ponds area which confirmed the preliminary determination that the fault has not been active during the last 10,000 years (JEG, 1985b).

3. Comment

Failure surfaces shown on Figure A-6 are both extremely shallow. Were deeper failure surfaces through the Mancos Shale evaluated? (554)

Response

A broad range of failure surfaces were analyzed using computer aided analyses. The circles presented in Figure A-6 represent surfaces exhibiting the minimum safety factors for the conditions analyzed, including failure surfaces through the Mancos Shale.

6.6 BODO CANYON SITE: ENGINEERING, HYDROLOGIC, AND GEOLOGIC CONSIDERATIONS

Many comments were centered on the engineering design for relocation to Bodo Canyon and the hydrologic and geologic conditions encountered. The DOE's responses are presented below, following the individual comment summaries.

6.6.1 Engineering design

The EPA, NRC, Colorado Department of Health, and others raised issues relating to transportation alternatives, surface diversion ditches, slope stability, revegetation of the covered tailings, and capacity of the Bodo Canyon site.

1. Comment

The EPA stated that Sections 3.2.4 and A.5.2.1 present confusing and contradictory discussions regarding diversion ditches and drainage channels for the Bodo Canyon site. Section 3.2.4 states that the ditches would be preserved and sized for the PMP, while the appendix states that they would be abandoned following stabilization. (492)

Response

Section 3.2.4 is correct. The ditches would be preserved at the Bodo Canyon site. The appendix statement is incorrect.

2. Comment

Diversion channel sideslopes of 3 horizontal and 1 vertical were selected over flatter slopes in Section A.5.2.3 for Bodo Canyon. Discuss the specific slopes that were considered, the specific erosion protection that would be required, and the specific alignment and size of diversion channels needed. (554)

Response

In order to meet the longevity requirements as intended by PL95-604, good engineering judgment would dictate that major drainages are not blocked. The design was therefore constrained by using the maximum permissible sideslope that would provide the containment of all of the contaminated material and also not block any major drainages. The proposed embankment design meets these requirements and, therefore, additional design using flatter slopes and diversion channels was considered unnecessary.

3. Comment

Can reclaimed areas armored with gravel and rocks be further covered with soil to support vegetation for wildlife use? (493)

Response

A vegetative cover could be designed only for the flatter topslopes; the sideslopes are of such rock size and slope so as to virtually preclude a self-sustaining vegetative cover. Because of the limited area of topslopes, only a rock cover is under consideration at this time.

4. Comment

The NRC noted that the slope stability factors-of-safety in Section A.5.3.1 for the upstream and downstream slopes of the homogeneous embankments for Alternative 3 under seismic, end-of-construction conditions are reported as 1.3 and 1.1, respectively. These values should be re-checked for it would seem unlikely that the 1 (horizontal) to 1 (vertical) upstream slope would have a higher factor of safety than the 3 (horizontal) to 1 (vertical) downstream slope under the same loading conditions. (490)

Response

It is more appropriate to evaluate an embankment for seismic stability after completion of remedial action rather than at the end of construction of the embankments prior to tailings placement. The probability of a seismic event occurring at the end of construction, but prior to tailings placement is nearly zero. Although values were reported in Table A-10 of the DEIS (page A-48) these should be ignored.

5. Comment

Will the Bodo Canyon site accommodate increased quantities of tailings in the event that DOE has underestimated the amount of tailings present in the piles? (549, 519)

Response

Yes, the Bodo Canyon site can accommodate at least 25 percent more tailings than the presently estimated quantities without increasing the disturbed area.

6. Comment

Section 5.6.2 mentions cutoff trenches as a mitigation measure to be used at the Bodo Canyon site. These trenches should be described in the conceptual design portion of the DEIS. (490)

Response

It is not now foreseen that cutoff trenches would be required for the Bodo Canyon alternative and the text has been modified to reflect this change (also see Table 1.1 and Section 5.6.1 of this FEIS).

7. Comment

What is the basis for the three-foot-thick riprap layers on the perimeter embankments in the Bodo Canyon design? (554)

Response

The 3-foot layer of riprap on the 3 horizontal to 1 vertical embankment slopes is to prevent erosion due to runoff resulting from a PMP.

8. Comment

The calculation of the required cover thickness for Alternative 3 should include consideration of long-term erosional processes (sheet plus wind erosion). The proposed depth of cover should consist of the thickness required to attenuate radon plus the thickness expected to be eroded over 1000 years with an appropriate factor of safety. (554)

Response

The cover system has been revised to provide for both the attenuation of radon plus erosion protection for 1000 years. At Bodo Canyon there would be five feet of clayey soil for the radon barrier, two feet of rock on the topslopes, and three feet of rock on the perimeter embankments to prevent erosion from wind and runoff resulting from a PMP and to maintain radon releases over 1000 years to be within EPA standards. The text has been edited to reflect this change (see Sections 1.3.3, 1.3.4, and 3.2.4 of this FEIS).

9. Comment

Shear strength and unit weight parameters for all materials associated with Alternative 3 should be specified, along with the bases for selection of the parameters. In addition, the location of critical failure surfaces should be shown on Figure A-18. (554)

Response

The purpose of the presentation of stability numbers in the EIS is for comparison of alternatives and is not intended to represent a rigorous design analysis of each site. A detailed analysis of the selected alternative will be completed for actual design. Therefore, additional information is not provided.

6.6.2 Hydrologic considerations

Comments on the hydrology and water quality of the Bodo Canyon site came from the NRC, the Durango Task Force, and the Colorado Department of Health.

1. Comment

Section F.2.3.1 states that Bodo Canyon alluvium/colluvium has hydraulic conductivities ranging from 10^{-8} to 10^{-7} cm/sec, very low values for unconsolidated deposits. The basis for these values should be presented in the EIS. (554)

Response

The alluvial/colluvial deposits in Bodo Canyon are described in Dames & Moore and JEG boring logs as clayey to sandy silts and silty to sandy clays. The conductivity values (K) reported in the DEIS include samples of clay from a test pit (TP-4) located outside of Bodo Canyon. Dames & Moore's 1983 geotechnical study reports laboratory permeabilities for only two samples collected from Bodo Canyon (silty clay from 46.5 feet in boring B-1). The average of these two values is 5.5×10^{-4} feet/day (1.9×10^{-7} cm/sec).

Recent slug testing at well DUR03-602, screened at 39.5 to 49.5 feet in a sandy silt interval, yielded a horizontal K value of approximately 1.3 feet/day (4.6×10^{-4} cm/sec). This would translate to a vertical hydraulic conductivity on the order of 10^{-5} cm/sec. For finer-grained, clayey deposits, K values of approximately 10^{-6} cm/sec are likely.

2. Comment

The EIS should present additional hydrologic characteristics of the horizontal and lateral extent of the interbedded sands and shales of the Cliff House unit at the Bodo Canyon site. (490)

Response

An evaluation of existing Dames & Moore borehole logs and JEG logs from recently installed wells at Bodo Canyon confirms that the Cliff House Sandstone bedrock consists of sandy shale with occasional

interbedded layers of fine-grained sandstone to depths as great as 120 feet. Hydraulic conductivity values from packer tests are greatest in the upper 10 to 40 feet of bedrock and at depth intervals associated with sandstone layers and fractured zones. Conductivity values for unfractured intervals of sandy shale at greater depths are two or three orders of magnitude less. Lateral flow of ground water in the Cliff House bedrock will occur primarily within these sandstone layers and fracture zones, although vertical seepage through the shale will also occur.

The hydrologic characteristics described are included in the addendum to Appendix F, Table F.43 and Figure F.28 in this FEIS.

3. Comment

It is unclear from Table F.40 (page F-127) of the DEIS what hydraulic conductivity value was used in the modelling of leachate production rates at Bodo Canyon. The reported K value of 1.0 ft/yr for fractured shale is consistent with field-measured values at Long Hollow, but not at Bodo Canyon. The EIS should clarify this apparent inconsistency. (490, 554)

Response

The hydraulic conductivity (K) value of 1.0 ft/yr was used only in modelling leachate generation and ground-water flow at the Long Hollow site. The one-dimensional simulation of leachate production at Bodo Canyon was based on the hydraulic conductivity for soils and alluvium at the site ($K = 0.1$ ft/day). This should be recorded as a footnote beneath Table F.40 of the DEIS. Also, Figure F.19 (DEIS) on page F-135 should be re-titled "Pressure head and total head distribution for 1.0 in/yr infiltration for Long Hollow site" (Harlen, 1985).

4. Comment

The modelling studies reported in Section F.2.5 of the DEIS do not adequately represent the flow systems at Bodo Canyon and Long Hollow because initial and boundary conditions are not justified nor are the impact parameters site-specific. The assumption that atmospheric pressure will be maintained in the drainage blanket proposed at Long Hollow is not realistic. The modeling studies should be re-evaluated. (490)

Response

As preliminary simulations of leachate generation at the two sites, the modeling studies reported in the DEIS are adequate. Of necessity, these studies utilized certain impact parameters drawn from other tailings disposal sites. Now that additional site-specific data have been collected from these two sites, simple analytical models

can be used to predict leachate production, ground-water flow rates, and dilution/mixing parameters. Additional modeling may be warranted for the preferred alternative. The results of such modeling would be reported in the site-specific Remedial Action Plan (RAP).

5. Comment

The DEIS does not characterize adequately the attenuative capacity of the clays and sediments at the Durango, Bodo Canyon, and Long Hollow sites. The EIS should quantify the attenuative capacity of natural liner materials and surrounding soils and sediments at proposed disposal sites. (490)

Response

Data on the cation exchange capacity (CEC) and mineralogical content of the soils and alluvial deposits at the proposed sites (and borrow areas) have not been collected. Nor have site- and contaminant-specific distribution coefficients (Kd's) been determined. However, the clay-rich (montmorillonitic) low permeability soils at Bodo Canyon and Long Hollow should provide for effective retention, filtration, and adsorption of reactive contaminants (e.g., radium and other cations). Also, compacted clay liners proposed for the sites will significantly retard vertical seepage of leachate.

6. Comment

Section F.2.3 of the DEIS states that flow in the shallow aquifer in the Bodo Canyon area is toward the Animas River where it discharges. It should be stated that this direction is coincident with the movement in the fractured bedrock. (490)

Response

Section F.2.3 already states this, referring to the fractured bedrock zone as "weathered bedrock."

7. Comment

The ground-water discussion of Bodo Canyon in the DEIS should include: 1) an assessment for the potential for ground-water contamination, 2) additional study of preventative measures, 3) a plan for monitoring and correction or mitigation if future contamination of the ground-water should occur. (534, 490)

Data on the extent of contamination in the Animas River sediment samples are presented in Appendix H of the DEIS. In general, contaminated material from the processing site has not caused elevated radionuclide concentrations in sediments in the Animas River above typical background levels found in southwestern Colorado.

3. Comment

External gamma radiation measurements and radionuclide soil concentrations should be determined to characterize the haul road route between the tailings pile and County Road 211. (490)

Response

An extensive radiological site characterization survey was conducted (BFEC, 1984) which included gamma exposure rate and soil sample analyses in the area between the tailings piles and County Road 211. A gamma traverse survey and soil sampling would be conducted along the remainder of County Road 211 or the proposed haul road following the decision to relocate the tailings to an alternate disposal site. This would be done to characterize existing levels before commencing construction. Periodic monitoring during construction would then be performed to ensure there was no spillage during transportation.

4. Comment

Air sample monitors for detecting Rn-222 should be placed around the site before any remedial action to obtain background reference data. (507)

Response

Ambient average radon concentration data are presented in Section 4.8 of this FEIS. These data were collected several years ago at a few locations in the Durango area. They showed that the concentrations on the site averaged about 2 to 5 pCi/l with a rapid decrease with distance from the source to a background value of about 0.5 pCi/l. Recent one-year average measurements (data available at the UMTRA Project Office) at 22 locations in the Durango area confirm these values. The elevated radon levels due to the site extend less than about 1000 feet to the east of the piles (towards downtown) but exist at a level of about 0.5 pCi/l above background about a mile to the south along the Animas River. Prior to remedial action, according to the alternative selected, additional continuous radon monitoring instruments will be installed to measure the site boundary concentrations during construction.

5. Comment

The radionuclide concentrations in the tailings used in Section H.1.1.2 are 973 pCi/g for Ra-226, 1070 pCi/g for Tn-230, and 103 pCi/g for U-238. Natural uranium (U-nat) concentration, not U-238, should be used in the DEIS analyses. U-nat concentrations would be twice that measured for U-238, or 206 pCi/g. Also, the Pb-210 concentrations should be estimated and used in the DEIS analysis. (554)

Response

The MILDOS model requires input of a U-238 concentration as was done in the DEIS. MILDOS considers U-234 to be in equilibrium with U-238 and accounts for U-234 in its dose estimation. The natural uranium air particulate lung dose to a worker would therefore be approximately equivalent to the Ra-226 air particulate lung dose of 124 mrem (Section H.3.2.2), which is a factor of 50 lower than the maximally exposed worker lung dose of 4.9 rem from inhalation of radon daughters. It is therefore considered that the difference in U-238 versus natural uranium air particulate health effects is negligible.

If the natural uranium concentration of 206 pCi/g were used in place of the U-238 concentration of 103 pCi/g for occupational dose estimation in Section H.3.2.2, the result would have approximately doubled for uranium air particulate health effects.

The dose from Pb-210 has been shown to be small when compared to the three principal radionuclides (U-238, Tn-230, Ra-226). Assuming that 20 percent of the radon is released from the soil, the concentration of the Pb-210 and its decay product Po-210 would be approximately 80 percent of the Ra-226 concentration. Calculations presented in the ANL report (1983) show that the lung dose would increase by only six percent if Pb-210 and Po-210 were considered.

6. Comment

The DEIS states on pages 108-109 that the effect of snow cover and frozen ground would decrease the ambient Radon-222 concentration for the Bodo Canyon baseline characterization of Radon-222 levels. This statement requires documentation. (554)

Response

Since the DEIS was written, additional radon concentration measurements have been made in the Durango vicinity. The addendum to Appendix H in this FEIS contains a data table for Bodo Canyon location 919 and other monitoring locations. Also, a summary histogram is provided where the Bodo Canyon data are included in the "Group Background Locations" (TAC, 1985).

7. Comment

Radiological monitoring data for the Long Hollow site should include airborne particulate and radon monitoring and surface soil and vegetation sampling. Particulates and radon should be monitored in at least three locations; background, on the site and downwind. Soil and vegetation should be sampled at a background and downwind location. (554)

Response

These data are acquired once the remedial action has been selected. It is not anticipated that natural background levels would be so high as to exclude a site from being used.

8. Comment

Section H.1.1.2 assumes that the radionuclides in the tailings piles are in secular equilibrium. Data elsewhere in the DEIS do not support this statement. (554) The assumption of secular equilibrium of Th-230 and Ra-226 cannot be made due to a lack of information regarding the error limits. (554)

Response

The assumption of secular equilibrium was used for calculation purposes only. For health effects calculations measured concentrations of the U-238, Ra-226, and Th-230 in the large pile, which comprises 79 percent of the tailings volume, were used.

9. Comment

Why were no Pb-210 sample concentrations determined during the radionuclide characterization studies described on page H-12? (554)

Response

Pb-210 concentrations in nearby soils are not considered as important as Ra-226, Th-230, and uranium. Only in areas of extremely high radon concentrations in the absence of the long lived radionuclides would it be necessary to sample for Pb-210.

10. Comment

Radiation monitoring during and after the remedial action was the subject of several comments.

o Comment a

What is the lowest possible radon level that could be imposed during the remedial action for a one-week period as opposed to a 26-week or 52-week average? (459) Will a weekly radon emission limit be observed during the remedial action? (519)

o Response a

During remedial action, several continuous radon monitors will be operated around the tailing site. These monitors will be used to measure the cumulative radon concentration near the site boundary. Although the standard requires the annual average limit of radon to be less than 3 pCi/l, the Remedial Action Contractor will take steps to reduce the radon release when the continuous monitors indicate the approach of 3 pCi/l for a weekly average. This approach has been applied to past operations and ensures that the ambient annual average levels remain below the 3 pCi/l limit.

o Comment b

Will radiation monitoring records be made available to the public and the task force on a timely (daily) basis? (454, 549, 515)

o Response b

Radiation monitoring records of continuous radon concentration, air particulate activity, and Animas River water samples will be maintained on the site. The sampling effort will begin before construction activity begins and continue until after remedial action is complete. These records will be available through designated public agencies and task force members. The analyses of most samples will be performed at the site so that the records reflect current (weekly) results. A major intent of continuous monitoring of radon and air particulates is to protect on-site workers who receive larger doses than the public simply due to their proximity to the contamination. The monitoring results are used to control both radon and particulate emissions to protect the workers. This indirectly limits the exposure to the public as well.

o Comment c

Would a radiological survey of the haul roads be conducted following remedial action? (489)

o Response c

Periodically during remedial action, all haul roads involving transport of contaminated material (including those from vicinity properties) will be surveyed for contamination spills. Any contamination detected will be removed.

o Comment d

What is the amount of radiation now being released from the tailings and has this caused a higher than normal incidence of cancer? (414, 446)

o Response d

The amount of radiation being released for no action conditions (Alternative 1) was addressed in Section 5.2 and Appendix H of the DEIS. Associated excess health effects, based on the estimated radiation doses for Alternative 1 and best available risk factors, are also presented in Section 5.2 for no action conditions. Available research data indicate that elevated radiation exposure may slightly increase the risk of contracting cancer; however, the population of Durango is not large enough to detect any excess cancers caused by the tailings pile.

6.10.2 Health effects calculations, source terms, and pathways

The models used to calculate health effects based on radiation dose were the subject of numerous comments. Health effects calculations, models, and exposure pathways are addressed in this section.

1. Comment

Several commenters requested that the health effects to both workers and the public be recalculated based on more conservative (i.e., higher) radiological dose/health effects conversion factors. (493 and 454) Other commenters noted the wide diversity of opinion among health physicists on the effects of low level radiation, and requested that DOE summarize the reasons for selecting the health effect model that was used. (515, 487, 473) Another comment stated that use of the Evans health risk model is inappropriate due to deficiencies in the model. Use of the BEIR III model or another more conservative model was suggested. (537)

Response

The health effects calculated in the FEIS have been revised from those in the DEIS based on a reevaluation of risk factors. A complete review of recent work on the effects of low level radiation

shows that the United Nations Scientific Committee on the Effects of Atomic Radiation quoted a range of $200 \text{ to } 450 \times 10^{-6}$ deaths per person-WLM (UNSCEAR, 1977), while the EPA in its Final Environmental Impact Statement for Remedial Action Standards for Inactive Uranium Processing Sites quoted 300×10^{-6} deaths per person-WLM (EPA, 1982). The BEIR-III report formulated an age-dependent model (NAS, 1980) for predicting the risk of lung cancer based on several studies of uranium and fluorspar miners. Evans et al. (1981) reviewed the BEIR-III study, lung cancer risk estimates published by other authors, and epidemiological evidence. They concluded that the most defensible upper-bound to the lifetime lung-cancer risk for the general population is 100×10^{-6} deaths per person-WLM. A compilation of these and other risk factor values is shown below:

<u>Reference</u>	<u>Range ($\times 10^{-6}$ deaths per person-WLM)</u>
UNSCEAR, 1977	200 to 450
NAS, 1980	200 to 1400
ICRP, 1981	150 to 450
Evans et al., 1981	100
EPA, 1982	300
NCRP, 1984a	100 to 200
USNRC, 1979	360

Recognizing the inadequate understanding of the risk factor, the FEIS text uses the approximate median of the values and ranges reported above: 300×10^{-6} health effects per person-WLM. The DEIS, Appendix H, used a risk factor of 100×10^{-6} health effects per person-WLM; therefore, the bronchial epithelium doses presented in the FEIS text are a factor of three higher than the DEIS Appendix H MILDOS output doses. The risk factor of 300×10^{-6} health effects per person-WLM is equivalent to a dose conversion factor of approximately 15 rem per WLM (NCRP, 1984b).

