

**REVIEW COMMENTS AND RESPONSES
TO
SPOOK PRELIMINARY FINAL CADSAR**

July, 1987

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UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Spook, Wyoming, Date: May 21, 1987
Document: Preliminary Final CADSAR
Commentor: NRC

Comment: 1 Page: 14, 22

As requested by NRC staff following review of the draft CADSAR, DOE has presented available ground water information to support the preferred alternative of stabilization-in-place (SIP). NRC staff have reviewed and have several questions regarding this information and future ground water conditions.

1. DOE acknowledge that "high ground-water levels may flood the pit floor and the stabilized tailings" (page 22). The CADSAR does not give details how a second-phase hydrologic drilling program will be designed to accurately ascertain the likelihood of this problem. For this analysis NRC staff suggest DOE's second phase characterization plan include construction of cored monitor wells in the mine pit floor in order to collect the following data: a) close identification of the water table or multiple aquifers, b) detailed stratigraphic logs of bedrock below the pit, c) lithology, grain-size and porosity of the bedrock, and d) fractures or other small scale structures with potential affects on ground water movement.
2. The ground-water flow directions illustrated in the CADSAR appear to contradict assertions made by DOE that flow direction is generally northeastward. Figure 3.7 depicts ground water flowing southeast, south of the pile. This results in "background" wells 902 and 903 actually being located downgradient of the pile. It is unknown what effect the open pit has on regional ground water flow, but it appears significant from the figure may not affect remedial action plans, it may affect future characterization plans. NRC staff suggest that DOE take this radial flow into account when developing future well construction plans.

Further, NRC staff commented on the Scope of Work for ground-water characterization at the Spook site that the area west of the pit was unmonitored. The staff conclude that monitoring this area could provide an explanation for the apparent radial flow east of the pit, and again suggest that it be considered if future characterization work is initiated.

SECTION 2

Response: Page 22

By: E. Banks

Date: June 23, 1987

Plans for Implementation:

1. To avoid groundwater intrusion into the stabilized tailings pile, the bottom elevation of the cell will be approximately 30 feet above the current groundwater level. The design of the stabilized pile will be discussed in the draft RAP. The Phase II groundwater drilling program will include a cored hole in the bottom of the pit which will provide lithology, porosity, permeability, and any small scale structures affecting groundwater movement. The results of the Phase II drilling program will be available in the draft Environmental Assessment in October, 1987.
2. The concerns regarding the groundwater flow direction are acknowledged. Data gathered from the Phase I monitor wells may indicate the presence of separate aquifers with opposing flow directions. Data collected from the Phase I drilling program will be used to develop the Phase II drilling program; the results of which will be made available in the draft Environmental Assessment in October. The Phase II drilling program will include wells to the west of the site.

SECTION 3

Confirmation of Implementation:

Checked by: E. Banks, Date: 7/1/87
Approved by: My J. J. J., Date: 7/6/87

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Spook, Wyoming, Date: May 21, 1987
Document: Preliminary Final CADSAR
Commentor: NRC

Comment: 2 Page: 15, 16

DOE presented preliminary ground-water quality data in Table 3.2 of the CADSAR for samples taken from pre-existing water wells located in the vicinity of the tailings, and mentioned that "in most cases the well completion data (i.e. total depth and screen intervals) for these six existing wells are incomplete or missing". NRC staff will likely have difficulty accepting these data from wells without completion data. DOE should obtain completion data if reliance is to be placed on these sample results.

SECTION 2

Response: Page 15, 16 By: E. Banks
Date: June 24, 1987

Plans for Implementation:

The data gathered from the pre-existing wells without completion data will not be considered for characterization of the background water quality. The data from these wells presented in the CADSAR were from general information on the quality of the water currently being used in the area.

SECTION 3

Confirmation of Implementation:

Checked by: *E. Banks*, Date: 7/1/87
Approved by: *Myron*, Date: 7/6/87

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Spook, Wyoming, Date: May 21, 1987
Document: Preliminary Final CADSAR
Commentor: NRC

Comment: 3 General

DOE mentioned in the CADSAR that if a Phase II drilling program is considered necessary to characterize ground water in the vicinity of the pile, then it may not be possible to include complete results in the draft EA or RAP will necessarily require these additional data, especially if DOE feels it important enough to collect the data in the first place. Therefore, the staff take the position that if additional drilling is considered necessary by DOE, then the information resulting from this work should be included in the draft EA and RAP, regardless of when the documents are scheduled for issuance.