2. Comment

Other commenters requested that further studies should be conducted of the relationship between tailings and birth defects and other health effects such as leukemia. (458, 515)

Response

Radiation and its associated health effects have been studied more thoroughly than health effects from other carcinogenic agents. The evaluation of health effects caused by low-level radiation is, however, a difficult task, and many uncertainties are associated with the estimation of risks from radiation. The traditional approach for estimating risks from low-level radiation exposures is to extrapolate from effects observed at high radiation exposures using the linear dose-response and no threshold assumptions. Synergistic effects of other health effect agents (e.g., chemicals), are not considered in this FEIS.

The health effect estimations made in this FEIS are primarily based on data and models developed over the last ten years (see previous comment). Quantitative risk estimation of somatic effects for various organs of the body can be obtained using available human radiation exposure data. The manifestation of a cancer caused by radiation exposure would occur after a latent period of up to 25 years, depending on the type of cancer and the age of the person exposed. The risks from radiation will vary with adult age and sex, but are presented as average values where variation due to adult age and sex is small. No data are available that indicate whether risk estimates for adults are appropriate for radiation exposure during childhood. Research continues into the relation between health effects and chronic exposure to low levels of radiation, but progress is slow since the normal incidence (that unrelated to the presence of man-induced exposure) of health effects such as birth defects and leukemia is large compared to that due to man-induced exposure.

Regardless, UMTRCA acknowledges that potential health hazards exist and instructs the DOE to perform action in compliance with the EPA standards to minimize such risks. Such requested studies were, more appropriately, a part of the EPA standard setting process.

3. Comment

The lung cancer death rates should be presented in laymen terms and compared with death rate projections by other authors and recognized experts (424, 425).

Response

The health effects of radon diffusion from tailings arise from inhalation of the short-lived radon decay products (daughters) which then deposit energy from alpha particles in the lung. For radiation protection purposes, the International Commission on Radiological Protection (ICRP, 1977) proposed an individual lung-cancer risk factor of 20×10^{-6} per rem, or 20 excess cancer deaths where one million individuals each receive a one-rem lung dose equivalent from radon daughters. Other standards-setting organizations express the excess risk of lung cancer based on the unit of working level (WL) which is defined as any combination of short-lived radon daughters in one liter of air which, on completed decay, gives a total emission of 1.3×10^5 million electron volts of alpha radiation. The working-level month (WLM) is a unit defined as the exposure resulting from the inhalation of air with a concentration of 1 WL of radon daughters for 170 working hours. The most recent determination (NCRP, 1984b) of the dose conversion factor lists 14 rem/WLM as equivalent. This results in a risk factor of 280×10^{-6} health effects per person WLM which is quite similar to the risk factor used in the FEIS. (See comment 1.a.)

The addendum to Appendix H in this FEIS provides an example of the excess risk to a maximally-exposed individual in the general pop-

ulation during one year of remedial action. The estimated excess risk to that individual of 0.00029 is the lifetime probability of that individual dying of cancer for an exposure time of one year. Another interpretation of that excess risk is that one person out of 3450 people would acquire a fatal cancer if all 3450 people lived immediately across the Animas River from the tailings pile and were exposed during the one-year remedial action period.

The excess risk estimates in the FEIS are for the entire population within 50 kilometers of the Durango tailings site during a 100-year period. For example, in Table 5.2 if no action occurred, 1.34 excess cancer deaths would occur in the general population over the next 100 years as caused by the tailings pile. As a comparison, only 2.66×10^{-2} (or 0.0266) excess cancer deaths would occur over the next 100 years if Alternative 3, stabilization at Bodo Canyon, were chosen. Since this number is much less than one, it is likely that no excess cancer caused by the tailings could occur during the 100-year period.

4. Comment

The FEIS should present one exposure chart which represents both the radon and radiological emissions from both the vicinity sites and the tailings pile. The combined values must be presented as one value for a true representation of population exposure from both aspects of the project. (519)

Response

Although Appendix B of the DEIS provides an analysis of the cleanup of vicinity properties, the intent of the EIS is a comparison of the alternatives to stabilizing the much larger volume of contaminated material within the tailings pile and associated processing facilities. Whatever alternative is chosen, the cleanup of vicinity properties will be undertaken pursuant to the EPA standards. Thus, the exposure due to the vicinity property remedial action is, in effect, superimposed upon all alternatives, and would not affect a comparison among alternatives.

5. Comment

A reference should be provided for the discussion on page H-42 of transportable particulate mean aerodynamic diameter. (554)

Response

See Appendix A (page A-3) of the report entitled: Data Base for Radioactive Waste Management - Impacts Analyses Methodology Report, NUREG/CR-1759, Vol. 3, U.S. Nuclear Regulatory Commission, Washington, D.C. (USNRC, 1981).

This was cited as NRC, 1981a in Appendix H of the DEIS.

6. Comment

Presentation of final tables of joint relative frequency distribution for each of six Pasquill stability classes to be used as input for a MILDOS run would assure the reader that a composite of Tables D-4 and D-6 were actually used. (554)

Response

The joint frequency distribution used in the MILDOS runs is an array of 576 (16 x 6 x 6) frequencies of occurrence for each wind direction, wind speed class, and stability class, and is usually presented as a six-page table. In the interest of brevity, these tables were not presented.

7. Comment

Six comments were directed at the radiation exposure pathways that were considered in the DEIS.

o Comment a

Radiation exposure calculations do not adequately account for the food pathway contribution from foraging animals. (454)

o Response a

There are five principal pathways which could potentially result in exposure of man to radiation from the tailings pile. These are: 1) inhalation of radon daughters; 2) direct exposure to gamma radiation emitted from the contamination area; 3) inhalation and ingestion of airborne radioactive particulates; 4) ingestion of ground and surface water contaminated with radioactive materials; and 5) ingestion of contaminated foodstuff produced in areas contaminated by tailings. For calculations of health effects in the FEIS, only the most significant radiation exposure pathways are considered; they are inhalation of radon daughters, direct exposure to gamma radiation and air particulate inhalation. Analyses for the latter two radiation exposure pathways lead to doses that are much smaller (several orders of magnitude) than doses from radon daughter inhalation and direct gamma radiation. The latter two radiation exposure pathways are not considered in this analysis.

o Comment b

The EIS should include a discussion of the accumulation of radionuclides in the bone tissue of wildlife. (489, 534)

o Response b

The DOE disagrees. The uncertainty in the effects of low-level radiation on humans is relatively large and the understanding of uptake and bioaccumulation in the bone tissue of wildlife is virtually non-existent. The food pathway to humans from wildlife bone tissue is insignificant.

o Comment c

One commenter stated that ingestion of windblown particulates and contaminated surface waters are greater potential radiological exposure pathways than was acknowledged in the DEIS. (489, 460, 455)

o Response c

The modeling of the release and airborne transport of particulates in the DEIS was based on the best analytical tools currently available. Source terms were based on particulate release rates developed by the Air Quality Control Division of the Colorado Department of Health. These are generally considered to be conservative; however, it is recognized that there is some degree of uncertainty in their performance. Regardless, the same algorithms were used to develop the source terms for each alternative and therefore, comparison of the relative impacts of the alternatives can be made.

o Comment d

Section 5.8 should discuss the incremental increases in direct gamma and airborne particulates as a result of the remedial action. (490)

o Response d

The general public and nearby workers are presently being exposed to radon daughters and direct gamma radiation from the unstabilized piles. Radon is diffusing into the atmosphere where it is being dispersed by winds over a large area (i.e., inhalation pathway). Gamma radiation is being emitted and exposes any person living or working within 0.3 mile of the tailings (i.e., direct gamma exposure pathway).

During implementation of each of the alternatives except the no action alternative, the exposure to the general population from the radiological pathways would increase as the tailings are disturbed on the site and as the tailings are transported to an alternate site. Remedial action workers would also be exposed to these pathways during remedial action.

As presented in Appendix H, the percentage increase in radon released from the tailings due to construction activities would be small relative to the radon released prior to remedial action. This is because a large radon flux is released from the existing tailings under the no-action alternative. During construction, increases in gamma exposure rates and airborne radioactive particulate concentrations would be larger than for radon concentration compared to levels prior to remedial action. This is due to an increase in gamma exposure rates as the pile is excavated and then mounded as a result of exposure of more tailings. Airborne particulate concentrations also would increase from near-zero background levels to measurable levels caused by disturbance of the tailings, and particulate concentrations could increase under adverse meteorological conditions. Air particulate dispersion would be controlled by mitigative measures during excavation activities.

The elevated gamma exposure rate primarily increases health effects to the remediation workers on the site. During remedial action for workers the risk to workers from inhalation of air particulates would be a small percent of that from exposure to radon daughters or to gamma rays, and the air particulate exposure to the general population would be even less. Inhalation of radon daughters would continue to be the dominant source factor in the general population health effects calculation for no action and during remedial action.

o Comment e

It is not clear how incremental doses associated with vicinity property cleanup were estimated. Also, it is not clear if the incremental doses have been added to the doses resulting from the radiological assessments made of the Durango site alternative. (554)

o Response e

The average radiation exposure levels to radon daughters and gamma radiation were determined from data at 54 Durango vicinity properties. Background radiation levels were subtracted from these average values. This resulted in excess exposure rates of 6 microR/hr and 0.021 WL. These values were applied to all vicinity properties.

The calculated exposures do not include the incremental effects from the site. The health effects incurred by persons living on vicinity properties due to site activities are considered in the site health effects calculations. An upper bound of health effects for those persons living on a vicinity property could be determined by adding the health effects contribution from the site to the health effects expected for vicinity properties.

8. Comment

Several commenters expressed concern over apparent unequal treatment of radiation sources for the calculation of radiation exposures and projected health effects.

o Comment a

One commenter observed that the radon sources for Alternatives 3, 4 and 5 were underestimated while the sources for Alternative 2 were overestimated, making the stabilization in place alternative appear less desirable. (454)

o Response a

The DOE disagrees with this comment. The radon source term was calculated in virtually the same way for each alternative with the only difference being in the sequencing and amount of area exposed. Therefore, the relative health effects calculated from alternative to alternative are comparable. The methods for deriving the source terms for the various alternatives are described in Appendix H, of the DEIS.

o Comment b

The analysis of the radon source term (Section H.3.1.2) during reprocessing fails to include several sources. Radon releases from the drying and crushing operations prior to the heap leach process were not determined. (490)

o Response b

In Section H.3.1.2, of the DEIS, it is stated that for the reprocessing alternative the tailings material would be wetted before transport and again on arrival at the Long Hollow site. It was assumed that the tailings would be transported and placed in leach tanks within two weeks; therefore radon would not build into a state of equilibrium or be released from the interstitial spaces. It was also assumed that the tailings would be kept saturated until they were heap-leached, and that drying or crushing would not be done before heap-leaching. The diffusion of radon through a saturated material is extremely limited compared to that through the same dry material. It is agreed that the assumption of no radon source term during this period is not conservative; however, it is believed that inclusion of a radon source term for this period of two weeks would add little to the health effects calculations.

o Comment c

On page H-71, Alternative 5, assuming a zero radon daughter dose for scooping up, transporting, and dumping of tailings into leach tanks is not appropriate unless the entire process is automated without any workers present. (554)

o Response c

If 1800 cy of tailings are placed in a leach tank per day after a maximum of a two-week delay, the amount of radon gas available for release would be equal to the amount produced in two weeks times the 0.2 emanating fraction or

$$(973 \text{ pCi/g}) \times (1.57 \text{ g/cm}^3) \times (\text{ft}^3 / 3.531 \times 10^{-5} \text{ cm}^3) \\ (\text{yd}^3 / 27 \text{ ft}^3) (1800 \text{ yd}^3 / \text{day}) (\text{Ci} / 10^{12} \text{ pCi}) \times (0.2 \\ \text{emanating fraction}) =$$

$$5.77 \times 10^{-4} \text{ Ci/day. Over the 51 month period } (5.77 \times \\ 10^{-4} \text{ Ci/day}) (51 \text{ month}) (30 \text{ day/month}) = 0.883 \text{ Ci.}$$

Since this total release is only 0.1 percent of the total radon release at Long Hollow, it is considered negligible.

o Response d

Performing radon flux calculations based on a one-time sample for tailings moisture content is weak. Perhaps including the depth at which the sample was taken could add a little information. An average of several samples from both piles at different depths would be the best approach. (554)

o Response d

Page H-7, last paragraph, acknowledges the fact that radon flux calculations based on a single measurement of moisture content can be misleading. For health effects calculations, a radon flux to radium content in the tailings of one is used. The flux that was used in this FEIS (973 pCi/m²s) is 3 times higher than the calculated flux, and is therefore conservative.

o Comment e

The relative contribution to dose from Pb-210 in the tailings should be addressed on page H-72. (554)

o Response e

If both Pb-210 and Po-210 are considered, the dose would increase by about six percent (ANL, 1983).

o Comment f

The use of a three meter mixing height on page H-73 should be referenced or explained. Meteorological mixing heights are usually much higher, even in southwest Colorado. (554)

o Response f

Three meters is assumed as a conservative value (USNRC, 1981).

6.10.3 Exposures of specific populations

Several comments requested health risk evaluations of specific populations or groups of people, e.g., children at a day care center, boaters on the Animas River, and remedial action workers.

1. Comment

Risk to maximally exposed individuals as well as to general populations from radon gas exposure should be assessed and based on actual measured values at the site and not on predicted values. (455, 507, 531),

Response

Risk to the maximally exposed individual has been calculated and is presented in the addendum to Appendix H of this FEIS.

The excess risk of cancer to a remedial action worker is 0.00069 which is the life-time probability of an individual dying from cancer for an exposure time of one year. Another interpretation is that one person out of 1,450 people would acquire a fatal cancer if there were 1,450 workers on the tailings pile for the one-year period.

2. Comment

Residents near the Bodo Canyon and Long Hollow sites expressed concern over the health risks to their children as well as children attending a day care center in the Long Hollow area. (510, 511, 453)

Response

The Long Hollow area and day care center and the Bodo Canyon area would be expected to have lower radiation exposures than the locations near the existing site during remedial action. Following remedial action and independent of which alternative is selected, the disposal site would be constructed according to EPA standards and radiation levels caused by the tailings beyond the disposal site perimeter would be negligible in relation to natural background levels already existing. Appendix H, Section H.3.2.1 of the DEIS presents the calculated radiation exposures for ten locations during remedial action for each of the alternatives.

3. Comment

The final EIS should address health hazards to recreational boaters on the Animas River. (504)

Response

The duration of time spent by a boater in the vicinity of the tailings pile would be so small that any excess radiation exposure would be virtually nil; even smaller than the excess radiation exposure to the general population during transportation of the tailings as calculated in Section H.3.3.2 of the DEIS.

4. Comment

The projected yearly radiation dose and whole body exposure for a truck driver hauling tailings seems to be unacceptably high. Could the truck cabs be shielded to reduce the exposure? Provide the basis for the data. (477, 554)

Response

The analysis referred to by the commenter takes no credit for the normal shielding which would exist between the driver and tailings. A discussion of the over-conservatism of this approach can be found in paragraph 3 on page H-72 of the Appendix (Section H.3.2.2) of the DEIS. If credit is taken for about one inch of steel, the dose to the driver is calculated to about 200 to 300 mrem per year.

5. Comment

Section 5.2.4 should also include a discussion of the potential radiation dose to cleanup workers in the accident scenarios. (493)

Response

The radiation exposure from spilled tailings would be of short duration and extremely small, negligible when compared to exposures the workers would be receiving during the planned remedial action. The estimated health risks to workers for the remedial action alternatives are conservative and would incorporate any excess radiation exposure from cleanup of spilled material.

6. Comment

What measures will be used to reduce workers radiation exposure during the remedial action? (408)

Response

Worker exposures during remedial action would be lessened by the wetting of contaminated material during construction activities, the wearing of respirators, frequent relocation of workers to areas not containing radioactive materials, and other shielding measures. These means for reducing workers exposure would be employed if necessary during remedial action and will be described in detail in the Remedial Action Plan. General procedures are described in Section 5.2.1 of the DEIS.

7. Comment

Some commenters suggested that a review of medical records in the Durango area would provide a basis for cancer risk to the local population (159,177). Another commenter suggested that a cancer registry be established in Durango. (_____)

Response

A review of medical records in Durango would be helpful in determining the number of persons contacting cancer in the Durango area. It is felt, however, that for purposes of this EIS the national incidence of cancer is adequate for relating the magnitude of cancer risk from remedial action to the natural incidence of cancer.

6.10.4 General radiation related comments

A number of comments posed general questions on radiation levels, standards, and other topics.

1. Comment

Plans should be made for rapid and effective response to truck accidents. These plans should include training of local medical personnel for the treatment of injuries involving radiation contamination. (493, 523, 534)

Response

While not specifically a part of the EIS, an emergency response procedure for handling accidents of virtually all types will be included in the Remedial Action Plan (which will be developed once the selection of an alternative is made). The Remedial Action Contractor will have trained personnel available at all times for potential responses to accidents. The radiation exposure to spilled tailings is extremely small and appropriate action is generally limited to rapid containment and removal of the material. Medical attention as a result of accidents is anticipated to be limited to the immediate treatment of non-radiation related injuries. However, the Remedial Action Contractor will provide information on the proper decontamination of injury victims to local emergency medical personnel. See Section B.4.1.2, of the DEIS.

2. Comment

Several commenters said that the need to reduce health effects requiring the pile to be moved from Durango has not been demonstrated. (479, 412) There is no evidence of an increase in cancer incidence in Durango. (444, 449, 450) Another comment stated that the DEIS did not clearly indicate the health hazard that is posed from long-term low dose radiation. (473)

Response

As shown in Appendix H of the DEIS and Table 1.3 of the FEIS, long-term excess health effects are very low and similar for each alternative. Thus, it is quite clear that minimization of health effects is not the reason for relocation. Further, DOE is mandated by the UMTRCA of 1978 to perform remedial action in compliance with the EPA standards; demonstration of cancer incidence due to the tailings is irrelevant for purposes of this remedial action.

3. Comment

Could the amount of radiation being released from the pile be reduced without moving the pile? (414)

Response

Radiation levels could be reduced to meet EPA standards, as addressed in Alternative 2 in the DEIS; however, it is clear that there are difficulties in meeting the longevity standard of 200 to 1000 years.

4. Comment

How much radiation would be released if the pile were mixed. (414)

Response

The amount of radiation that would be released during construction for stabilization in place and for relocation was addressed in Section 5.2 and Appendix H of the DEIS.

5. Comment

Tailings should be disturbed as little as possible; the radon gas coming off of the surface materials is different from what one would expect in the center of the tailings. As long as the center is not exposed it is of a relatively low hazard. (542)

Response

The DOE disagrees. The radon released from tailings is due to the disintegration of radium within the pile. A fraction (usually about 20 percent) of the radon produced is created within the interstitial pore space and is able to diffuse to the surface. Thus, the radon flux primarily depends on the radium content of the first several feet of material below the surface. Although little information exists on the distribution of radium within the Durango pile, analyses from many other uranium tailings piles shows that the distribution is relatively uniform. Thus, when the center of the pile is exposed, there would not be significantly more radon flux than is occurring at the present time.

6. Comment

What are the final EPA standards for radiation? (525)

Response

The EPA standards for inactive uranium mill tailings sites are presented in Section 2.2 of this FEIS.

7. Comment

Several commenters stated that the smelter stack on the Durango site should be decontaminated and left intact. (439, 482)

Response

The level of radioactive contamination of the smelter stack and the structural stability relative to withstanding on-site remedial action activities will be factors in the decision whether to decontaminate or demolish the smelter stack. See Section 6.16.

6.11 WILDLIFE

There were 26 comments relating to wildlife. Several commenters had concerns relating to the need for a wildlife mitigation plan which would include costs and kinds of mitigation. Others raised issues relating to the legality of using Bodo Canyon as a disposal site or the inappropriate use of a Wildlife Management Area which might set precedence for other actions. Several others felt that wildlife values in Long Hollow were inaccurately portrayed in the DEIS. The comment summaries and responses are presented below.

1. Comment

Comments on the wildlife values and impacts came from six individuals, the Wildlife Society, the League of Women Voters, and the State of Colorado.

o Comment a

Several commenters felt that wildlife values in Long Hollow were not accurately portrayed (as compared to Bodo Canyon) and that the wildlife impacts resulting from Alternative 4 and 5 were not adequately addressed in the DEIS. (475, 488, 535, 537, 543, 376, 377)

o Response a

Since publication of the DEIS, wildlife variety, distribution, and abundance, and wildlife habitat have been re-examined in consultation with the Colorado Division of Wildlife (CDW). Additional information has been included in Sections 4.7.2 and 5.7 and Appendix L of this FEIS.

o Comment b

Several commenters questioned the legality of using the Bodo State Wildlife Management area as a tailings disposal site or for borrow materials, and cited the original Nature Conservancy deed requirements. (456, 515) The Colorado Department of Health requested that a land usage arrangement be presented by the DOE for consideration by the Colorado Division of Wildlife and The Nature Conservancy. (491)

o Response b

The commenters are correct in that the deed restrictions on the Bodo property require that the land "....forever be held as wildlife habitat and for no purpose inconsistent therewith..." This restriction can only be modified through agreement by all parties (DOE, CDW, Nature Conservancy) of a wildlife impact mitigation plan prior to transfer of the title to DOE by the state.

o Comment c

One commenter was concerned about the precedent of depositing hazardous materials in wildlife management areas if Alternative 3 were selected. (475) The state owned Bodo wildlife area should be used only if other alternatives are shown to be less viable. (481)

o Response c

Although deposition of hazardous materials at the Bodo State Wildlife Area might be precedent setting, any and all future disposal sponsored and funded by the Federal Government would be subject to compliance with NEPA and, presumably, agreement by the state. Furthermore, the extent to which wildlife impacts are mitigated at Bodo would set a precedent for mitigation at other hazardous materials or radioactive waste disposal sites. Regarding the issue of alternative selection, the DOE recognizes wildlife values and the importance of the habitat in the Bodo Canyon area. However, the selection of an alternative is dependent upon many factors of which wildlife is only one. In recognition of the importance of wildlife, the DOE has developed a detailed plan to mitigate the impacts to wildlife (Appendix L).

Comment d

The FEIS should address impacts to wildlife from truck traffic on C.R.211. (537, 456)

o Response d

These impacts have been addressed in Section 5.7 and Appendix L. Impacts that have been considered for each alternative include wildlife-vehicle accidents, loss of habitat from road widening and dust emissions, and loss of habitat utilization from increased traffic volumes.

o Comment e

The increasing real estate development in the Durango area is creating pressure on existing wildlife populations; use of Bodo Canyon for either a source of materials or for remedial action would further impact wildlife populations. (456)

o Response e

Agreed. Since publication of the DEIS, impacts to wildlife have been thoroughly reviewed, revised, and described (Section 5.7). A draft Wildlife Impact Mitigation Plan (Appendix L) to reduce, minimize, and eliminate impacts has been completed and submitted to the state for consideration.

o Comment f

It is stated that the entire Bodo Canyon area has been deeded to the State of Colorado by the Nature Conservancy. In this deed has the Natural Conservancy placed any restrictions on the use of the land which could affect the reclamation of the relocated tailings? (554)

o Response f

No. As stated in the response to comment b, deed restrictions specifically address use of the land and not reclamation requirements.

2. Comment

Numerous comments from government agencies, organizations, and individuals expressed concerns about wildlife mitigation particularly at Bodo Canyon.

o Comment a

Several commenters, including the State of Colorado, requested the inclusion of a wildlife mitigation plan for each of the alternatives, or, clear statements of how impacts to wildlife would be mitigated in each alternative. (489, 493, 475, 551)

o Response a

A draft wildlife impact mitigation plan has been developed for Alternative 3, the preferred alternative, and is included as Appendix L in this FEIS. The elements of the plan are summarized in Section 5.21.7. Regardless of the alternative selected for remedial action, a mitigation plan will be an integral part of the project. In the event that Alternative 2, 4, or 5 is selected, a revised mitigation plan containing the same essential elements as the draft plan, included as Appendix L, would be developed and implemented.

o Comment b

Commenters requested that the EIS provide greater detail on the costs and terms of the biological mitigation plan that would be implemented if the Bodo Canyon site were selected. (492, 493, 451, 452, 508, 509, 515)

o Response b

A draft mitigation plan containing various mitigation measures and estimated costs is included as Appendix L of this FEIS. Table

L.4.1 provides estimated costs for the following measures; education programs, speed restrictions, timing of remedial action activities, road signs, reporting of road kills, reimbursement of road kills, van pooling, timing of road construction activities, exhaust system checks, firearms restrictions, habitat enhancement and replacement, and others.

o Comment c

One commenter inquired how the CDW would be compensated and what additional costs would be incurred by them if the Bodo Canyon site were selected. (534)

o Response c

The DOE recognizes that the CDW would incur additional costs during remedial action (Section L.3.4 of Appendix L). Section L.4.1 of Appendix L recommends a means to offset such costs.

3. Comment

What would be the loss to recreationists using the Bodo Wildlife Area during truck travel, closing of County Roads 211 and 212, and other disposal operations? (534)

Response

Current estimated recreational use (11,850 days/year) of the Bodo wildlife area and estimated recreational loss (3946 days/year) during remedial action (Alternative 3) are provided in Sections 4.9.2 and 5.8 of this FEIS and Section L.3.3 of Appendix L.

4. Comment

Before issuance of a final EIS, a wildlife mitigation plan should be issued with enough response time for the public to review and comment on it. (508, 509)

Response

The DOE acknowledges the commenter's desires to review the wildlife mitigation plan prior to the issuance of the FEIS. However, the DOE disagrees with the need for early public review of the plan. Appendix L of the FEIS contains a draft wildlife mitigation plan.

6.12 TRANSPORTATION

The majority of transportation related comments expressed concern that County Road 141 (Wildcat Canyon Road) would be used to transport tailings to Long Hollow. These concerns were almost exclusively from local area residents including people living in the Rafter J Subdivision who submitted a petition requesting that an alternate road be constructed. Other comments involved changes to the Bodo Canyon road and the effectiveness of dust control during truck haulage. The DOE's responses and comment summaries are given below.

1. Comment

Many commenters expressed concern over the use of Wildcat Canyon Road (County Road 141) for Alternatives 4 and 5. Commenters felt it would be very dangerous for haul trucks to use Wildcat Canyon Road since it is used as the major route for access to Durango by the residents that live in the Long Hollow area. Commenters recommended that a road be constructed to run parallel to Wildcat Canyon Road for use by haul trucks. (351 through 391, 422, 423, 424, 425, 526, 537, 543, 521, 429, 439, 440, 447, 378, 379, 476)

Response

Both Alternatives 4 and 5 were modified to include the construction of a haul road parallel to Wildcat Canyon Road. Wildcat Canyon Road would not be used by haul trucks. Sections 3.2.5, 3.2.6 and 5.14 of the FEIS indicate this change.

2. Comment

An individual asked if the Bodo Canyon Road would meet transportation standards. (513) A citizen organization asked other questions: What will be the level of access improvements from County Road 211 to the piles? Will road profiles and cross sections be prepared for inclusion in the final EIS? What maintenance measures will be necessary to prevent deterioration of the gravelled roadbeds? (487).

Response

The haul roads would be widened and improved and would comply with La Plata County road standards. A minimum width of 35 feet would be required for two-way traffic with the 25-ton-capacity haul trucks for Alternative 3a (transport of tailings to Bodo Canyon by truck). The haul road would be compacted, a geotextile fabric would be placed under a gravel surface, and a water or chemical dust palliative applied to minimize dust (Section 3.24). Additional improvements will include, where necessary, safety beams, drainage ditches, and culverts. Actual construction drawings for road profiles and cross sections are beyond the scope of the Final EIS. The haul road would be regraded

and resurfaced as necessary to maintain road integrity during remedial action. The road would not have to be widened for Alternative 3b, stabilization at Bodo Canyon using a conveyor system.

3. Comment

What would be the effect of traffic increases past the CDW House in Ridges Basin? (455)

Response

There would be no change in traffic patterns past the CDW House for Alternatives 1, 2, and 3. For Alternatives 4 and 5, County Road 211 would have to be widened and improved. A minimum width of 35 feet would be required for two-way traffic of the 25-ton-capacity haul trucks. As stated in Section 1.5 of the EIS under Alternative 4, the estimated truck traffic would be 450 trips/day for five months and 534 trips/day for 15 months. Under Alternative 5, the maximum estimated truck traffic would be 72 trips/day for 51 months (Section 5.14 and Table 1.3).

4. Comment

Include a consideration of hard surfacing the Bodo Canyon road; describe cost estimates, impacts, and mitigations. (534)

Response

The cost estimate for hard surfacing (six-inch asphalt) the Bodo Canyon road is approximately \$3 million more than simply resurfacing with gravel. At this time, hard surfacing is not under consideration.

5. Comment

Would DOE pay for the road maintenance program? (493)

Response

DOE will pay 90 percent and the state ten percent for the maintenance of roads on the sites. Maintenance of county/state roads is the responsibility of the county/state and is funded through taxes paid by all trucking firms. If County Roads 211 and 212 are totally dedicated during remedial action, maintenance will be paid for by the DOE (90 percent) and the state (10 percent).

6. Comment

A traffic signal may be needed at the intersection of County Road 211 and County Road 141 and at the turnoff to the Long Hollow site if either Alternative 4 or 5 is selected. (493)

Response

Alternative 4 was modified to include the construction of a haul road parallel to County Road 141. County Road 141 would not be used by haul trucks and therefore a traffic signal would not be needed. Sections 1.3.4, 3.2.5, 3.2.6, and portions of Section 5.0 have been revised accordingly.

7. Comment

The use of canvas tarps to cover truck loads of tailings or wetting of truck loads of tailings will not adequately control materials from being blown off trucks during transportation. (424, 425)

Response

Studies conducted for other remedial action projects and at UMTRA Project sites at Shiprock, Salt Lake City, and Canonsburg have shown that canvas tarps and wetting will adequately control release of airborne materials from trucks during transportation. In addition, a truck wash system would be constructed to cleanse the trucks exterior prior to leaving the disposal site and prior to leaving the Durango site.

8. Comment

Traffic accident ratios for specific road segments should be used instead of national averages. (493)

Response

As in the case with any forecast that extrapolates from historical data, the predicted number of fatal/injury traffic accidents that is provided in this EIS may represent an underestimate of what actually will occur. However, the prediction also may be an overestimate of future accidents. A historical data base that is broader than the particular roadways that may be used in the remedial action was used because of a lack of traffic information specific to County Roads 211, 212, and 141 (see Section 4.12.7).

9. Comment

What is the potential for accidents involved in moving the tailings? (414)

Response

The potential for accidents under each remedial action alternative is quantified in Section 5.14 (Impacts on Transportation Networks) of the EIS.

10. Comment

Why are there more truck-related injuries for Alternative 5 than Alternative 4? (493)

Response

There are more truck trips and hence miles travelled to complete Alternative 5 than to complete Alternative 4.

The primary differences which translate into more miles travelled under Alternative 5 than Alternative 4 include:

- Relocation of the plant facilities used in reprocessing operations from Naturita to Long Hollow.
- Transport of materials used in the reprocessing operation from Gallup, New Mexico, and Grand Junction, Colorado, to Long Hollow.
- The transport of recovered uranium and vanadium from Long Hollow to Blanding, Utah.

6.13 LAND USE

A number of commenters inquired about the affects of the remedial action on the Animas-La Plata project or vice-versa. Other statements concerned county zoning approval, the use of privately owned land for a disposal site, future land use, and impacts to livestock grazing, public utilities, and the Southern Ute Indian Reservation. DOE's response to each of these issues is presented below, along with summaries of the comments.

1. Comments

The cumulative effects of the remedial action and the Ridges Basin Project (Animas-La Plata) should be addressed in the EIS. (454, 427, 439, 440, 493, 473, 515, 539, 537)

Response

In planning the remedial action, the DOE has considered the possible, likely, cumulative effects of the Bureau of Reclamation's Animas-La Plata Project. The Ridges Basin Reservoir component would inundate part of County Road 211 and a water intake structure would be constructed at the raffinate ponds location. Projecting the entire range of cumulative effects of the projects is not necessary because of the uncertainty of when construction of the Animas-La Plata Project would begin due to lack of funding from Congress. As the Animas-La Plata Project stands now, the schedule put forth in its Environmental Statement conflicts little with that of the Durango remedial action.

2. Comment

Disposal at Bodo Canyon or Long Hollow would require zoning approval by La Plata County. (493)

Response

The DOE agrees that coordination with the La Plata county government would be essential for any of the remedial action alternatives. However, La Plata County uses a land use change approval system rather than a land use zoning approach for managing land development. The DOE has reviewed the county regulations and will comply with local land use requirements.

3. Comment

Use of privately owned land as an alternative disposal site would be a mistake if publicly owned land is available. (439, 440)

Response

The choice of acceptable sites for the stabilization of uranium mill tailings is based on many factors (such as those described in Appendix C, page C-4 of the DEIS). Of primary concern are geotechnical characteristics. It is imperative that the site that is chosen be geotechnically suitable, enabling stabilization to be as secure and permanent as possible. Current and potential future land uses were considered in selecting alternate disposal sites. The use of private land is considered when the land offers beneficial characteristics which public land cannot.

4. Comment

The DOE should reevaluate the projections of future land use near the Long Hollow site with more emphasis on the expanding low-density residential development. (424, 425, 537)

Response

The EIS describes potential future land uses in the Long Hollow area (e.g., the suitability of the area for low density housing because of the flat terrain). The EIS also mentions that such development is occurring in the area, and that precise projections of residential development in the area are somewhat subjective. Thus, the approach utilized was to describe potential future uses rather than to make projections (see Section 4.9.3).

5. Comment

More emphasis should be placed on the use of Long Hollow as grazing land. (488)

Alternatives 4 and 5 would shutdown sheep ranching operations during remedial action due to traffic and noise. (453, 488)

Response

The DEIS described, in Section 4.9.3, the current and historic uses of the Long Hollow site for sheep grazing and lambing. The land targeted for the proposed Long Hollow site (80 to 195 acres) and the immediate vicinity (1100 acres total) are used by the owner for grazing. This acreage is an important component of a 2000-head sheep operation. A loss of the entire parcel would disrupt the operation, forcing the owner to find other grazing land or discontinue the operation. The land use within a five-mile radius of the Long Hollow site is displayed on a detailed map in Appendix I, page I-29, of the DEIS. The use of land at, and in the vicinity of, the proposed Long Hollow site for grazing is also presented in the text in Appendix I, page I-27, of the DEIS.

Section 5.8 in the FEIS has been revised to more clearly state the impact to sheep ranching in the area.

6. Comment

The EIS should address the impacts to utilities for all of the alternatives. (493)

Response

None of the alternatives are expected to place demands on utilities which cannot be met with existing facilities. This is expressed in Section 5.15. Although utility installations exist on or near both the Bodo Canyon and the Long Hollow disposal sites, remedial action would not affect these installations.

7. Comment

Commenters requested that DOE initiate consultation with the U.S. Department of Interior and/or the Southern Ute Indian Tribe concerning the impacts of Alternatives 4 and 5 because the Long Hollow site, although privately owned, is within the exterior boundary of the Southern Ute Indian Reservation. (473, 489, 522)

Response

The Long Hollow site is on the northern edge of the Southern Ute Indian Tribe Reservation boundary although the surface of the land is privately owned. Currently, Alternative 3, relocation to Bodo Canyon, is the preferred alternative. Implementation of this alternative would have little impact on the Southern Ute Reservation. If either Alternative 4 or 5 were selected, additional consultation with the Department of Interior would be undertaken.

6.14 MINERAL RESOURCES

Five mineral resource issues were evident in comments from the Colorado Department of Health, a local citizens group (CCAMP), the Durango Task Force, and the U.S. Department of Interior. The issues are stated below along with responses.

1. Comment

The EIS should state that future recovery of uranium would be much less expensive under Alternative 4 than 1, 2, or 3. (493)

Response

Agreed.

2. Comment

Another commenter said that if recovering the remaining uranium and vanadium values is so important, why have no mineral development companies shown an interest in the reprocessing concept. (515)

Response

Alternative 5, reprocessing of the tailings at Long Hollow, was included in the DEIS as the preferred alternative because of the estimated content of vanadium and uranium in the tailings and because the former owners (Ranchers Exploration and Development Corporation) had planned at one time to reprocess the tailings to recover the mineral values. The current owner, Hecla Mining Company, has indicated that reprocessing is not feasible at this time. To date, only one other firm has expressed a limited interest and, thus, relocation to Bodo Canyon is now the preferred alternative in this FEIS.

3. Comment

Sand and gravel deposits are available on private land across County Road 141 from Long Hollow. (493)

Response

The DOE is aware of commercial sand and gravel deposits which are presently west of the Long Hollow site.

4. Comment

What is the impact on the loss of mineral values, such as the coal underlying the Bodo Canyon site? (534) It is stated that the Bodo Canyon site is underlain by as much as 400,000 tons of potentially recoverable coal. Provide information concerning ownership of mineral rights at the site. (554)

Response

These issues are discussed in Section 5.5 of the EIS.

5. Comment

DOE should describe how remedial action would affect the recovery of the mineral resources remaining in the smelter slag at the Durango site. (489, 493)

Response

Remedial action is likely to have little affect upon the possible recovery of minerals from the smelter slag. The slag remaining at the Durango site is the result of gold, silver, and lead smelting which occurred prior to the milling of uranium ore. High temperatures of the smelting processes fused the silica contained in the ores with the residual metals. Crushing and resmelting the slag would be a costly proposition in which no commercial venture has expressed interest. However, if Alternative 3, 4, or 5 is implemented, recovery of mineral resources will be decided upon by the current owner, Hecla Mining Company.

6. Comment

Section E.2.2 discusses the mineral resources near the Durango, Bodo Canyon, and Long Hollow sites, but does not provide maps showing the locations of the coal mines near the Bodo Canyon site or other mineral sources. (554)

Response

Inactive, abandoned mines are present within the vicinity of the Bodo Canyon and Long Hollow sites. The nearest active coal mines are several miles distant.

7. Comment

One commenter suggested that radium and other radioactive elements could be recovered (as well as uranium) during processing. The radio-

active materials could be stockpiled until the market price for the materials improves. (419)

Response

The future market for radium and other radioactive elements is highly speculative and is not significant enough to affect the remedial action decision. If a decision is made to reprocess the tailings, additional consideration would be given to by product mineral recovery during preparation of the final design.

6.15 AIR QUALITY AND NOISE

Comments from the Colorado Department of Health, a local citizens group, and seven individuals related to air quality, meteorology, and noise. The majority of the comments focused on the dust which would be released during the remedial action. Summaries of the comments and DOE's responses are given below.

1. Comment

The DEIS does not adequately consider wind velocities (particularly at Long Hollow) and potential wind blown dust. (510, 511, 537)

Response

The DEIS presents wind data for Durango and Bodo Canyon for the period February, 1982, through January, 1983. No meteorological data were collected at Long Hollow (see Comment and Response #4). As stated in the DEIS, wind direction in Long Hollow is probably more southwesterly than in Bodo Canyon due to the difference in orientation of each valley. Wind speeds in Long Hollow would be expected to be slightly higher than in Bodo Canyon because Long Hollow is flatter with less relief, and also has less vegetation which would tend to reduce wind speed.

Windblown dust, or fugitive dust will occur; however, there are effective mitigation measures which would be implemented (e.g., application of water and/or chemical surfactants). Since the comment does not indicate what is lacking in the consideration of wind and dust, it is difficult to address the comment. TSP levels were predicted for Long Hollow, as for the other sites, by means of the Valley model.