SECTION 2

Response: General By: E. Banks
Date: June 24, 1987

Plans for Implementation:

The Phase II drilling program will be completed in August 1987. To include this additional drilling, issuance of the draft EA will be slipped to October, 1987. The draft RAP will be issued on schedule with a discussion on the need for the Phase II drilling for additional plume characterization. Additional groundwater characterization should not affect the conceptual pile layout and design. The results of the additional drilling will be included in the draft EA, final EA, and final RAP.

SECTION 3

Confirmation of Implementation:

Checked by: E. Banks, Date: 7/1/87
Approved by: [Signature], Date: 7/6/87

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Spook, Wyoming, Date: May 21, 1987
Document: Preliminary Final CADSAR
Commentor: NRC

Comment: Page 4 General

In response to a comment on the draft CADSAR, DOE provided a topographic map of the site vicinity in the final CADSAR. This map is not of sufficient detail to evaluate surface water drainage and geomorphic features of the proposed disposal site. Subsequent documentation should provide maps of greater detail.

Potential geomorphic hazards, such as mass wasting, channel incision, headcutting, and backfill subsidence (which may lead to surface water ponding), are not discussed in the final CADSAR. These hazards should be fully assessed and their potential impacts considered in the project design. Subsequent documentation should include a discussion of these hazards and their mitigation.

SECTION 2

Response: General By: E. Banks
Date: June 24, 1987

Plans for Implementation:

A more detailed topographic map of the Spook site vicinity will accompany the draft RAP. The draft RAP will also discuss potential geomorphic hazards and assess the impact these hazards will have on the project design.

SECTION 3

Confirmation of Implementation:

Checked by: E. Banks, Date: 7/1/87
Approved by: My J. Linton, Date: 7/6/87

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Spook, Wyoming, Date: May 21, 1987
Document: Preliminary Final CADSAR
Commentor: NRC

Comment: 5 Page: 9

The staff is concerned how backfilling of the tunnels will be done safely and successfully to prevent surface depressions due to possible collapse of the tunnels. Surface depressions resulting from improperly backfilled tunnels can result in surface water ponding and possible surface erosion. However, if the tunnels are not properly backfilled, DOE will need to discuss the possible impacts on ground-water (recharge, preferential flow, and flow direction) and surface water flows given that the tunnels are not under the planned reclamation site.

The staff recommends that the EA discuss whether backfilling of the tunnels can be safely and successfully accomplished. If it can be accomplished, then the EA should identify the source of material that will be used for backfill, and the RAP should identify the procedures that would be followed and criteria that will be met for proper backfilling.

SECTION 2

Response: Page 9 By: E. Banks
Date: June 24, 1987

Plans for Implementation:

The draft RAP and draft EA will discuss the criteria for backfilling of the tunnels and the impacts these tunnels may have on the project design. The detailed design for backfilling will be addressed as a final design issue.

SECTION 3

Confirmation of Implementation:

Checked by: E. Banks, Date: 7/1/87
Approved by: Mydleton, Date: 7/6/87

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Spook, Wyoming, Date: May 21, 1987
Document: Preliminary Final CADSAR
Commentor: NRC

Comment: 6 Page: 22

The final CADSAR indicates that contamination levels of the windblown tailings may be indistinguishable from those of the overburden and/or the natural surface materials. Since the overburden material has been identified as a potential source of material for the radon barrier, the staff encourages DOE to continue with additional radiological characterization for differentiating between windblown tailings and overburden or low grade ore materials. The staff agrees with DOE that all radiological data and analyses should be included with the RAP.

SECTION 2

Response: Page 22 By: E. Banks
Date: June 24, 1987

Plans for Implementation:

The results of the radiological characterization efforts involving the tailings and overburden material will be included in the RAP. Through the use of the Ra-226 to U-238 ratios, and with additional historical data, the differentiation of tailings versus natural overburden materials will be made.

SECTION 3

Confirmation of Implementation:

Checked by: E. Banks, Date: 7/1/87
Approved by: Myerson, Date: 7/6/87

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Spook, Wyoming, Date: June 4, 1987

Document: Preliminary Final CADSAR

Commentor: Hydro-Engineering - Wyoming

Comment: Page: 4

Section 3.1: The largest of the mine tunnels is approximately 370 feet according to Western Nuclear records.

SECTION 2

Response: Page 4

By: E. Banks

Date: June 24, 1987

Plans for Implementation:

The length of the largest of the mine tunnels will be revised to 370 feet in the final CADSAR.