2. Comment

Use of the existing Bodo Road (County Road 211) would create air quality problems. (535)

Response

Agreed. Estimates of maximum emissions and mitigation measures are discussed in Sections 5.3 and 5.21.2, respectively.

3. Comment

Due to inaccessibility of the Long Hollow site, the following data have been assumed to be the same as the Bodo Canyon site, eight miles away: wind speed and direction, air stability, water quality, probable maximum precipitation, existing radionuclides, and total sus-

pended particulates. This information must be provided in the FEIS based on "site-specific data" for the Long Hollow site. (515, 454).

Response

The owner of the Long Hollow site denied access to his property during the period. Consequently, there are little requested data which are available. Data collected at the Bodo Canyon site are not "assumed to be the same" as would have been measured at the Long Hollow site. Rather, it is reasonable to assume, in the absence of site-specific data, that, due to the short distance separating Long Hollow and Bodo Canyon, and due to the the topographical and surface similarities, no significant differences would be observed between measurements of the same parameter at each site. Significance relates, in this case, not to the statistical determination, but rather to the size of a difference that would influence the site selection process. Since there have been no hypotheses established ahead of time (e.g., does wind speed exceed X mph more than ten percent of the time?) as criteria by which to eliminate or favor sites, the lack of site-specific ambient environmental data for Long Hollow does not mean that reasonable conclusions cannot be drawn by examining proximal or regional data. Thus, the DOE believes that the information provided in this EIS is more than adequate to estimate impacts and provide for comparison among alternatives.

4. Comment

The dust emission estimates should include emissions generated by drying and crushing of tailings prior to reprocessing. (454)

Response

It is anticipated that drying of the tailings, should it prove to be required, occasionally would be largely accomplished during the loading, hauling and unloading activities which would occur prior to reprocessing. Emissions from these activities were accounted for in the current emissions inventory. In the event that high moisture content necessitates a separate drying step prior to reprocessing, fugitive emissions would be minimal, especially since the entire tailings pile would not require special drying. Those portions of the pile which must be dried would be damp initially and little or no dust would be generated. The drying process would continue until the required moisture content is reached and the tailings would then be fed into the reprocessing system.

Due to the physical nature of the tailings, crushing would not be required. The tailings are a finely-grained sand-like material which is quite uniform in size. Throughout the existing pile it is likely that there are areas where agglomeration has occurred due to compaction over time. Such agglomeration would be broken up during the normal earthmoving, loading, hauling, and dumping activities. The mixing process would further reduce any large particles. While a portable

crusher or screen may be required infrequently, there would be no routine crushing operation which requires consideration as a separate major source of fugitive dust.

5. Comment

Fugitive dust emissions during the remedial actions could be further reduced by adopting dust control measures such as: 1) speed controls for trucks on unpaved roads; 2) hydromulching material piles; 3) use of synthetic covers until revegetation is complete; and 4) covering trucks that will haul uncontaminated materials. (493)

Response

The above suggestions are all possible additional methods of increasing the effectiveness of mitigation measures (see Section D.2.14 of the DEIS) for control of fugitive particulates. Each method will be evaluated by the state prior to issuance of an Air Pollutant Emissions Notice to the remedial action contractor.

6. Comment

Were the particulate releases from the hauling of cover materials and maintenance of on-site roads included in the calculations of total particulate releases? (493)

Response

Yes. See Section D.2.7, Table D.17, and Table D.18 of the DEIS.

7. Comment

The air particulate emissions calculations should take into account the fact that County Road 141 is paved. (493)

Response

The text states that County Road 141 is gravelled rather than paved. In Section D.2.13 it is stated: "Fugitive particulate emissions were calculated for truck traffic on the transportation corridors for Alternatives 2, 3, 4, and 5 using the same formula used in Section D.2.7 for unpaved roadways (because this is a worst-case situation)."

8. Comment

The explanation of wind stability should be rewritten in language that would be easier for laymen to understand. (424, 425)

Response

Section 4.3.4 of this FEIS has been so revised.

9. Comment

Would there be an impact to air quality for Alternative 1 (No Action)?
(493)

Response

Yes. Please refer to Section 5.3, Impacts on Air Quality Alternative 1 - no action and Tables D-8 and D-9 of the DEIS.

10. Comment

The EIS should contain a more comprehensive discussion of site-specific noise sources and impacts, particularly transportation-related noise. (493)

Response

In the absence of recorded ambient sound levels for any of the disposal sites, little more can be said beyond stating the typical values for ambient sound levels as described in Section 4.10 of the DEIS. Estimates of noise levels emitted by trucks and construction equipment were obtained from a noise-prediction model. The expected increases in sound levels due to construction and transportation are clearly described in Section 5.9 of the DEIS. It should be noted that the model is conservative with respect to predicted sound levels, i.e., values used to discuss impacts are high rather than low. Consequently, the DOE believes the existing DEIS sections related to noise levels and impacts are adequate.

6.16 SCENIC, HISTORIC, AND CULTURAL

Key issues identified in comments relating to scenic, historic, and cultural resources were: 1) requests for more information on archaeological sites, 2) preservation of the historic smelter stack, and 3) impacts to the proposed La Plata Canyon National Natural Landmark. Comments came from the State of Colorado, the U.S. Department of Interior, the League of Women Voters, the Durango Task Force, the Wildlife Society, and five individuals. The comment summaries and DOE responses are given below.

1. Comment

Several commenters expressed concern for impacts to cultural resources. (424, 425, 475, 493, 515, 519, 549)

o Comment a

Further information should be included on the archaeological, historical or cultural sites which may be affected by the remedial action. (424, 425) What specific mitigation measures will be implemented with regard to affected cultural resources at Bodo Canyon? (549, 519, 515)

o Response a

The DOE has conducted several Class III archaeological surveys including the Durango site, the Bodo Canyon site, the Long Hollow site and adjacent transportation corridors. Sections 4.11.3 and 5.10 describe the results of the archaeological studies.

Mitigation measures for impacts to archaeological features may include:

- (1) Modification to the final design to avoid some significant archaeological sites.
- (2) Excavation of some significant archaeological sites to recover the maximum amount of scientific data that is reasonably possible.
- (3) Detailed mapping of surface features and collection of artifacts.

Although the complete cultural resource mitigation plan for Alternative 3 has not been finalized, Section 5.21.6 describes the basic elements of the plan. The mitigation plan will be finalized in consultation with the Colorado State Historic Preservation Officer.

o Comment b

The costs of the archaeological mitigation plans need to be identified. (493)

o Response b

The preliminary cost estimates for mitigation of cultural resources in Bodo Canyon, along County Roads 211 and 212, and the smelter stack range from \$100,000 to \$130,000.

o Comment c

Archaeological surveys of the borrow sites and along County Roads 211 and 141 should be performed as soon as possible. (493)

o Response c

In addition to the archaeological surveys described in the DEIS, a Class III archaeological survey was conducted in November, 1984, along part of County Road 211. DOE is proceeding with cultural resource studies which would accomplish archaeological surveys, testing, and data recovery, where needed, for all of the action alternatives. This course of action is being taken to ensure that the project will not experience delays. After the record of decision has been published, DOE will discontinue archaeological studies on the alternatives that are no longer being considered. Protection of cultural resources is being facilitated by a Programmatic Memorandum of Agreement between DOE, the Colorado State Historic Preservation Office and the Advisory Council on Historic Preservation. Sections 4.11.3 and 5.10 of this FEIS have been updated to reflect the current status of archaeological investigations.

o Comment d

The cultural site at Long Hollow should be tested as soon as possible. (493)

o Response d

By selecting Alternative 3, disposal at Bodo Canyon, as the preferred alternative, the DOE believes that there is not an urgent need to conduct subsurface testing at the referenced archaeological site. The cultural resource site in question is so small that an archaeological testing and data recovery program could be completed at a later date without delay to the remedial action (in the event that the Long Hollow site were selected for tailings disposal).

o Comment e

The State of Colorado stated that when the final alternative is chosen, the DOE must complete a determination of effect and develop a plan to avoid, minimize, or mitigate the adverse effects of any eligible cultural resource. (493)

o Response e

Agreed. The DOE has entered into a Programmatic Memorandum of Agreement (PMOA) with the Advisory Council on Historic Preservation and the Colorado State Historic Preservation Officer (SHPO) regarding the protection of cultural resources associated with the UMTRA Project in Colorado. The PMOA established procedures that the parties pledge to comply with in fulfilling the requirements of Section 106 of the National Historic Preservation Act of 1966.

2. Comment

Two commenters stated that the smelter stack on the Durango site should be decontaminated and left intact. (489, 482) Another commenter requested that the preservation of the smelter stack be included in the cost estimate and presented in the EIS. (493)

Response

With tailings disposal at Bodo Canyon as the preferred alternative, the stack will have to be demolished for safety reasons and because of the difficulty in decontaminating the stack, as described in Section 5.10.

The cost estimate for decontaminating the stack is \$100,000 and does not include the cost for stabilization of the stack. This cost is not part of the cost estimate as presented in the DEIS because it is assumed that the stack would be demolished. Concurrence on the decision to demolish the stack has been requested from the Colorado Historic Preservation Officer.

3. Comment

The EIS should be revised to indicate that the Colorado State Historic Preservation Officer (SHPO) has determined that the smelter stack is eligible for nomination to the National Register of Historic Places. (493)

Response

Agreed. See revised Sections 4.11.3 and 5.10 of this FEIS.

4. Comment

Several commenters suggested that the tailings pile be made into a historical monument because of its role in the production of early nuclear weapons. (159, 414, 421, 443)

Response

Although the tailings pile may have historical value, DOE's directive from Congress is to conduct remedial actions that will promote public health and safety in compliance with the EPA standards rather than to memorialize the past. However, DOE is not opposed to the establishment of a historical marker.

5. Comment

One commenter requested that DOE address the potential impacts of remedial action on the Animas River Valley, a potential National Natural Landmark which includes a section of the northwestern portion of the Durango site. (439)

Response

The Durango processing site is located on the south end of the 32,000 acre portion of the Animas River Valley which has been proposed for listing on the National Registry of National Landmarks. The Registry is a listing of nationally significant ecological and geological features in the United States. Section 4.11.2 has been revised to recognize the geologic and ecological values present in the Animas River Valley. As noted in Section 5.10 of the FEIS, remedial action at the processing site is not expected to diminish the scenic value of the proposed landmark which extends from Durango north to Silverton.

6.17 SOCIOECONOMICS

Loss of tourism, changes in income, tax revenue and employment, and economic hardship of adjacent landowners were among the socioeconomic topics mentioned in the comments. Tourism impacts were the concern of 372 commenters, making it one of the issues of greatest public interest. The DOE's response to each socioeconomic issue is given below following each comment summary.

1. Comment

Many commenters requested that the FEIS include a discussion of the impacts of the remedial action on the tourist industry in Durango. The majority of these comments were submitted by means of form letters. (1 through 350, 392 through 406, 413, 448, 463, 482, 487, 515, 536, 550)

Response

Appendix N of this FEIS presents the results of a study which evaluated the effects of the alternatives on the Durango tourism industry. Various sections of this FEIS have been modified to account for the new data. Tourist response to construction of any type is highly variable. Tourism impacts at Durango would hinge upon the level of attention that is given to the remedial action by the media and tourist perceptions of personal risk associated with the project.

2. Comment

The FEIS should include a statement on the psychological impacts to residents and visitors. (482, 545)

Response

Psychological impacts from remedial action are extremely difficult to assess. As determined by the U.S. Supreme Court (U.S. Nuclear Regulatory Commission vs. People Against Nuclear Energy), evaluation of psychological impacts are beyond the scope of NEPA, and thus, are not considered in this EIS.

3. Comment

Several inquiries were made as to the impacts to owners of disposal sites and adjacent lands.

o Comment a

The FEIS should evaluate and consider the impact on the livelihood, lifestyle, and quality of life on the nearby property owners. (453, 488, 521, 535, 537, 543)

o Response a

The grazing of livestock is the primary use of land by property owners in the vicinity of the proposed Bodo Canyon and Long Hollow sites. This land use and, thus, the livelihood and lifestyle of property owners in the vicinity of either proposed site would be affected to some extent during the remedial action. However, the remedial action is a relatively short-term activity and post-remedial action impacts would be minimal. Property owners whose land is directly affected by remedial action operations could have their livelihoods and lifestyles impacted, for example, by being forced to change their grazing operations. The severity of such impacts would depend on the adaptability of these operations to changes brought by remedial action activity, as well as on the effectiveness of mitigation measures undertaken.

The quality of life of property owners near remedial action sites would be affected by dust, noise, and any changes in livelihood or lifestyle necessitated by the remedial action. Mitigation measures designed to minimize dust, noise, and changes in livelihoods and lifestyles of property owners near remedial action activity would reduce impacts on the quality of life of property owners.

o Comment b

Impacts to sheep ranching operations at Long Hollow have not been adequately addressed. Sheep ranching at Long Hollow would not be viable if Alternative 4 or 5 were selected. (488, 455)

o Response b

A stabilized tailings pile at the proposed Long Hollow site would not be expected to affect land use adjacent to the site. Thus, the grazing of sheep could continue on land currently used for that purpose, except for the estimated restricted land occupied by the tailings (80 acres under Alternative 4 and 195 acres under Alternative 5).

There would be some effects on operations adjacent to the tailings piles or along travel routes during the remedial action period. Sheep are timid animals, sensitive to noise and unfamiliar movements. Trucks on roads and construction activity at the proposed site would tend to drive sheep to the edges of grazing areas, away from activity and noise. The lack of proper grazing and anxiety caused by unfamiliar activity could lower weight gains and reproduction rates, according to information from California State Polytechnic University, Pomona (1985). A suggested mitigation measure designed to reduce noise and block activity from view, thereby reducing the negative impact to sheep operations, would be the construction of a fence that is high enough to block the sheep's view of the activity and made of material that would reduce noise levels reaching grazing areas. The selection of such mitigation measures would be made during preparation of the final design and in concert with the affected landowner.

o Comment c

Owners of property that will be acquired by the state or Federal government as part of the remedial action should receive compensation at fair market value. (549)

o Response c

The State of Colorado obtains fair market value estimates from the U.S. Army Corps of Engineers. An offer is made to the property owner based on the valuation by the U.S. Army Corps of Engineers.

o Comment d

The existing day care center at the Long Hollow site would be disrupted if Alternative 4 or 5 were selected. (453)

o Response d

The DOE does not agree that the operations of the day care center located west of the proposed Long Hollow site would be disrupted. Construction noise, dust, and traffic, as well as fears of low level radiation exposure are recognized as concerns. However, traffic impacts would be minimal as a new road would be built parallel to County Road 141 which would carry remedial action truck traffic. Maximum annual concentrations of particulate matter are expected to settle at points south of the site, while most of the particulate matter settling in the direction of the day care center is expected to settle before reaching the center. Additional applications of a dust palliative could reduce dust settling in the direction of the day care center to a degree. Noise from the remedial action would have its greatest impact on the center during the first 10 months of construction under Alternative 4; noise levels under Alternative 5 would be lower than under Alternative 4, but would occur for a longer period.

o Comment e

The economic impact to land owners adjacent to the remedial action locations should be addressed and potential mitigation measures should be identified. (424, 425, 427, 447, 453, 454, 493, 521, 537)

o Response e

The land adjacent to both the Long Hollow and Bodo Canyon sites is used by private owners primarily for the grazing of livestock. This use would be unaffected by the presence of a stabilized tailings pile. Thus, little permanent impact would be expected on grazing activity. Temporary impacts to sheep operations adjacent to

remedial action activity may occur due to the reaction of sheep to unfamiliar noise and activity. Mitigation measures which may serve to reduce temporary adverse impacts on sheep ranchers include the coordination of sheep movements to and from pastures with remedial action activities so as to lessen the stress on the animals and the construction of a fence which would both block the view of remedial action activity from the animals and lessen noise impacts.

Impacts on property values were addressed in the EIS (Section 5.13). Studies and other research suggest that development and land values are not affected by unstabilized tailings piles. In Grand Junction, Colorado, residential and commercial developments have increased over the last 10 years on land adjacent to the tailings site; 50 to 60 housing units, several warehouses and commercial businesses, a sawmill, and a lumber yard were built according to Mr. Karl Metzner, Director of City Planning in Grand Junction (May 17, 1984). Thus, a stabilized tailings pile at either Bodo Canyon or Long Hollow would be expected to have little impact on land values of property near the pile or on residential or commercial development near the pile.

4. Comment

Do the employment figures include personnel involvement in remedial action at vicinity properties and in road construction and maintenance? (493)

Response

The impact of each remedial action alternative on the level of employment was estimated by using employment and income directly associated with the particular alternative (including road construction and maintenance work). The vicinity properties cleanup is a separate activity. The impacts of vicinity properties cleanup, considering a separate workforce, are described in Appendix B of the DEIS.

5. Comment

One commenter requested that the economic impacts be revised to reflect a commitment to maximize local expenditures, including requirements to pay state and local taxes. (493)

Response

In estimating economic impacts, it was assumed that all labor, materials, and equipment which could be obtained locally would be obtained locally. Impacts on property and income tax receipts were addressed for each alternative. Materials purchased for Federal projects are not subject to sales tax upon application for exemption by con-

tractors. Thus, local and state sales taxes would be affected only indirectly through spending on taxable items by those employed as a result of the project. This indirect effect was regarded as minimal since impacts on income for each of the alternatives were small.

6.18 VICINITY PROPERTIES

Comments from the Durango Task Force, a local citizens group (CCAMP), and three Durango area residents referred to a number of aspects of vicinity property cleanup. Summaries of the comments and responses are stated below.

1. Comment

A general description of the problem of radon gas in society and at Durango vicinity properties should be provided. (519)

Response

The only member of the uranium-238 decay series that is not a solid is radon. Radon is an inert gas and does not react chemically with other elements; it therefore can diffuse out of matter and into the atmosphere. Atmospheric radon concentration is measured in units of picocuries per liter (pCi/l). In the uranium milling process, radium-226, the parent of radon, is left in the tailings, which then become a source from which radon diffuses into the atmosphere. Once in the atmosphere, radon is transported downwind and, according to its 3.8-day life-life, decays into the short-lived radon daughters which can attach to particulates in the air. Since radon is an inert gas, it is inhaled and exhaled, contributing very little radiation exposure to the lungs. The radon daughters are solids, however, and once inhaled can deposit in, or attach to, the lung and then decay, transmitting alpha energy in the lung. Because of the short half-life, these daughters will decay before being removed from the lung. Trace amounts of uranium-238 and its daughters are found everywhere on the earth; therefore, radon and its short-lived daughters contribute to the natural background radiation exposure of the general population.

Ever since the uranium mill tailings piles near Durango, Colorado, were formed, wind and water have transported small amounts of the tailings to lands adjacent to the Durango site. In addition, some of the tailings may have been used as fill and construction material at locations in and around Durango at a time when the potential health hazard of uranium mill tailings was unrecognized. Thus, elevated gamma-radiation levels and radon-daughter concentrations may occur at various locations off the Durango site. Those properties at which elevated radiation levels exceed EPA standards (40 CFR Part 192) because of the presence of uranium mill tailings are called "vicinity properties."

There have been several investigations at Durango to locate vicinity properties. In December, 1983, the DOE formally designated candidate properties for further research and possible cleanup. This designation list included 137 properties in Durango. Additional research on these properties (on-site surveys) will provide more detailed estimates of radiation levels and volumes of contaminated materials. It

should be noted that additional properties may well be identified in the future as potential cleanup candidates in Durango. The tailings at the vicinity properties emit small amounts of radon gas and low-level alpha and gamma radiation. Radon gas is of particular concern because it can build up in enclosed structures until potentially hazardous levels are reached (40 CFR Part 192.12). The EPA's standards for cleanup of tailings (EPA, 1983) require cleanup of contamination only when the amount and location of the tailings causes an indoor radon daughter concentration of 0.02 to 0.04 WL. The standards provide criteria to assist in this determination. The EPA estimates that perhaps more than half of the identified locations of such contamination do not present a hazard sufficient to warrant cleanup. To eliminate radiation hazards at those properties where EPA standards are exceeded, the DOE is proposing to remove the residues through the cleanup activities.

The proposed actions for the vicinity properties are explained in Section B.1.3 of Appendix B (DEIS).

2. Comment

One commenter said that the vicinity properties must be treated in as much detail as the pile itself including how many properties might be involved, the extent and location of contamination, the current radon and gamma levels, the time required for individual vicinity property clean up, and the like. (454) Another comment from a group of local citizens stated that the lack of detailed vicinity property information makes Appendix B unacceptable and that the DOE should issue a new Appendix B. (515)

Response

The DOE disagrees with the need to readdress all issues associated with vicinity properties and has elected not to revise and reissue Appendix B. For purposes of complying with NEPA, it is sufficient to estimate, conservatively the volumes of material involved and major impacts associated with cleanup (e.g., health, transportation) for inclusion in the body of the EIS. This has been done with the DEIS.

Regarding the other comments, property-specific information concerning radon and gamma levels is available on some properties but not all at this time. This is because some properties have been identified by a mobile van scan which indicates only that a property has gamma values above a given background threshold. The mobile survey does not provide for refinement of these types of data.

Those properties that do have this information are listed along with the information in the UMTRA Project's Vicinity Properties Data Management System (VPDMS). A copy of the specific report which shows this radiological information is available at the Durango Planning Department for reference. This report along with others, is issued monthly by the DOE to participatory agencies and contractors. The properties are noted by number to protect the privacy of the property owners and tenants.

The time required for individual vicinity property cleanup is determined each year based upon the size and complexity of each property. The specific time required for individual vicinity property cleanups is between two and 60 weeks. The DOE will continue to provide updated information to the local Task Force.

o Comment a

A group of Durango residents expressed concern that Appendix B is uncertain as to the number of vicinity properties in Durango. If the DOE can provide only vague, contradictory information, when may we expect a coherent, well thought out plan for remedial actions be expected? (515)

o Response a

At this point in time, the DOE has data on Durango vicinity properties based upon aerial surveys, mobile surveys and on-site surveys. New information is being developed every day. As this information is developed, the accuracy of the property estimates will be improved. The commenter is correct in assuming that at this point in time the total number of properties to be cleaned up in Durango is not known. The commenter is incorrect in assuming that a coherent, well thought out plan is not available. The surveys are being used to continuously refine the estimate of the numbers of properties. Based on current information, and new information hopefully input by local citizens, the DOE will confirm total property estimates in Durango by spring of 1986. Additional details are available in the Vicinity Properties Management and Implementation Manual (VPMIM) (DOE, 1984b) and Vicinity Properties Data Management System (VPDMS) computation printouts at the Durango Public Library.

o Comment b

Three written comments stated that the discussion of vicinity property remedial actions should have been discussed in Volume I of the DEIS rather than being confined to Appendix B of Volume II. (454, 515) The major expenditure (\$7.8 million) estimated for vicinity property cleanup makes it "completely inappropriate that the vicinity properties be relegated to a mere 16 pages buried in the appendices." (454) The Durango Task Force also stated that Appendix B is insufficient. (515)

o Response b

The comments imply that treatment of vicinity properties in Appendix B in some way minimizes the importance of remedial action and resulting impacts analysis; this is not true. The description of the range of cleanup activities was presented in full in the appendix and the resulting incremental impacts (i.e., in addition

to those from remedial action at the site) were factored into the text where their inclusion was relatively substantial (e.g. transportation). However, it was recognized that the majority of the impacts are anticipated from remedial action at the mill site and that regardless of the action alternative selected, remedial action at vicinity properties and its associated impacts would remain unchanged. Thus, the justification of the approach described in Appendix B.

3. Comment

Four comments were received specifically relating to the vicinity property remedial action process.

o Comment a

The Durango Task Force and a local citizens group requested that the EIS include a detailed description of the steps involved with a vicinity property from the initial survey to the completed remedial action. (519, 515)

o Response a

The details of the vicinity property process are provided in the Vicinity Properties Management and Implementation Manual (VPMIM) and are not germane, per se, to the estimation of impacts from the various alternatives. This document has been provided to the Task Force for use by the community. In addition, public meetings to be held over the next two years will emphasize descriptions of this process.

o Comment b

The Durango Task Force also recommended that a Critical Path Method (CPM) schedule would be useful in planning vicinity property clean-up. (519)

o Response b

This is a good recommendation. Critical Path Method (CPM) schedules are currently being checked by the project participants to track progress on vicinity properties and to identify problems. The schedules are designed for groups of properties in bid packages and are traced through completion of the vicinity property cleanup process. The critical path activities in Durango currently are: 1) engineering reviews by the State of Colorado, and 2) Remedial Action Agreement approvals by individual property owners.

The Durango vicinity property effort is currently on schedule.

o Comment c

Another request of the Durango Task Force and a local citizens group was to identify all of the participants in the vicinity property program along with their specific responsibilities. (519, 515)

o Response c

The vicinity property process is implemented by six parties, each responsible for various activities. The implementing agencies are the DOE, NRC, and the State of Colorado. The Project's prime contractors are Oak Ridge National Laboratory, Morrison-Knudsen Company, and Jacobs Engineering Group Inc. A detailed description of the vicinity property process and of each one of these party's responsibilities was presented to the Durango Citizens' Task Force in August of 1984, and again in April, 1985. In addition, a special public information Fact Sheet will be presented to the Task Force for its distribution by August, 1985.

To supplement this information, a brief summary of each agency's and contractor's responsibility on the project is presented below along with the identification of contacts within those organizations.

o Comment d

How does the DOE plan to implement consultation and coordination with local authorities and concerned citizens throughout the vicinity property cleanup? A group of Durango residents recommended that a Citizens Advisory Committee could facilitate the coordination. (515)

o Response d

A citizen's Task Force has been developed in Durango to help disseminate information regarding the project's plans and progress to the local Durango public and to act as a mechanism for local input. This Task Force has been in place since 1979. Last year (August, 1984) Project Office representatives met in a public meeting with the Task Force to discuss the vicinity properties process and to describe plans and schedules. This meeting was publicized and well attended. Since that time occasional meetings have been conducted with the Task Force to discuss progress and issues. Now that activity has stepped up on Durango vicinity properties, these meetings will be held more often. In addition, a number of other techniques for dissemination of information and for feedback are being considered for application in Durango. Recommendations in this regard are welcome.

Organization	Function	Contact
U.S. DOE	Responsible for management of all efforts to identify and clean up vicinity properties. Responsible for budget of 90 percent total cleanup cost.	Mr. Richard Sena, Uranium Mill Tailings Project Office 5301 Central Ave, NE Suite 1700 Albuquerque, NM 87108 (505) 844-3941
State of Colorado	Responsible for approving all remedial action plans and monitoring project activities. Also responsible for budget of 10 percent total cleanup cost.	Mr. Paul Ferraro Colorado Department of Health 4210 East 11th Ave. Denver, CO 80220 (303) 320-8333
U.S. NRC	Responsible for approving all remedial action plans.	Mr. Dan Martin, U.S. Nuclear Regulatory Commission Mail Station 623-55 Washington, D.C. 20555
Oak Ridge National Laboratory	Responsible for identification of all vicinity properties and "screening" radiological surveys.	Mr. Craig Little, Oak Ridge National Laboratory P.O. Box 2567 Grand Junction, CO 81501 (303) 242-8621
Morrison-Knudsen Co.	Responsible for remedial action design and property cleanup.	Mr. John Pepin Morrison-Knudsen Co. P.O. Box 9136 Albuquerque, NM 87119 (505) 766-3076
Jacobs Engineering Group Inc.	Responsible for management, planning and monitoring of cleanup activities. Also responsible for public participation.	Mr. Philip Stassi Jacobs Engineering Group Inc. 5301 Central Ave., NE Albuquerque, NM 87108 (505) 846-4030

4. Comment

The Durango Task Force requested that the DOE publish a list of the historical radiation surveys that have been conducted in Durango, the level of efficiency that was achieved, and how their results were utilized. (519)

Response

In 1971, a mobile gamma scan of the Durango area was conducted for the EPA by Atomic Energy Commission personnel. This street-by-street scan of the city identified the location of 358 gamma radiation anomalies. All but 10 of these locations were subsequently investigated by the EPA during preliminary property surveys. These on-site surveys found evidence of, or the potential for, the presence of tailings at over 100 locations.

At the request of the DOE, in August, 1980, an aerial radiological survey of the Durango area was performed by EG&G, Inc. This survey highlighted numerous locations within the Durango area exhibiting above-background gamma-radiation levels. Ground-level investigation of these areas was recommended by EG&G to further define the locations of the anomalies and provide more detailed information on the source of the elevated activity.

As part of the second phase of DOE's activities in Durango, a mobile gamma scan of selected areas in and around the city was conducted by Oak Ridge National Laboratory (ORNL) during the period from November 2 to 6 and 18 to 20, 1981. The purpose of the scanning activity was to:

- (1) Provide the ground-level follow up surveying support for the aerial survey conducted by EG&G in 1980.
- (2) Provide cross correlation data between the scanning system and the results of the previous EPA scan to determine the validity of that historical data.
- (3) Conduct street-by-street scanning of those areas of town not previously scanned by EPA in 1971.

The product of this scanning survey was a listing of properties that required more detailed radiological characterization. This listing, provided in an internal report to DOE, classified the subject properties into three categories for future study. Within two of these categories, additional mobile scanning with a refined ORNL scanning system was recommended to obtain spectral information to help in determining the need for on-site investigations.

In response to that recommendation, ORNL was directed in March, 1982, to make measurements with the refined ORNL system of the gamma radiation fields associated with each of the properties identified from the earlier study, analyze the resulting spectral information, and provide a prioritized listing of the properties requiring future on-site

surveys. The 1981 scan survey using the EPA gross count scanning system was limited to the anomalous areas identified by the EG&G aerial survey and those areas not surveyed previously by the EPA. The 1982 ORNL survey concentrated on those properties identified by previous surveys.

In order to eliminate the possibility that contaminated properties may have remained unidentified, a comprehensive street-by-street mobile scan survey of the remaining sections of Durango was conducted by ORNL during the period of October 24 to November 4, 1983. These surveys concluded the aerial and mobile van scan screening activity.

As a follow-up to the mobile van scans, on-site radiological surveys are now being conducted by ORNL to determine whether or not contamination on each identified property exceeds the EPA Standards. These on-site surveys were started in June, 1982, and will be completed in 1986. Thus far over 100 on-site surveys have been completed. A summary of the past screening and inclusion surveys is provided below.

Survey type	Organization	Dates	Properties evaluated	Possible contaminated properties identified
Preliminary mobile van	EPA/AEC	1971	3,338	358
Follow-up mobile van	EPA	1972	362	118
Aerial	DOE/EG&G	1980	Regions	Regions
Follow-up mobile van	DOE/ORNL	1981	--	--
Follow-up mobile van	DOE/ORNL	1982	120	80
Final mobile van	DOE/ORNL	1983	--	--

The information from these surveys was summarized and presented in Appendix B of the DEIS.

5. Comment

The DOE's lists of included vicinity properties and designated vicinity properties were the subject of two comments.

o Comment a

The public should be told which vicinity properties were designated by the DOE for remedial action. (525, 538)

o Response a

The designated list is public information. However, the DOE has a responsibility to the designated property owners to protect them against harassment and to honor their rights to privacy. For these reasons the DOE does not feel it is prudent to publish the list of designated properties.

The DOE has alternatively elected to release the list of designated properties to the state health department. It is hopeful that the state will use this information to reduce the possibility of new construction taking place on designated properties before the DOE has an opportunity to perform cleanup activities. In addition, the Durango City Planning Department has received the designation list and receives updates of the list each month.

Requests for data on the status of specific properties should be addressed to Mr. G. Hoch, Durango City Planner (303) 247-5622 or Mr. Al Hazle, Colorado Department of Health, (303) 320-8333.

o Comment b

The DOE should re-evaluate its list of identified vicinity properties that will undergo remedial action. The commenter feels that since the Durango municipal swimming pool was not on the DOE list but should have been (as the result of an independent survey) that the DOE list may be incomplete. (538)

o Response b

The designation list is a summary of all properties for which data indicated possible contamination, at the time of the list's publication. Undoubtedly, additional properties will be discovered before remedial action work is completed in Durango. As referenced in the comment, the UMTRA Project Inclusion Survey Contractor has already identified an additional 43 properties in Durango with the modified van scan, which had not been identified at the time the designation list was published. DOE does not believe, however, that a significant number of additional undiscovered properties now exist in Durango. To verify this, the DOE intends to advertise in the local newspapers for information on any properties which may be contaminated. Based on the response to this advertisement, additional properties may be added to the current list.

6. Comment

Several questions inquired about the vicinity property remedial action implementation.

o Comment a

What procedures would be implemented to temporarily relocate individuals during vicinity property cleanup? (515)

o Response a

Temporary dislocation of property owners during vicinity property remedial action is required in certain situations. Those situations are evaluated on a case-by-case basis.

If dislocation is required, owners or tenants are moved to temporary accommodations and a specified per diem financial allowance is paid to them by the DOE. All reasonable dislocation costs are borne by the DOE. However, dislocation of owners or tenants is not encouraged due to the inconvenience it poses to the property occupants.

o Comment b

Appendix B does not provide enough detail about how DOE would handle an accidental spill of contaminated materials on city streets during vicinity property clean up. (515)

o Response b

The DOE's Remedial Action Contractor (RAC) maintains a specific health and safety plan consistent with the UMTRA Project's health and safety requirements. The RAC's plan provides for emergency response to accidental spills of tailings during vicinity property remedial action.

Basically, all contaminated material spilled from the truck would be returned to a transport vehicle using physical means (e.g., shovels, brooms). The material would be removed from the street and placed back in the truck. If the truck driver is injured, an emergency phone number would be provided for use by civilians or local police. Spilled material would be removed from the streets and placed in the tailings repository as quickly as possible.

o Comment c

The time required to clean up vicinity properties is another concern of the Durango citizens group (CCAMP). Why does Section B.1.3 present two different time estimates (one year versus two years) for the transport of vicinity property contaminated material to the Durango site? Is DOE planning to transport the contaminated materials directly to one of the alternate disposal sites? Such inconsistencies suggest that the DOE has very little idea as to how it will implement the vicinity property remedial action. (515)

o Response c

The DOE plans to start cleaning up vicinity properties this summer. Until such time as a disposal site is selected, and the appropriate receiving facilities can be developed, the DOE will move vicinity property material to a temporary repository. All attempts have been made to secure the final disposal area prior to the beginning of vicinity property clean up. However, since this has not been done to date, current plans are to move vicinity property material to a temporary repository (currently the existing tailings pile). This material will eventually be moved to an alternate disposal site or stabilized on the site, depending upon the alternative selected in the Record of Decision (ROD).

o Comment d

Another concern of the Durango citizens group is interruption of services during vicinity property clean up. (515)

Section B.4.2. "Impacts on Transportation Networks and of Accidents" states that "No interruption of public services is expected during the cleanup activities." However, in Section B.4.3. "Impacts on Population, Land Use and Economics," states that "some commercial establishments may have to be closed temporarily during remedial actions." Since Table B-1 includes La Plata County's "hospitals, schools, churches, hotels and commercial properties," can one assume that there will be no significant disruption to public services? No information is presented as to how hospitals and schools will function during remedial action. (515)

o Response d

The commenter is correct in assuming that disruption of public services will be minimal. Arrangements would be made on individual vicinity properties to temporarily dislocate property owners/tenants or to temporarily relocate businesses or services, if required. This arrangement will be evaluated on a case-by-case basis. There is always the possibility that certain properties will not be usable for the time required to clean up these properties. Of course, measures will be taken on a case-by-case basis to maintain critical public services during cleanup.

This statement referenced by the commenter in Section B.4.2, references only the transportation networks and not public services. There are no inconsistencies in the statements referenced.

o Comment e

According to Section B.1.3, DOE plans to bring contaminated vicinity properties into compliance with EPA standards. This implies that some level of contamination may be left in place which is allowed by the standards. The commenter believes that there is no

safe level of radiation and that all traces of tailings should be removed from vicinity properties. (515)

o Response e

The EPA standards are based primarily on potential exposure and risk to individuals working and/or living in a structure built over material meeting the standards and are not debatable within the framework of the EIS. The EIS serves to compare the various alternatives upon a common basis. It is not intended to justify the EPA standards. That is done in the Final EIS for Remedial Action Standards for Inactive Uranium Processing Sites (EPA 520/4-82-013-1, October, 1982).

In addition, field guidance currently being implemented during vicinity property remedial actions in Colorado requires:

- (1) When excavating away from structures, all tailings in excess of the 5 pCi/gm above background for the top 15 cm. of material, and in excess of 15 pCi/gm above background below the top 15 cm. shall be removed since their removal may uncover larger hidden deposits. Averaging techniques over 100 square meters (15 cubic meters volume) should only be utilized when tailings removal would result in excessive costs.
- (2) When working around or underneath structures and around underground utilities routed to structures, the aforementioned logic should also be applied. However, if there are contaminated materials which are measured not to exceed the EPA soil standards of 5 pCi/gm and 15 pCi/gm above background but exceed normal background, consideration should be given to removing these materials. This is recommended in certain situations in order to be assured that completed remedial actions performed underneath or around structures will meet the EPA indoor radon daughter concentration (RDC) standard.

7. Comment

If cleanup of 137 vicinity properties is estimated to cost \$11,896,000 (Section B.4.3) what will clean up of the 31 designated sites cost? (515)

Response

There are two levels of cost estimates for vicinity property remedial action. Until this year, the estimate used in the DEIS was all that was available. At this time, property-specific estimates are being developed on Durango vicinity properties. As these estimates are developed, they will be incorporated into the overall cost estimate. It is premature at this point to generate any cost estimates which are different than those published in the DEIS.

8. Comment

At a public meeting in Durango, a DOE contractor indicated that elevated radiation readings at Greenmont Cemetery are a natural anomaly. A commenter stated that evidence is available demonstrating that tailings are present in the cemetery contrary to what the DOE contractor stated. (515) What criteria will DOE use to identify contaminated vicinity properties? What proof does a resident have to provide to the DOE to qualify as a vicinity property? How does the DOE intend to guarantee that all contaminated properties in the community will be identified and addressed? (519)

Response

The DOE had information in January, 1985, to prove that contamination at the Greenmont Cemetery was due to residual radioactive materials (tailings). If any project participant implied anything contrary, it was in error. This information was derived from soil sample analyses which are conducted by the Inclusion Survey Contractor, ORNL, in July, of 1983. This contractor is responsible for determining whether or not each property being considered for remedial action exceeds the EPA standards.

The EPA standards were published in 40 CFR Part 192 and dictate acceptable levels for contamination due to residual radioactive material from the processing sites (tailings). Since the inclusion survey on this property was completed in July, 1983, this information has been officially developed by this project and the property has been included in the UMTRA Project. The DOE apologizes for any confusion regarding this property.

The methods by which contamination is detected, and the verification of contamination and cleanup have been fully described in response to comments 3a, 3c, and 4 of Section 6.18.

6.19 EDITORIAL COMMENTS

A number of comments pointed out typographical or editorial errors in the DEIS. Each of these comments has not been summarized with a separate response. However, the text of this FEIS has been revised as appropriate.

6.20 OUT-OF-SCOPE COMMENTS

The CEQ regulations governing the preparation of environmental documents such as this FEIS state that "the NEPA process is intended to help public officials make decisions that are based on understanding of environmental consequences, and take actions that protect, restore, and enhance the environment." In the present instance there is the problem of what should be done about the Durango tailings. The decision to be made is to choose among the reasonable alternatives for remedial action. This FEIS is intended to provide the environmental input to that decision; however, it will not be the only input there will also be policy and financial inputs.