SECTION 3

Confirmation of Implementation:

Checked by: E. Banks, Date: 7/1/87

Approved by: Hydro-Engineering, Date: 7/6/87

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Spook, Wyoming, Date: June 4, 1987

Document: Preliminary Final CADSAR

Commentor: Hydro-Engineering - Wyoming

Comment: Page: 8

Figure 3.4: Does not show location of longest tunnel on the south side of the pit.

SECTION 2

Response: Page 8

By: E. Banks

Date: June 24, 1987

Plans for Implementation:

Figure 3.4 will be revised to show the longest tunnel on the south side of the pit.

SECTION 3

Confirmation of Implementation:

Checked by: E. Banks, Date: 7/1/87

Approved by: My [signature], Date: 7/6/87

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Spook, Wyoming, Date: June 4, 1987

Document: Preliminary Final CADSAR

Commentor: Hydro-Engineering - Wyoming

Comment: Page: 11

Section 3.2: The volumes of the tunnels are estimated to be 2500 cubic yards.

SECTION 2

Response: Page 11

By: E. Banks

Date: June 24, 1987

Plans for Implementation:

The revised estimate of 2500 cubic yards will be incorporated into the final CADSAR.

SECTION 3

Confirmation of Implementation:

Checked by: E. Banks, Date: 7/1/87

Approved by: My J. Linton, Date: 7/6/87

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Spook, Wyoming, Date: June 4, 1987
Document: Preliminary Final CADSAR
Commentor: Hydro-Engineering - Wyoming

Comment: Page: 15

Section 3.6: The alluvial material should be considered as another source for radon cover material due to its typically being finer grain material. The 500, 700, 800, and 900 piles contain significant volumes of this material.

SECTION 2

Response: Page 15 By: E. Banks
Date: June 24, 1987

Plans for Implementation:

The draft RAP will include the results of the characterizations of piles 500, 700, 800, and 900. The source for the low permeability layer material will be determined from this characterization effort.

SECTION 3

Confirmation of Implementation:

Checked by: *E. Banks*, Date: 7/1/87
Approved by: *Myfountan*, Date: 7/6/87

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Spook, Wyoming, Date: June 4, 1987
Document: Preliminary Final CADSAR
Commentor: Hydro-Engineering - Wyoming

Comment: Page: 15

Ground-water quality: Wells 902, 903, 904, and 906 are not very likely completed in the Upper aquifer. Therefore, water quality of these wells should not be relied upon for defining background of the Upper aquifer.

SECTION 2

Response: Page 15 By: E. Banks
Date: June 24, 1987

Plans for Implementation:

The data gathered from the pre-existing wells without completion data will not be considered for characterization of the background water quality. The data from these wells presented in the CADSAR was for general information on the quality of the water currently being used in the area.

SECTION 3

Confirmation of Implementation:

Checked by: E. Banks, Date: 7/6/87
Approved by: Hydro-Engineering, Date: 7/6/87

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Spook, Wyoming, Date: June 4, 1987
Document: Preliminary Final CADSAR
Commentor: Hydro-Engineering - Wyoming

Comment: _____ Page: 14

Figure 3.7: Needs to replace this ground-water flow map with Jacobs' interpretations where the piezometric contours are based on only one aquifer at a time. Figure 3.7 makes use of both water-level elevations from the Upper and Lower sands.

SECTION 2

Response: Page 14 By: E. Banks
Date: June 24, 1987

Plans for Implementation:

The information in Figure 3.7 will be separated into two figures (Upper and Lower sands) in the draft RAP.

SECTION 3

Confirmation of Implementation:

Checked by: *E. Banks*, Date: 7/1/87
Approved by: *Hydro-Engineering*, Date: 7/6/87

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Spook, Wyoming, Date: June 4, 1987
Document: Preliminary Final CADSAR
Commentor: Hydro-Engineering - Wyoming

Comment: Page: 17

Section 4.1: Some backfill in the southern end of the pit may be best done prior to the movement of the tails. This would allow the low area to the south to be brought up to a more workable level. The in-pit pile near the southern access could be shaped to ease the tails placement. We should be considering whether some of the low grade ore in the pile should be placed with the tails.

SECTION 2

Response: Page 17 By: E. Banks
Date: June 24, 1987

Plans for Implementation:

Construction sequencing is considered to be a final design issue and will not be addressed in either the CADSAR or draft RAP. The draft RAP will, however, recommend that the slope of the pit floor be maintained away from the tailings area to provide for positive drainage.

SECTION 3

Confirmation of Implementation:

Checked by: E. Banks, Date: 7/1/87
Approved by: Hydro-Engineering, Date: 7/6/87

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Spook, Wyoming, Date: June 4, 1987
Document: Preliminary Final CADSAR
Commentor: Hydro-Engineering - Wyoming

Comment: Page: 20

Section 4.2: Stabilization on site, adjacent to the pit is not as desirable as placement in the pit (SIP). A rock cover would probably be necessary for this option where it is not needed for the SIP option. We think this option should not be considered as a viable option at this site.

SECTION 2

Response: Page 20 By: E. Banks
Date: June 24, 1987

Plans for Implementation:

Comment acknowledged. The draft RAP will only address the SIP option. The draft EA will address the SOS option only as an option which was considered and rejected.

SECTION 3

Confirmation of Implementation:

Checked by: *E. Banks*, Date: 7/1/87
Approved by: *Hydron*, Date: 7/6/87

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Spook, Wyoming, Date: June 4, 1987
Document: Preliminary Final CADSAR
Commentor: Hydro-Engineering - Wyoming

Comment: Page: 22

Section 5.2: The bottom level of the tails should be selected at least 20 feet above the present water-level elevation because little is known about long-term water-level fluctuations.

SECTION 2

Response: Page 22 By: E. Banks
Date: June 24, 1987

Plans for Implementation:

Conceptual design places the tailings 30 feet above present groundwater elevation. The conceptual design of the stabilized tailings pile will be presented in the draft RAP. Discussion in the draft RAP will include elevations of the pile and the design considerations necessary for groundwater fluctuations.

SECTION 3

Confirmation of Implementation:

Checked by: E. Banks, Date: 7/1/87
Approved by: My J. J. J., Date: 7/6/87

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Spook, Wyoming, Date: June 4, 1987
Document: Preliminary Final CADSAR
Commentor: Hydro-Engineering - Wyoming

Comment: Page: 22

Section 5.3: If windblown contaminates are high from the piles, they will be cleaned up. We, therefore, think that excavation of the windblown tailings is beneficial.

SECTION 2

Response: Page 22 By: E. Banks
Date: June 24, 1987

Plans for Implementation:

The draft RAP will contain the results of the radiological characterization, including the depth and location of the windblown tailings material. This material will be excavated where required to meet the EPA standards and stabilized as part of the remedial action.

SECTION 3

Confirmation of Implementation:

Checked by: E. Banks, Date: 7/1/87
Approved by: M. J. J. J. J., Date: 7/6/87

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Spook, Wyoming, Date: June 4, 1987
Document: Preliminary Final CADSAR
Commentor: Land Quality Division - Wyoming

Comment: _____ Page: 17

Section 4.1: The State prefers stabilization of the tailings in place, defined as placement of contaminated material in the Spook Pit.

SECTION 2

Response: Page 17 By: E. Banks
Date: June 24, 1987

Plans for Implementation:

Comment acknowledged.

SECTION 3

Confirmation of Implementation:

Checked by: E. Banks, Date: 7/1/87
Approved by: My [Signature], Date: 7/6/87

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Spook, Wyoming, Date: June 4, 1987
Document: Preliminary Final CADSAR
Commentor: Land Quality Division - Wyoming

Comment: Page: 22

Section 5.3: The State prefers the windblown material from the tailings be excavated.

SECTION 2

Response: Page 22 By: E. Banks
Date: June 24, 1987

Plans for Implementation:

The draft RAP will contain the results of the radiological characterization, including the depth and location of the windblown tailings material. This material will be excavated where required to meet EPA standards and stabilized as part of the remedial action.

SECTION 3

Confirmation of Implementation:

Checked by: *E. Banks*, Date: 2/1/88
Approved by: *W. J. Jentzen*, Date: 7/6/87

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Spook, Wyoming, Date: June 4, 1987
Document: Preliminary Final CADSAR
Commentor: AML - Wyoming

Comment: General

Item of Clarification: Not finding anything to the contrary, we presume that this job will be bid by DOE in January 1989, with work commencing in April 1989.

SECTION 2

Response: General By: E. Banks
Date: June 24, 1987

Your presumption agrees with the current schedule of remedial action starting in April, 1989.