A number of the comments made orally and in writing on the DEIS are not really relevant to the environmental inputs to that decision. In spite of their not really being relevant to the purpose of this FEIS, the DOE does recognize their existence in the subsections that follow, even though a number have been mentioned earlier. The DOE has responded to some of these out-of-scope comments.

6.20.1 Public participation and personal preferences

Public Participation

The issue of public participation was raised in many written statements and oral comments. Most of these comments were requests to extend the public comment period on the DEIS. The issues that were expressed are stated below along with the DOE's response.

1. Comment

Written and oral statements from 372 individuals requested that DOE extend the comment period on the DEIS to enable the public more time to evaluate the various alternatives and provide comments to the DOE. Most of these comments were submitted by means of a form letter which stated, in part, "I urge that the DOE extend the comment period for an additional 120 days since both the public meeting and public hearing were held during the Christmas holiday season. In addition, the DOE must provide additional essential information within 30 days so that we can complete our evaluation of the alternatives you presented." (1-325, 327-350, 392-406, 420, 428, 446, 454, 460, 463, 481, 494-503, 562)

Response

The original comment period for the DEIS began on November 16, 1984, and closed January 11, 1985. In response to the requests, the official comment period was extended an additional 45 days through February 25, 1985. The DOE believes that the 45 day extension provided ample time for the public to evaluate the DEIS. Regulations require a public comment period of a minimum of 45 days, whereas the total comment period for this DEIS was 101 days.

Additional information has been provided by DOE in a public meeting held on December 18, 1985, and at open meetings of the Durango Uranium Mill Tailings Task Force on January 30, 1985, March 13, 1985, April 17, 1985, and June 5, 1985.

3. Comment

The DOE did not solicit separate input from the owner of the Long Hollow site during the preparation of the DEIS. (488)

Response

The DOE disagrees with the commenter's observation. The Long Hollow site has been visited many times by DOE and contractor personnel, the DOE and the owner of the Long Hollow site have an existing access agreement, the owner and DOE contractor personnel have had many telephone and face-to-face discussions and the owner, like any citizen, has had more than ample opportunity to comment throughout the EIS process.

3. Comment

Several commenters expressed the idea that local decision making input should be considered past the DEIS stage in the form of a joint review process with the state. Before a preferred alternative is selected, the recommendations by DOE would be reviewed by the public in Durango and that public's recommendation would be included with the state process before the selection of a preferred alternative would occur. (538, 545, 487, 493, 555)

Response

Commenters are reminded that the public is allowed further input into the decisionmaking process following publication of this FEIS. After this document is released, a minimum 30-day comment period is required, after which the comments received are considered and an official Record of Decision issued.

The DOE does recognize the citizens of Durango's desire to be appraised during development of the FEIS and intends to continue to meet with the Durango Task Force to address any concerns the community might have. The State of Colorado will review the FEIS at agreed upon stages in the document's development. Any recommendations the citizens of Durango may make to the state agencies involved are likely to weigh heavily in the state's review of the FEIS.

The Colorado Joint Review Process is designed for mining projects, energy projects, and ski resort development. The DOE and the state chose not to use the Joint Review Process, although a comparable review and decisionmaking process is in place with the UMTRA Project.

5. Comment

Public information and education should be continuously available to the residents and visitors of Durango during all phases of the remedial action program to ensure public understanding of the radiation hazard and to alleviate concern over the nature of the activities taking place. (536, 515, 582)

Response

Public information is an important element of the UMTRA Project. A Durango Task Force consisting of local officials and citizens was established early in the program, to act as a liaison between the community and the DOE. Regular meetings were held with the Task Force to provide updates on the project's progress, and learn of any community concerns there might be. These meetings have always been open to the media and the public.

The DOE anticipates continuing to meet with the Task Force throughout the remedial action construction, and will also hold public meetings at the beginning and end of the construction season to keep the citizens of Durango apprised of cleanup activities. Radiation monitoring results will be available to the Task Force, and will also be available at the remedial action contractor's field office during remedial action construction.

6. Comment

The Durango Uranium Mill Tailings Task Force requested a meeting with DOE in Durango once the information which was not ready at the time of the draft publication is available. In addition, they requested permission to present a written statement representing the city of Durango's position to DOE and that such statement be considered when DOE makes a decision on a preferred alternative.

Response

The DOE has already attended several meetings in 1985 and will schedule one or more additional meetings with the Durango Task Force to address as fully as possible any identified information needs. When the DOE receives the Task Force's written statement, those comments will be given consideration in the final decision.

Personal Preferences

Some letters and statements did not discuss any specific issues in the DEIS but expressed the authors' preference for one or another of the alternatives examined in that document. Even those letters and statements that did comment on specific issues usually also stated preferences. These preferences distribute themselves as shown in Table 6.1.

1. Comment

Twelve commenters stated that one area is presently contaminated, there is no need to disrupt another area or impact more people. (451, 452, 504, 530, 543, 366, 367, 374, 375, 382, 383, 561)

2. Comment

A local citizens organization, CCAMP, presented the results of an opinion poll concerning the DOE plans for remedial action. The survey of 506 local residents indicated that 69 percent of those interviewed preferred the stabilization in place alternative. Issues that were considered to be most important to those surveyed were: 1) minimize the release of radioactive dust and gas, 2) avoid contaminating another site or watershed, and 3) minimize contamination of ground water. (515)

3. Comment

A statement expressing the owner preferences of the Bodo Canyon, Long Hollow and present tailing sites should be included in the FEIS and considered by the DOE before making their decision on the preferred alternative. (534)

Response

Owners of the sites under consideration (designated site, Bodo Canyon, Long Hollow) have had the opportunity to express their preferences as part of the EIS process. Their preferences have been noted, recorded, and considered in Section 6.0 of this FEIS.

6.20.2 Bias

Several comments claimed that the DEIS was biased against one alternative or was merely an attempt to justify the preferred alternative.

1. Comment

The alternatives presented in the EIS are biased against stabilization in place, primarily due to down playing the significance of dust from tailings haulage. (445)

2. Comment

The DOE was unduly biased against the Bodo Canyon site because of the wildlife present in the area. (488)

Table 6.1 Personal preferences expressed by commenters

Alternative	In favor	Total	Opposed	Total
<u>Alternative 1</u>	327, 366, 367, 380, 381, 412,	17	485, 486, 481	3
No action	432, 433, 439, 440, 451, 452, 510, 511, 479, 528, 529			
<u>Alternative 2</u>	325, 368, 369, 370, 371, 374,	71	407, 419, 426, 485, 481	5
Stabilization in place at the Durango site	375, 378, 379, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 518, 455, 409, 410, 411, 413, 421, 422, 423, 428, 429, 430, 431, 434, 435, 436, 437, 518, 438, 439, 440, 443, 441, 442, 444, 447, 448, 456, 458, 459, 460, 462, 464, 465, 466, 467, 468, 469, 470, 471, 472, 504, 505, 513, 473, 475, 561, 521, 526, 533, 524, 548			
<u>Alternative 3</u>	376, 377, 493, 416, 417, 418,	9	400, 456, 473, 475, 479, 560	6
Relocation and stabilization at Bodo Canyon	439, 440, 447,			
<u>Alternative 4</u>	492	1	372, 373, 378, 379, 413, 424, 425, 447, 453, 453, 460, 488, 486, 473, 475, 479, 481, 537, 521, 524, 527, 528, 535, 542, 543	24
Relocation and stabilization at Long Hollow				

Table 6.1 Personal preferences expressed by commenters (Concluded)

Alternative	In favor	Total	Opposed	Total
<u>Alternative 5</u>	419, 426, 482	3	372, 373, 376 377, 378, 379, 413, 422, 423, 424, 425, 431, 437, 433, 438, 434, 440, 446, 447, 453, 460, 508, 509, 488, 486, 473, 475, 479, 481, 524, 527, 528, 532, 535, 536, 537, 542, 543	38
Relocation, re- processing, and stabilization at Long Hollow				
Other options (not identified)			445, 461, 487	3

3. Comment

The DEIS lacks any real analysis and evaluation of all the facts presented and how they relate to and could affect existing area residents for each alternative. (455)

4. The DEIS seems to justify the preferred alternative rather than evaluate all impacts of all actions. (461)

5. Comment

"The DOE did not choose stabilization in place because, simply the DOE favors the company that owns the pile. Hecla Mining should have the opportunity to reprocess it. So said the DOE, I say, their profit at our expense." (325)

6.20.3 Other comments

Miscellaneous comments not otherwise categorized are summarized below.

1. Comment

DOE has stated that land for the Long Hollow alternative will be taken under eminent domain. Why cannot the current Durango site be taken under this same authority, immediately, so that DOE can begin to perform borings and identify exactly what is in the pile and where? (515)

Response

The comment apparently refers to a statement made by DOE officials regarding the acquisition of a disposal site for the Durango tailings. The comment does not recognize that there are two phases of acquisition, with the state responsible for the actual purchase or condemnation of the Durango mill site or disposal site and DOE responsible for access to the site prior to a remedial action decision. Under the Uranium Mill Tailings Radiation Control Act, the State of Colorado is primarily responsible for acquisition of a disposal site. If condemnation is required, the state will pursue legislative authority for such eminent domain authority. With respect to acquisition of the Durango mill site, there is no authority to the state and concurrence of NRC. Prior to a remedial action decision, DOE is responsible for negotiating access to the tailings pile and candidate disposal sites for the purpose of data gathering in connection with the preparation of an environmental document and the conceptual design for remedial action. Access was negotiated for the Long Hollow site, the Bodo Canyon site, and the Durango site. Access could not be obtained for drilling on the pile because of disagreement with the owner regarding the extent of the liabilities to be assumed by DOE in connection with the drilling program and the current license conditions imposed by the Colorado Department of Health.

2. Comment

Two written comments raised the issue of the type of permits that would be required for the remedial action and the schedule for obtaining the permits. (493 and 519)

Response

DOE has researched, with other government agencies, the laws and regulations which would probably apply to remedial actions at Durango. A list of the permits and agencies has been developed for the FEIS and is presented in Appendix O. The time required for preparation, processing, and approval of permit applications could take as long as eight months or possibly longer.

3. Comment

Future technology might allow for other more environmentally-safe means of moving the contaminated materials; and the economic benefits might be greater. What would be the real harm in saving expenditures of energy now and keeping entropy low until new and better techniques are developed? (482)

Response

The direction provided by Congress in the UMTCA requires remedial action with completion by 1990. Another concern is that the tailings pile could shift unexpectedly causing need for an urgent, unplanned cleanup before "new technology" is developed. Intentional misuse of tailings is also conceivable for tailings that have not been permanently stabilized.

4. Comment

Because the authorization for UMTCA officially ends in 1990, how will the extension of this law be guaranteed, allowing the project to be completed after 1990 if necessary? (515)

Response

The DOE will monitor the progress of remedial action and revise the estimated completion date periodically. If the projected completion date is after March 7, 1990, DOE will propose to Congress that the UMTCA be extended and that the required funds be provided. DOE would take timely action to avoid halting the remedial action prior to completion due to the expiration of UMTCA.

5. Comment

DOE does not have adequate experience in conducting remedial actions of uranium tailings for the public to show confidence in DOE's plans. (515)

Response

The DOE and its predecessor agencies (Energy Research and Development Administration and Atomic Energy Commission) have been the lead agencies in planning and conducting uranium mill tailings remedial actions since such work was first envisioned in 1972. DOE has facilitated remedial action for vicinity properties at Grand Junction, Colorado; Salt Lake City, Utah; and Canonsburg, Pennsylvania. Remedial actions at tailings piles are underway at Canonsburg, Salt Lake City, and Shiprock. Other contaminated sites have been cleaned up under the Formerly Utilized Sites Remedial Action Project (FUSRAP) and others. DOE is quite confident that remedial action will be achieved expediently, and in compliance with the standards.

6. Comment

One commenter stated that using the Long Hollow site for the disposal of the Durango tailings, could eventually lead to the expanded use of the site as a regional disposal site for other mill wastes which would become an annoyance to local residents. (477)

Response

The DOE does not anticipate that this would be a likely scenario due to the high cost of transporting tailings from the nearest active/inactive mill sites (all more than 60 miles distant).

7. Comment

One written comment stated the opinion that the main reason that DOE selected the Long Hollow site as the preferred alternative is because Ranchers Exploration had proposed to use Long Hollow for tailings reprocessing. However, DOE has not offered the Long Hollow landowner a land exchange proposal that is equivalent to the Ranchers offer. (488)

Response

The basis of selecting alternative disposal sites is discussed in Section 1.1 of the FEIS and Appendix C of the DEIS. Acquisition of tailings disposal sites and alternate tailings disposal sites is outlined in the Cooperative Agreement between DOE and the State of Colorado. Briefly, that process involves the State of Colorado

obtaining fair market appraisals of sites to be affected and the state acquiring the lands from the owners. The issue of matching previous offers related to former commercial projects is not relevant to the UMTRA Project remedial action proposed at Durango.

8. Comment

The piles have been stabilized and any type of action would disturb the established equilibrium and cause more health related problems and risks than are presently occurring. (451, 452, 455, 456)

Response

The tailings pile has been partially stabilized by establishing a thin, vegetative cover; however, this does not decrease the amount of radon emitted by the tailings. Remedial action must be performed as required by the Uranium Mill Tailings Radiation Control Act of 1978 (PL95-604) and radiation levels must be reduced to meet EPA standards for remedial action of these tailings piles. Health effects during and after remedial action are addressed in Section 5.1.

9. Comment

A few individuals said that money was being wasted on the project. Some presented the concern that tax dollars could be put to better use on other projects or that excessive costs warrant a decision for no action. (327, 412, 429, 432, 433, 479, 512)

Response

DOE must perform remedial action in compliance with the EPA standards.

10. Comment

Several commenters felt that one or another of the alternatives has greatest cancer risks, largest number of traffic deaths and accidents, least public support, and/or is the most expensive. (521)

11. Comment

The basis for selection of the remedial action should be a reduction in health effects rather than the least cost as was emphasized in the DEIS. (515)

12. Comment

The commenters feel that it is important to stress health effects of whichever alternative is chosen. (530, 543)

13. Comment

Cost effectiveness of proposed remedial actions need to be evaluated against the existing situation. The commenter questions effectiveness of spending between \$16 to \$58 million dollars to prevent 0.4 death in 100 years. (461)

14. Comment

The commenter believes it is possible to stabilize the tailings in place and would like to make a model of the site. (546)

15. Comment

There are increased hazards inherent in all the alternatives to move the tailings, including the possibilities of increasing the release of radon gases, radiological illnesses or deaths, occupational injuries, and transportation hazards. Considered cumulatively, are these hazards worth the disruption, public anxiety and adverse economic effects of moving the piles? (482)

6.21 LISTING OF HEARING COMMENTERS AND AUTHORS OF WRITTEN STATEMENTS

The names and affiliations of individuals who gave oral testimony at the public hearings or submitted written comments are listed in Tables 6.2 and 6.3. Table 6.2 lists commenters sequentially according to the index number that was assigned by the DOE. Table 6.3 is an alphabetical listing of commenters.

Table 6.2 Index of persons submitting written comments or who gave oral testimony at a public hearing

Index number	Name	Affiliation	Origin - letter (L) or hearing (H)
1	Laura Sholten	Citizen of La Plata County	L
2	Margaret Walsh	Citizen of La Plata County	L
3	Tierney Rupp	Citizen of La Plata County	L
4	Ralph E. Rupp, II	Citizen of La Plata County	L
5	Sarah Butler	Citizen of La Plata County	L
6	Pamela S. Goguen	Citizen of La Plata County	L
7	John M. Wells	Citizen of La Plata County	L
8	Miriam Barton	Citizen of La Plata County	L
9	Robert Gregorio	Citizen of La Plata County	L
10	Cassandra J. Austin	Citizen of La Plata County	L
11	Sondra Dierksen	Citizen of La Plata County	L
12	Jenny Chamberlin	Citizen of La Plata County	L
13	Lillian E. Peebles	Citizen of La Plata County	L
14	Berkelay C. Bryant	Citizen of La Plata County	L
15	Greg Metcalf	Citizen of La Plata County	L
16	Adele Presby	Citizen of La Plata County	L
17	Maggie Bowes	Citizen of La Plata County	L
18	Susan Dahl	Citizen of La Plata County	L
19	Stanley Cook	Citizen of La Plata County	L
20	Chris May	Citizen of La Plata County	L
21	Faye Lynn Harris	Citizen of La Plata County	L
22	Penny Biffar	Citizen of La Plata County	L
23	Joe Stockman	Citizen of La Plata County	L
24	Ted A. Tubbs	Citizen of La Plata County	L
25	Louise Y. Locke	Citizen of La Plata County	L
26	Gary P. Kavanagh	Citizen of La Plata County	L
27	Claudia J. Parker	Citizen of La Plata County	L
28	Carol A. Johnson	Citizen of La Plata County	L
29	Sandra M. Todeschi	Citizen of La Plata County	L
30	Gladys Todeschi	Citizen of La Plata County	L
31	Margaret Todeschi	Citizen of La Plata County	L
32	Anne E. Seaman	Citizen of La Plata County	L
33	Becky Padilla	Citizen of La Plata County	L
34	Martha Winters	Citizen of La Plata County	L
35	Arayce Gutierrez	Citizen of La Plata County	L
36	Patricia L. Russell	Citizen of La Plata County	L
37	C. J. Willis	Citizen of La Plata County	L
38	Marie Malarsie	Citizen of La Plata County	L
39	Patty Sinl	Citizen of La Plata County	L
40	Barb Edwards	Citizen of La Plata County	L
41	Joe Graves	Citizen of La Plata County	L
42	Judith Zelk	Citizen of La Plata County	L
43	Elisa B. Peterson	Citizen of La Plata County	L
44	Thomas V. Peterson	Citizen of La Plata County	L

Table 6.2 Index of persons submitting written comments or
who gave oral testimony at a public hearing (Continued)

Index number	Name	Affiliation	Origin - letter (L) or hearing (H)
45	Carlan Maynes	Citizen of La Plata County	L
46	Mildred Maurer	Citizen of La Plata County	L
47	Jay Weisnel	Citizen of La Plata County	L
48	Kathryn A. Souder	Citizen of La Plata County	L
49	Kathleen Lau	Citizen of La Plata County	L
50	Sunny Hallower	Citizen of La Plata County	L
51	W. Michael Elliott	Citizen of La Plata County	L
52	Robert McDaniel	Citizen of La Plata County	L
53	Stephen P. Sproul	Citizen of La Plata County	L
54	Toni E. Duval	Citizen of La Plata County	L
55	William E. Locke	Citizen of La Plata County	L
56	Pete L. Gomez	Citizen of La Plata County	L
57	Linda Snider	Citizen of La Plata County	L
58	Clarissa Yanez-Ternley	Citizen of La Plata County	L
59	Carla Feijoo	Citizen of La Plata County	L
60	Gary Ader	Citizen of La Plata County	L
61	J. E. Winegardner	Citizen of La Plata County	L
62	Nancy Vohs	Citizen of La Plata County	L
63	Nancy Vermevlen	Citizen of La Plata County	L
64	Kristy Henning	Citizen of La Plata County	L
65	Karen Davey	Citizen of La Plata County	L
66	John Ridenour	Citizen of La Plata County	L
67	Debra Hammond	Citizen of La Plata County	L
68	Virginia Royce	Citizen of La Plata County	L
69	Margaret Poteet	Citizen of La Plata County	L
70	Mary E. Emrich	Citizen of La Plata County	L
71	Louis P. Rea	Citizen of La Plata County	L
72	Marilyn Snair	Citizen of La Plata County	L
73	Gabriela Torres	Citizen of La Plata County	L
74	Joyce Roseberry	Citizen of La Plata County	L
75	Roger Hillmeyer	Citizen of La Plata County	L
76	Marsha Pavlek	Citizen of La Plata County	L
77	Jerry Dalla	Citizen of La Plata County	L
78	Mel Caskey	Citizen of La Plata County	L
79	Vicki Caskey	Citizen of La Plata County	L
80	Dale McClanahan	Citizen of La Plata County	L
81	Lauris Reynolds	Citizen of La Plata County	L
82	Karen S. Howard	Citizen of La Plata County	L
83	Cliff Cox	Citizen of La Plata County	L
84	Chris Duran	Citizen of La Plata County	L
85	Richard L. Peterson	Citizen of La Plata County	L
86	Arthur L. Peterson	Citizen of La Plata County	L
87	Becky L. Rockford	Citizen of La Plata County	L
88	David L. Rice	Citizen of La Plata County	L
89	Dan Hylant	Citizen of La Plata County	L