SECTION 3

Confirmation of Implementation:

Checked by: E. Banks, Date: 2/1/87
Approved by: My [signature], Date: 7/6/87

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Spook, Wyoming, Date: June 4, 1987
Document: Preliminary Final CADSAR
Commentor: AML- Wyoming

Comment: _____ Page: 22

Section 5.2: Will LQD be afforded the opportunity to review and comment on the second phase of drilling and pursuant results for ground water?

SECTION 2

Response: Page 22 By: E. Banks
Date: June 24, 1987

Plans for Implementation:

On May 20, 1987 a description of the Phase II drilling program was sent to Hydro-Engineering, the design contractor for the AML Program. This Scope of Work has since been slightly revised and the updated version will be sent to LQD under separate cover.

SECTION 3

Confirmation of Implementation:

Checked by: *E. Banks*, Date: 7/1/87
Approved by: *My J. J. J. J.*, Date: 7/6/87

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Spook, Wyoming, Date: June 4, 1987

Document: Preliminary Final CADSAR

Commentor: Department of Environmental Quality - Wyoming

Comment: 1 General

Text, 2nd Paragraph: The text is not clear as to what the final depth of tailings placement would be using the SIP option...

SECTION 2

Response: General By: E. Banks

Date: June 24, 1987

Plans for Implementation:

More specific design details as to the depth of tailings placement and the final elevation of the stabilized pile will be available in the draft RAP.

SECTION 3

Confirmation of Implementation:

Checked by: E. Banks, Date: 7/6/87

Approved by: Myrton, Date: 7/6/87

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Spook, Wyoming, Date: June 4, 1987
Document: Preliminary Final CADSAR
Commentor: Department of Environmental Quality - Wyoming

Comment: 2 Page: 15, 16

Text, 3rd Paragraph: Data that is currently available was taken from private and DOE wells. Completion information is often sketchy or absent for the private wells and it cannot be absolutely determined what aquifer(s) they monitor. This makes most of their data somewhat questionable even though these wells are apparently the only ones used for water quality monitoring. This also affects the potentiometric surface map. It is unknown why the DOE wells were not used.

SECTION 2

Response: Page 15, 16 By: E. Banks
Date: June 24, 1987

Plans for Implementation:

The data gathered from the pre-existing wells without completion data will not be considered for characterization of the background water quality. The data from these wells presented in the CADSAR was for general information on the quality of the water currently being used in the area. The DOE wells were not used for evaluation of the water quality because the chemical analyses were not available at the time the CADSAR was being prepared.

SECTION 3

Confirmation of Implementation:

Checked by: E. Banks, Date: 7/1/87
Approved by: My J. J. J. J., Date: 7/6/87

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Spook, Wyoming, Date: June 4, 1987
Document: Preliminary Final CADSAR
Commentor: Department of Environmental Quality - Wyoming

Comment: 3 Page: 14

Text, 4th Paragraph: Another problem with the SIP option is that the "background" wells are actually located downgradient from the tailings within local flow patterns (See Figure 3.7). The relationships between the regional and local flow patterns need to be resolved in order to justify the "background" status of these wells.

SECTION 2

Response: Page 14 By: E. Banks
Date: June 24, 1987

Plans for Implementation:

A Phase II drilling program will be completed in August, 1987. This additional drilling will better characterize both the water quality and the flow directions of the aquifer(s) in the site vicinity. The issuance of the draft EA will be slipped to October, 1987 to include the results of this drilling program.

SECTION 3

Confirmation of Implementation:

Checked by: *E. Banks*, Date: 7/1/87
Approved by: *Myerson*, Date: 7/6/87

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Spock, Wyoming, Date: June 4, 1987

Document: Preliminary Final CADSAR

Commentor: Department of Environmental Quality - Wyoming

Comment: 4 General

Text, Conclusions and Recommendations: Hydrologically, based on the information provided in the CADSAR report, the SOS option would be the route to take since it needs a minimum of groundwater data. However, if more groundwater data were collected and it could be thoroughly demonstrated that the water table would remain a safe distance below the tailings material, then I would recommend the use of the SIP option as it provides the greatest erosional stability.

SECTION 2

Response: General By: E. Banks

Date: June 24, 1987

Plans for Implementation:

To accommodate the potential for high groundwater fluctuations, the tailings pile will be approximately 30 feet above the current groundwater level. The design of the stabilized pile will be discussed in the draft RAP.

SECTION 3

Confirmation of Implementation:

Checked by: E. Banks, Date: 7/1/87

Approved by: My J. J. J. J., Date: 7/6/87