Table 6.2 Index of persons submitting written comments or
who gave oral testimony at a public hearing (Continued)

Index number	Name	Affiliation	Origin - letter (L) or hearing (H)
90	Teresa Rogers	Citizen of La Plata County	L
91	Dana C. Helvey	Citizen of La Plata County	L
92	Earl McMahon	Citizen of La Plata County	L
93	Miriam McMahon	Citizen of La Plata County	L
94	Lida P. Bowen	Citizen of La Plata County	L
95	Jill E. Engmark	Citizen of La Plata County	L
96	Jill C. Gaffney	Citizen of La Plata County	L
97	Sally M. Hall	Citizen of La Plata County	L
98	Marie Mestas	Citizen of La Plata County	L
99	Paula J. Brooks	Citizen of La Plata County	L
100	Kathy Larricq	Citizen of La Plata County	L
101	Sharee Erickson	Citizen of La Plata County	L
102	Genevieve T. Rankin	Citizen of La Plata County	L
103	Joy L. Martinez	Citizen of La Plata County	L
104	Sherry Sanford	Citizen of La Plata County	L
105	Pete C. Maisel	Citizen of La Plata County	L
106	Bob Luse	Citizen of La Plata County	L
107	Ryker Smith	Citizen of La Plata County	L
108	Ralph T. Correll	Citizen of La Plata County	L
109	Rose M. Havel	Citizen of La Plata County	L
110	David Loucks	Citizen of La Plata County	L
111	Nikki Anderson	Citizen of La Plata County	L
112	Kay M. Niggli	Citizen of La Plata County	L
113	David M. Turner	Citizen of La Plata County	L
114	Gloria Resnick	Citizen of La Plata County	L
115	Joan F. Cullen	Citizen of La Plata County	L
116	Steve Osborne	Citizen of La Plata County	L
117	Beth Silbergleit	Citizen of La Plata County	L
118	Beverly Conner	Citizen of La Plata County	L
119	Linda J. Hansen	Citizen of La Plata County	L
120	M.T. Smylie	Citizen of La Plata County	L
121	John E. Ogier	Citizen of La Plata County	L
122	Rick Dekdebrun	Citizen of La Plata County	L
123	Carol Martin-Hatch	Citizen of La Plata County	L
124	Ronald E. Gaddie	Citizen of La Plata County	L
125	John B. Houge	Citizen of La Plata County	L
126	Colette Bossow	Citizen of La Plata County	L
127	Jean Tipotsch	Citizen of La Plata County	L
128	H. Jackson Clark, II	Citizen of La Plata County	L
129	Betty Hibbard	Citizen of La Plata County	L
130	Rose M. Clark	Citizen of La Plata County	L
131	Rnonda Sumrall	Citizen of La Plata County	L
132	Eldon T. McCoy	Citizen of La Plata County	L
133	Anna McCoy	Citizen of La Plata County	L
134	Aimy Dickson	Citizen of La Plata County	L

Table 6.2 Index of persons submitting written comments or
who gave oral testimony at a public hearing (Continued)

Index number	Name	Affiliation	Origin - letter (L) or hearing (H)
135	Laura Rickard	Citizen of La Plata County	L
136	Skip Zeller	Citizen of La Plata County	L
137	Penne McDonald	Citizen of La Plata County	L
138	Kerry Drulis	Citizen of La Plata County	L
139	Herman L. Todeschi	Citizen of La Plata County	L
140	Louise M. Jaquez	Citizen of La Plata County	L
141	Shirley Osborne	Citizen of La Plata County	L
142	Christine Veba	Citizen of La Plata County	L
143	Henry King	Citizen of La Plata County	L
144	Charles F. Bishop	Citizen of La Plata County	L
145	Steve Carson	Citizen of La Plata County	L
146	Annette V. Carson	Citizen of La Plata County	L
147	Greg Burger	Citizen of La Plata County	L
148	Kelly Ray	Citizen of La Plata County	L
149	Blair Wiles	Citizen of La Plata County	L
150	Beth Cadwallader-Flory	Citizen of La Plata County	L
151	Cap Allen	Citizen of La Plata County	L
152	Walter J. Osterhoudt	Citizen of La Plata County	L
153	David L. Trantmann	Citizen of La Plata County	L
154	Ruth G. Mackay	Citizen of La Plata County	L
155	Sherman Rice	Citizen of La Plata County	L
156	Vikki LeClaire	Citizen of La Plata County	L
157	Oma Walls	Citizen of La Plata County	L
158	Mary C. Thompson	Citizen of La Plata County	L
159	Virginia L. Repert	Citizen of La Plata County	L
160	Dorothy H. Myers	Citizen of La Plata County	L
161	Rose M. Janes	Citizen of La Plata County	L
162	E. Joe Barni	Citizen of La Plata County	L
163	M.M. Carnes	Citizen of La Plata County	L
164	Mikala Moore	Citizen of La Plata County	L
165	Tilton W. Macy	Citizen of La Plata County	L
166	Ann Schwarz	Citizen of La Plata County	L
167	Grace Rice	Citizen of La Plata County	L
168	James and Emily Millard	Citizen of La Plata County	L
169	Deborah B. Brown	Citizen of La Plata County	L
170	Rebecca J. Bronson	Citizen of La Plata County	L
171	Zackary Zachary	Citizen of La Plata County	L
172	Anita Barnes	Citizen of La Plata County	L
173	Dylan Brown	Citizen of La Plata County	L
174	Carol Robertson	Citizen of La Plata County	L
175	Kim Cromwell	Citizen of La Plata County	L
176	Philip Taylor	Citizen of La Plata County	L
177	Donna H. Fleming	Citizen of La Plata County	L
178	Howard R. Arnold	Citizen of La Plata County	L
179	Beth A. Sherwood	Citizen of La Plata County	L

Table 6.2 Index of persons submitting written comments or
who gave oral testimony at a public hearing (Continued)

Index number	Name	Affiliation	Origin - letter (L) or hearing (H)
180	William H. Sageser	Citizen of La Plata County	L
181	Marlene J. Baker	Citizen of La Plata County	L
182	Joan K. McNitt	Citizen of La Plata County	L
183	Jim R. Wannanaker	Citizen of La Plata County	L
184	Nancy Napheys	Citizen of La Plata County	L
185	Karen M. Lamb	Citizen of La Plata County	L
186	Peg Ochsenreiter	Citizen of La Plata County	L
187	James R. Sinton	Citizen of La Plata County	L
188	Tom S. Sinton	Citizen of La Plata County	L
189	Ruth E. Rosenberg	Citizen of La Plata County	L
190	John C. Miernyk	Citizen of La Plata County	L
191	Christine A. Bryant	Citizen of La Plata County	L
192	Christine A. Thompson	Citizen of La Plata County	L
193	Martin Pearson	Citizen of La Plata County	L
194	Lyndie Pearson	Citizen of La Plata County	L
195	Dawn L. Petersen	Citizen of La Plata County	L
196	Brett L. Wells	Citizen of La Plata County	L
197	Renee Parsons	Citizen of La Plata County	L
198	Vicki L. Kirkpatrick	Citizen of La Plata County	L
199	Richard W. Sidwell	Citizen of La Plata County	L
200	Leslie W. Bohn	Citizen of La Plata County	L
201	George Moore	Citizen of La Plata County	L
202	Randy Murphy	Citizen of La Plata County	L
203	E. Esther Williams	Citizen of La Plata County	L
204	Stephen Swisher	Citizen of La Plata County	L
205	Fred Mestas	Citizen of La Plata County	L
206	Richard Bonaventura	Citizen of La Plata County	L
207	Gail Greve Watts	Citizen of La Plata County	L
208	James K. Wothyns	Citizen of La Plata County	L
209	John Bresnahan	Citizen of La Plata County	L
210	Rick Lane	Citizen of La Plata County	L
211	Sharon Jaworsky	Citizen of La Plata County	L
212	Sharon Nelson	Citizen of La Plata County	L
213	Robert D. Jacobson	Citizen of La Plata County	L
214	Russell Monell	Citizen of La Plata County	L
215	Greg Stone	Citizen of La Plata County	L
216	Jane Keeler	Citizen of La Plata County	L
217	George Bird	Citizen of La Plata County	L
218	Daniel C. Guet	Citizen of La Plata County	L
219	Robert V. Kling	Citizen of La Plata County	L
220	Mary Kostanski	Citizen of La Plata County	L
221	Wendy Bryant	Citizen of La Plata County	L
222	Maryellen Morrow	Citizen of La Plata County	L
223	Katherine A. Larson	Citizen of La Plata County	L
224	David P. Eppich	Citizen of La Plata County	L

Table 6.2 Index of persons submitting written comments or
who gave oral testimony at a public hearing (Continued)

Index number	Name	Affiliation	Origin - letter (L) or hearing (H)
225	Beverly B. Capelin	Citizen of La Plata County	L
226	Edna Fiorini	Citizen of La Plata County	L
227	Jean Fiorini	Citizen of La Plata County	L
228	Raymond Fiorini	Citizen of La Plata County	L
229	Barrie Anne Bryant	Citizen of La Plata County	L
230	Sara O'Meara Chanbelan	Citizen of La Plata County	L
231	Edward R. Galston	Citizen of La Plata County	L
232	Ernst Baer	Citizen of La Plata County	L
233	Regan Kauer	Citizen of La Plata County	L
234	Matthew Bourgeois	Citizen of La Plata County	L
235	Kathryn Eppich	Citizen of La Plata County	L
236	Jacquie Davenport	Citizen of La Plata County	L
237	Thomas G. Maynard	Citizen of La Plata County	L
238	Kathleen Johnson	Citizen of La Plata County	L
239	Kathy Evans	Citizen of La Plata County	L
240	Rebecca E. Jenkins	Citizen of La Plata County	L
241	Lance K. Clay	Citizen of La Plata County	L
242	Stuart Cohen	Citizen of La Plata County	L
243	Jim Rockelmann	Citizen of La Plata County	L
244	Gary Kolman	Citizen of La Plata County	L
245	Cindy Farley	Citizen of La Plata County	L
246	Bonnie Pietropaulo	Citizen of La Plata County	L
247	Fred D. Robin	Citizen of La Plata County	L
248	Jennifer Sullivan Carney	Citizen of La Plata County	L
249	Roubyn Smith	Citizen of La Plata County	L
250	Carol Durrschmidt	Citizen of La Plata County	L
251	Mary Mickelson	Citizen of La Plata County	L
252	Kurt Conrad	Citizen of La Plata County	L
253	Scott D. Henning	Citizen of La Plata County	L
254	Clayton B. Vedder, Jr.	Citizen of La Plata County	L
255	Aaron Ray	Citizen of La Plata County	L
256	Andrea G. Maynard	Citizen of La Plata County	L
257	Linn Stump	Citizen of La Plata County	L
258	D. Brian Soignier	Citizen of La Plata County	L
259	Kathleen Snadell	Citizen of La Plata County	L
260	Jeanne Thompson	Citizen of La Plata County	L
261	Camille Sebestyen	Citizen of La Plata County	L
262	J.M. Schlageter	Citizen of La Plata County	L
263	Judie Vagneur	Citizen of La Plata County	L
264	Richard N. Sandlin	Citizen of La Plata County	L
265	Patricia Sandlin	Citizen of La Plata County	L
266	Karen P. Armstrong	Citizen of La Plata County	L
267	Thomas Grandin	Citizen of La Plata County	L
268	James M. Perkins	Citizen of La Plata County	L
269	Janet L.S. Gerhardt	Citizen of La Plata County	L

Table 6.2 Index of persons submitting written comments or
who gave oral testimony at a public hearing (Continued)

Index number	Name	Affiliation	Origin - letter (L) or hearing (H)
270	Joan B. Taylor	Citizen of La Plata County	L
271	Sonya P. Guest	Citizen of La Plata County	L
272	Clifford E. Johns	Citizen of La Plata County	L
273	Sam Hofferber	Citizen of La Plata County	L
274	Brian J. Loveless	Citizen of La Plata County	L
275	Ron Shinn	Citizen of La Plata County	L
276	William F. Binger	Citizen of La Plata County	L
277	Alice Kirk	Citizen of La Plata County	L
278	Charles J. Larson	Citizen of La Plata County	L
279	Anna M. Price	Citizen of La Plata County	L
280	Roswitha McBroom	Citizen of La Plata County	L
281	Pam Bohn	Citizen of La Plata County	L
282	Teri Freyschlag	Citizen of La Plata County	L
283	Kathleen Fine	Citizen of La Plata County	L
284	Elizabeth L. Boles	Citizen of La Plata County	L
285	Jim Verce	Citizen of La Plata County	L
286	Brian Clark	Citizen of La Plata County	L
287	Margaret McSherry	Citizen of La Plata County	L
288	Joan Jagers	Citizen of La Plata County	L
289	Lynn McKee	Citizen of La Plata County	L
290	Teresa M. Offutt	Citizen of La Plata County	L
291	Glenn Barnhouse	Citizen of La Plata County	L
292	Dudley Engle	Citizen of La Plata County	L
293	Karen Lee Binger	Citizen of La Plata County	L
294	Kristen L. Boyer	Citizen of La Plata County	L
295	Richard E. Winn, Jr.	Citizen of La Plata County	L
296	Robert Dexter	Citizen of La Plata County	L
297	Carla Whitney	Citizen of La Plata County	L
298	Mildred E. McCoy	Citizen of La Plata County	L
299	Angie Candelaria	Citizen of La Plata County	L
300	R.J. McMullen	Citizen of La Plata County	L
301	Esther Fritz	Citizen of La Plata County	L
302	Teesa Kutowy	Citizen of La Plata County	L
303	Chris Perryman	Citizen of La Plata County	L
304	Daniel B. Conway	Citizen of La Plata County	L
305	Phil L. Gonzales	Citizen of La Plata County	L
306	Linda H. Graves	Citizen of La Plata County	L
307	Ronald M. Nelen	Citizen of La Plata County	L
308	William R. Burdick	Citizen of La Plata County	L
309	Patricia Kuttler	Citizen of La Plata County	L
310	Thomas N. Hansen	Citizen of La Plata County	L
311	Stephen L. Gilsdorf	Citizen of La Plata County	L
312	Janet Leech	Citizen of La Plata County	L
313	Patti Reese	Citizen of La Plata County	L
314	Christine Tafoya	Citizen of La Plata County	L

Table 6.2 Index of persons submitting written comments or
who gave oral testimony at a public hearing (Continued)

Index number	Name	Affiliation	Origin - letter (L) or hearing (H)
315	Jeffrey H. Vandiver	Citizen of La Plata County	L
316	Clay Earl Randolph	Citizen of La Plata County	L
317	Cecilia Jamison	Citizen of La Plata County	L
318	Paul Byington	Citizen of La Plata County	L
319	Mark Trail	Citizen of La Plata County	L
320	Jeanne Farmer	Citizen of La Plata County	L
321	Gary R. Farmer	Citizen of La Plata County	L
322	Harold E. Luzar, Jr.	Citizen of La Plata County	L
323	Cindy Gilliland Kent (aka Cindy A. Kent)	Citizen of La Plata County	L
324	Pamela Leigh	Citizen of La Plata County	L
325	Jane E. Leonard	Citizen of La Plata County	L
326	Robert G. Carney	Citizen of La Plata County	L
327	Frank J. Sinton	Citizen of La Plata County	L
328	Wendy Bryant	Citizen of La Plata County	L
329	Art E. Berg	Citizen of La Plata County	L
330	Joe Righter, Jr.	Citizen of La Plata County	L
331	Lori Kunder	Citizen of La Plata County	L
332	James Bruvold	Citizen of La Plata County	L
333	Nancy R. Heck	Citizen of La Plata County	L
334	Leslie Wheeler-Dobbs	Citizen of La Plata County	L
335	Mamie Rasmussen	Citizen of La Plata County	L
336	Jerald M. Bruck	Citizen of La Plata County	L
337	Martha Simpson	Citizen of La Plata County	L
338	Ruth M. Katzin	Citizen of La Plata County	L
339	Foy Cogburn	Citizen of La Plata County	L
340	Mrs. A. J. Mayer	Citizen of La Plata County	L
341	Michael Flickinger	Citizen of La Plata County	L
342	Cindy L. Conway	Citizen of La Plata County	L
343	Maria Holt	Citizen of La Plata County	L
344	Russell Barnes	Citizen of La Plata County	L
345	Patricia I. Berg	Citizen of La Plata County	L
346	Pam Peavey	Citizen of La Plata County	L
347	Kathy Kindle	Citizen of La Plata County	L
348	Elizabeth C. Strain	Citizen of La Plata County	L
349	Robert L. Andrews	Citizen of La Plata County	L
350	Daniel G. Officer	Citizen of La Plata County	L
351	Bill & Jennifer Springstead	Citizen of La Plata County	L
352	Ira O. Hartsock	Citizen of La Plata County	L
353	Patricia Hartsock	Citizen of La Plata County	L
354	Joyce Rosebury	Citizen of La Plata County	L
355	Ken Shivers	Citizen of La Plata County	L
356	Linda Shivers	Citizen of La Plata County	L
357	James D. Appel	Citizen of La Plata County	L

Table 6.2 Index of persons submitting written comments or who gave oral testimony at a public hearing (Continued)

Index number	Name	Affiliation	Origin - letter (L) or hearing (H)
358	Marjorie S. Appel	Citizen of La Plata County	L
359	Linda H. Hansen	Citizen of La Plata County	L
360	Bill Bray	Citizen of La Plata County	L
361	Leta M. Bray	Citizen of La Plata County	L
362	L. C. Widder	Citizen of La Plata County	L
363	J. R. Widder	Citizen of La Plata County	L
364	Lucinda S. Chavez	Citizen of La Plata County	L
365	Freddie Chavez	Citizen of La Plata County	L
366	Walter Punke	Citizen of La Plata County	L
367	Charlotte Punke	Citizen of La Plata County	L
368	Joyce M. Capp	Citizen of La Plata County	L
369	Jeff Capp	Citizen of La Plata County	L
370	N. R. Mills	Citizen of La Plata County	L
371	Charlotte Mills	Citizen of La Plata County	L
372	Pamela Graves	Citizen of La Plata County	L
373	Claude Graves	Citizen of La Plata County	L
374	K. Gombart	Citizen of La Plata County	L
375	Edith Gombart	Citizen of La Plata County	L
376	Tina M. Ellis	Citizen of La Plata County	L
377	Robert W. Ellis	Citizen of La Plata County	L
378	Joe Byrket	Citizen of La Plata County	L
379	Deborah S. Byrket	Citizen of La Plata County	L
380	Ann Schwarz	Citizen of La Plata County	L
381	Andrew F. Schwarz	Citizen of La Plata County	L
382	Mr. Park	Citizen of La Plata County	L
383	Mrs. Park	Citizen of La Plata County	L
384	Whitley C. Scribner	Citizen of La Plata County	L
385	Katherine B. Scribner	Citizen of La Plata County	L
386	Vicki Fyfe	Citizen of La Plata County	L
387	Gary Fyfe	Citizen of La Plata County	L
388	Brian Clark	Citizen of La Plata County	L
389	Lois C. Bartig	Citizen of La Plata County	L
390	Marianne L. Williams	Citizen of La Plata County	L
391	Larry H. Williams	Citizen of La Plata County	L
392	Michael Gerber	Citizen of La Plata County	L
393	Linda Gerber	Citizen of La Plata County	L
394	John R. Rice	Citizen of La Plata County	L
395	Wendy K. Rice	Citizen of La Plata County	L
396	Roland Rustad	Citizen of La Plata County	L
397	Pat Rustad	Citizen of La Plata County	L
398	Shelly Petrucka	Citizen of La Plata County	L
399	John Petrucka	Citizen of La Plata County	L
400	Daniel W. Boone	Citizen of La Plata County	L
401	Kathryn V. Boone	Citizen of La Plata County	L
402	Rodnyne D. Cook	Citizen of La Plata County	L

Table 6.2 Index of persons submitting written comments or who gave oral testimony at a public hearing (Continued)

Index number	Name	Affiliation	Origin - letter (L) or hearing (H)
403	Cynthia L. Ferguson	Citizen of La Plata County	L
404	Karen Thys	Citizen of La Plata County	L
405	Jerry Shryker	Citizen of La Plata County	L
406	Tamara Brennan	Citizen of La Plata County	L
407	Jackson Tallmadge	Citizen of La Plata County	L
408	Kara Bertholf	Citizen of La Plata County	L
409	Joanna G. Joiner	Citizen of La Plata County	L
410	Halford W. Joiner	Citizen of La Plata County	L
411	Lisa S. Joiner	Citizen of La Plata County	L
412	Kenneth A. Beegles	Citizen of La Plata County	L
413	Michael B. Stuart	Citizen of La Plata County	L
414	Rene' Larricq	Citizen of La Plata County	L
415	Deborah Powell	Citizen of La Plata County	L
416	C. W. Mertz	Citizen of La Plata County	L
417	Lynn Berger	Citizen of La Plata County	L
418	Donald E. Berger	Citizen of La Plata County	L
419	Jesse Crawford	Citizen of La Plata County	L
420	Hortense Kelley	Citizen of La Plata County	L
421	Bill Boland	Citizen of La Plata County	L
422	Jack Graham	Citizen of La Plata County	L
423	Jean Graham	Citizen of La Plata County	L
424	Marlo W. Schulz	Citizen of La Plata County	L
425	R. Gail Schulz	Citizen of La Plata County	L
426	Charles R. Butler	Citizen of La Plata County	L
427	Edward E. Moses	Citizen of La Plata County	L
428	John R. Cooley	Citizen of La Plata County	L
429	Kathleen M. Cooley	Citizen of La Plata County	L
430	Caryl R. Helmin	Citizen of La Plata County	L
431	Susan Myers	Citizen of La Plata County	L
432	Becky Speelman	Citizen of La Plata County	L
433	Cathy Mueller	Citizen of La Plata County	L
434	Brian Woods	Citizen of La Plata County	L
435	Bobby Turner	Citizen of La Plata County	L
436	Matt Evans	Citizen of La Plata County	L
437	William M. Browne	Citizen of La Plata County	L
438	John Dunsford	Citizen of La Plata County	L
439	Al Kleemeyer	Citizen of La Plata County	L
440	Debra Kleemeyer	Citizen of La Plata County	L
441	William Rutneld	Citizen of La Plata County	L
442	Marion L. Rutneld	Citizen of La Plata County	L
443	Bill Boland	Citizen of La Plata County	L
444	Leslie C. Brissette	Citizen of La Plata County	L
445	Robert Schwarz	Citizen of La Plata County	L
446	Donna M. Fleming	Citizen of La Plata County	L
447	Craig N. Larson	Citizen of La Plata County	L

Table 6.2 Index of persons submitting written comments or
who gave oral testimony at a public hearing (Continued)

Index number	Name	Affiliation	Origin - letter (L) or hearing (H)
448	Daniel G. Officer	Citizen of La Plata County	L
449	Nicholas J. Heidy	Citizen of La Plata County	L
450	Helen R. Heidy	Citizen of La Plata County	L
451	Violet L. Gwaltney	Citizen of La Plata County	L
452	Steward Ranch	Citizen of La Plata County	L
453	Charles D. Semmler	Citizen of La Plata County	L
454	Paul Bent	Citizen of La Plata County	L
455	Georgiana Spencer	Citizen of La Plata County	L
456	Thomas Lepisto	Citizen of La Plata County	L
457	Wendy Bryant	Citizen of La Plata County	L
458	Jerry Carney	Citizen of La Plata County	L
459	Kara Bertholf	Citizen of La Plata County	L
460	Jane E. Leonard	Citizen of La Plata County	L
461	Cap Alien	Citizen of La Plata County	L
462	Cheryle Brandsma	Citizen of La Plata County	L
463	Timothy A. Buzzard	Citizen of La Plata County	L
464	Nanna Alford	Citizen of La Plata County	L
465	Ethel Dyer	Citizen of La Plata County	L
466	Velena Eggleston	Citizen of La Plata County	L
467	Ruth Parkinson	Citizen of La Plata County	L
468	Evelyn Bugg	Citizen of La Plata County	L
469	Wilma DeNier	Citizen of La Plata County	L
470	Martha Simpson	Citizen of La Plata County	L
471	Margaret Dunn	Citizen of La Plata County	L
472	S. V. Alford	Citizen of La Plata County	L
473	Robert Jefferson, Chris Baker	Southern Ute Indian Tribe	L
474	Sydney S. Macy	The Nature Conservancy	L
475	Richard W. Hoffman	Colorado Chapter of the Wildlife Society	L
476	Karen Preston	Rafter J. Landowners Association	L
477	Kirk M. Cunningham	Sierra Club	L
478	James B. Martin	Environmental Defense Fund	L
479	Mr. Laverne Gwaltney	La Plata County Farm Bureau	L
480	Thomas B. Cochran	Natural Resources Defense Council	L
481	Margaret Puls	Future	L
482	Peg Langworthy	League of Women Voters of Durango	L
483	Tim LaFrance	Durango Uranium Mill Tailings Task Force	L
484	Andrea G. Maynard	Citizens Concerned about Moving the Pile (CCAMP)	L

Table 6.2 Index of persons submitting written comments or
who gave oral testimony at a public hearing (Continued)

Index number	Name	Affiliation	Origin - letter (L) or hearing (H)
485	Felix R. Miera	Environmental Improvement Division, State of New Mexico	L
486	R.T. Scott	La Plata County Commissioner	L
487	Lois Remple	Citizens for Safe Energy	L
488	James C. Anesi	Citizen of La Plata County	L
489	Bruce Blanchard	U.S. Department of Interior	L
490	Leo B. Higginbotham	U.S. Nuclear Regulatory Commission	L
491	James B. Martin	Environmental Defense Fund	L
492	Kerrigan G. Clough	U.S. Environmental Protection Agency	L
493	Tom Looby	Colorado Department of Health and other Colorado state agencies	L
494	Eleanor E. Gass	Citizen of La Plata County	L
495	Lawrence C. Gass	Citizen of La Plata County	L
496	Rebecca Griswold	Citizen of La Plata County	L
497	Rich Griswold	Citizen of La Plata County	L
498	David Porter	Citizen of La Plata County	L
499	Jeanne Porter	Citizen of La Plata County	L
500	William M. Browne	Citizen of La Plata County	L
501	Gladys L. Browne	Citizen of La Plata County	L
502	Barbara Garlick	Citizen of La Plata County	L
503	Bruce Garlick	Citizen of La Plata County	L
504	Jennifer Sullivan Carney	Citizen of La Plata County	L
505	Jerry Carney	Citizen of La Plata County	L
506	Tim Lahdekorpi	Citizen of La Plata County	L
507	James Bruvold	Citizen of La Plata County	L
508	Lewis McCool	Citizen of La Plata County	L
509	Susan McCool	Citizen of La Plata County	L
510	Amanda White	Citizen of La Plata County	L
511	Richard White	Citizen of La Plata County	L
512	John Ryan	Citizen of La Plata County	L
513	M. Lynne Wamble-Kenney	Citizen of La Plata County	L
514	Ken Francis	State of Colorado, Depart- ment of Local Affairs	L
515	Andrea G. Maynard	Citizens Concerned about Moving the Pile (CCAMP)	L
516	James G. Erickson	Citizen of La Plata County	L
517	Debra McCaffery	Citizen of La Plata County	L
518	Tamara Wiggans	Citizen of La Plata County	L
519	Timothy La France	Durango Uranium Mill Tailings Task Force	L
520	Bruce Honisch	Citizen of La Plata County	L
521	Charles Semmler	Citizen of La Plata County	H

Table 6.2 Index of persons submitting written comments or
who gave oral testimony at a public hearing (Concluded)

Index number	Name	Affiliation	Origin - letter (L) or hearing (H)
522	Robert Jefferson	Env Specialist for Southern Ute Indian Tribe	H
523	Randy Jernigan	Emergency Med Phys at Regional Training Center	H
524	Duane Taylor	Citizen of La Plata County	H
525	Robert Muhlheim	Citizen of La Plata County	H
526	Karen Preston	Rafter J. Landowners Association	H
527	Harry Edinger	Citizen of La Plata County	H
528	Ann Schwarz	Citizen of La Plata County	H
529	Gladys Browne	Citizen of La Plata County	H
530	Donna Fleming	Citizen of La Plata County	H
531	James Martin	Env Defense Fund Rocky Mtn. Regional Office	H
532	Roy Craig	Citizen of La Plata County	H
533	Tim La France	Southwest Colorado Bar Association	H
534	Harold Steinhoff	Durango UMTRA Task Force	H
535	James Anesi	Attorney for Gary Farmer	H
536	Judith Lent	Durango League of Women Voters	H
537	Bill Ehler	Citizen of La Plata County	H
538	Gregory Hoch	Citizen of La Plata County	H
539	Edward Moses	Citizen of La Plata County	H
540	Donald McDonald	Senator Gary Hart's Office	H
541	Richard Montoya	Citizen of La Plata County	H
542	Paul Bendt	Citizen of La Plata County	H
543	R.T. Scott	Citizen of La Plata County	H
544	Mark English	Citizen of La Plata County	H
545	Rick Lane	Citizen of La Plata County	H
546	Ernie Roberge	Citizen of La Plata County	H
547	Bob Hatfield	Citizen of La Plata County	H
548	Bob Haggerty	Citizen of La Plata County	H
549	Tim La France	Citizen of La Plata County	L
550	Rick Lane	Citizen of La Plata County	L
551	Wayne Sandfort	Colorado Wildlife Federation	L
552	Barbara Duncan	Citizen of La Plata County	L
553	Jim Zick	Citizen of La Plata County	L
554	Leo Higgenbotham	U.S. Nuclear Regulatory Commission (Denver Submission)	L
555	Andrea Maynard	Citizen of La Plata County	L
556	Albert Hazle	Colorado Department of Public Health	L
557	Karen Preston	Citizen of La Plata County	L
558	Howard Preston	Citizen of La Plata County	L
559	Christopher Meyer	Citizen of La Plata County	L
560	Christopher Ryan	Citizen of La Plata County	L
561	Ethel Purcell	Citizen of La Plata County	L
562	Paula Dahlke	Citizen of La Plata County	L

Table 6.3 Alphabetic listing of commenters

LAST NAME	FIRST NAME	INDEX NUMBER
ADER	GARY	060
ALFORD	NANNA	464
ALFORD	S. V.	472
ALLEN	CAP	151
ALLEN	CAP	461
ANDERSON	NIKKI	111
ANDREWS	ROBERT	349
ANESI	JAMES	488
ANESI	JAMES	535
APPEL	JAMES	357
APPEL	MARJORIE	358
ARMSTRONG	KAREN	266
ARNOLD	HOWARD	178
AUSTIN	CASSANDIA	010
BAER	ERNST	232
BAKER	MARLENE	181
BARANI	E. JOE	162
BARHOUSE	GLENN	291
BARNES	ANITA	172
BARNES	RUSSELL	344
BARTIG	LOIS	389
BARTON	MIRIAM	008
BEEGLES	KENNETH	412
BENDT	PAUL	542
BENDT	PAUL	454
BERG	ART	329
BERG	PATRICIA	345
BERGER	DONALD	418
BERGER	LYNN	417
BERTHOLF	KARA	408
BERTHOLF	KARA	459
BIFFAR	PENNY	022
BINGER	KAREN	293
BINGER	WILLIAM	276
BIRD	GEORGE	217
BISHOP	CHARLES	144
BLANCHARD	BRUCE	489
BOHN	LESLIE	200
BOHN	PAM	281
BOLAND	BILL	421
BOLAND	BILL	443
BOLES	ELIZABETH	264
BONAVENTURA	RICHARD	206
BOONE	DANIEL	400
BOONE	KATHRYN	401
BOSSOW	COLETTE	126
BOURGEOIS	MATTHEW	234
BOWEN	LIDA	094
BOWES	MAGGIE	017
BOYER	KRISTEN	294
BRANDSMA	CHERYLE	462
BRAY	BILL	360
BRAY	LLETA	361
BRENNAN	TAMARA	406
BRESNAHAN	JOHN	209

Table 6.3 Alphabetic listing of commenters

LAST NAME	FIRST NAME	INDEX NUMBER
BRISSETTE	LESLIE	444
BRONSON	REBECCA	170
BROOKS	PAULA	099
BROWN	DEBORAH	169
BROWN	DYLAN	173
BROWNE	GLADYS	501
BROWNE	GLADYS	529
BROWNE	WILLIAM	437
BROWNE	WILLIAM	500
BRUCK	JERALD	336
BRUVOLD	JAMES	332
BRUVOLD	JAMES	507
BRYANT	BARRIE	229
BRYANT	BERKELEY	014
BRYANT	CHRISTINE	191
BRYANT	WENDY	221
BRYANT	WENDY	328
BRYANT	WENDY	457
BUGG	EVELYN	468
BURDICK	WILLIAM	308
BURGER	GREG	147
BUTLER	CHARLES	426
BUTLER	SARAH	005
BUZZARD	TIMOTHY	463
BYINGTON	PAUL	318
BYRKET	DEBORAH	379
BYRKET	JOE	376
CADWALLADER-FLORY	BETH	150
CANDELARIA	ANGIE	299
CAPELIN	BEVERLY	225
CAPP	JEFF	369
CAPP	JOYCE	368
CARNES	M. M.	163
CARNEY	JENNIFER SULLIVAN	504
CARNEY	JERRY	458
CARNEY	JERRY	505
CARNEY	ROBERT	326
CARSON	ANNETTE	146
CARSON	STEVE	145
CASKEY	MEL	078
CASKEY	VICKI	079
CHAMBERLIN	JENNY	012
CHANELAN	SARA O'MEARA	230
CHAVEZ	FREDDIE	365
CHAVEZ	LUCINDA	364
CLARK	BRIAN	286
CLARK	BRIAN	388
CLARK	H. JACKSON, II	128
CLARK	ROSE	130
CLAY	LANCE	241
CLOUGH	KERRIGAN	492
COCHRAN	THOMAS	480
COGBURN	FOY	339
COHEN	STUART	242
CONNER	BEVERLY	118

Table 6.3 Alphabetic listing of commenters

LAST NAME	FIRST NAME	INDEX NUMBER
CONRAD	KURT	252
CONWAY	CINDY	342
CONWAY	DANIEL	304
COOK	RODYNIE	402
COOK	STANLEY	019
COOLEY	JOHN	428
COOLEY	KATHLEEN	429
CORRELL	RALPH	108
COX	CLIFF	083
CRAIG	ROY	532
CRAWFORD	JESSE	419
CROMWELL	KIM	175
CULLEN	JOAN	115
CUNNINGHAM	KIRK	477
DAHL	SUSAN	018
DAHLKE	PAULA	562
DALLA	JERRY	077
DAVENPORT	JACQUIE	236
DAVEY	KAREN	065
DE NIER	WILMA	469
DEKDEBRUN	RICK	122
DEXTER	ROBERT	296
DICKSON	AIMY	134
DIERKSEN	SONORA	011
DRULIS	KERRY	138
DUNCAN	BARBARA	552
DUNN	MARGARET	471
DUNSMORD	JOHN	438
DURAN	CHRIS	084
DURRSCHMIDT	CAROL	250
DUVAL	TONI	054
DYER	ETHEL	465
EDINGER	HARRY	527
EDWARDS	BARB	040
EGGLESTON	VELENA	466
EHLER	BILL	537
ELLIOTT	W. MICHAEL	051
ELLIS	ROBERT	377
ELLIS	TINA	376
EMRICH	MARY	070
ENGLE	DUDLEY	292
ENGLISH	MARK	544
ENSMARK	JILL	095
EPPICH	DAVID	224
EPPICH	KATHRYN	235
ERICKSON	JAMES	516
ERICKSON	SHAREE	101
EVANS	KATHY	239
EVANS	MATT	436
FARLEY	CINDY	245
FARMER	GARY	321
FARMER	JEANNE	320
FEIJOO	CARLA	059
FERGUSON	CYNTHIA	403
FINE	KATHLEEN	263

Table 6.3 Alphabetic listing of commenters

LAST NAME	FIRST NAME	INDEX NUMBER
FIORINI	EDNA	226
FIORINI	JEAN	227
FIORINI	RAYMOND	228
FLEMING	DONNA	177
FLEMING	DONNA	446
FLEMING	DONNA	530
FLICKINGER	MICHAEL	341
FRANCIS	KEN	514
FREYSSCHLAG	TERI	282
FRITZ	ESTHER	301
FYFE	GARY	387
FYFE	VICKI	386
GADDIE	RONALD	124
GAEFFNEY	JILL	096
GALSTON	EDWARD	231
GARLICK	BARBARA	502
GAPLICK	BRUCE	503
GASS	ELEANOR	494
GASS	LAWRENCE	495
GERBER	LINDA	393
GERBER	MICHAEL	392
GERHARDT	JANET L. S.	269
GILSDORF	STEPHEN	311
GOGUEN	PAMELA	006
GOMBART	EDITH	375
GOMBART	K.	374
GOMEZ	PETE	056
GONZALES	PHIL	305
GRAHAM	JACK	422
GRAHAM	JEAN	423
GRANDIN	THOMAS	267
GRAVES	CLAUDE	373
GRAVES	JOE	041
GRAVES	LINDA	306
GRAVES	PAMELA	372
GREGORIO	ROBERT	009
GRISWOLD	REBECCA	496
GRISWOLD	RICH	497
GUEST	SONYA	271
GUIET	DANIEL	218
GUTIERREZ	ARAYCE	035
GWALTNEY	MR. LAVERNE	479
GWALTNEY	VIOLET	451
HAGGERTY	BOB	548
HALL	SALLY	097
HALLOWER	SUNNY	050
HAMMOND	DEBRA	067
HANSEN	LINDA	119
HANSEN	LINDA	359
HANSEN	THOMAS	310
HARRIS	FAYE	021
HARTSOCK	IRA	352
HARTSOCK	PATRICIA	353
HATFIELD	BOB	547
HAVEL	ROSE	109

Table 6.3 Alphabetic listing of commenters

LAST NAME	FIRST NAME	INDEX NUMBER
HAZLE	ALBERT	556
HECK	NANCY	333
HEIDY	HELEN	450
HEIDY	NICHOLAS	449
HELMIN	CARYL	430
HELVEY	DANA	091
HENNING	KRISTY	064
HENNING	SCOTT	253
HIBBARD	BETTY	129
HIGGENBOTHAM	LEO	554
HIGGINBOTHAM	LEO	490
HILLMEYER	ROGER	075
HOCH	GREGORY	538
HOFFERBER	KIM	273
HOFFMAN	PICHARD	475
HOLT	MARIA	343
HONISCH	BRUCE	520
HOUGE	JOHN	125
HOWARD	KAREN	082
HYLANT	DAM	089
JACOBSON	ROBERT	213
JAGGERS	JOAN	288
JAMISON	CECILIA	317
JANES	ROSE	161
JAQUEZ	LOUISE	140
JAWORSKY	SHARON	211
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