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5025-RFL-L-01-01128-00

05 April 1988

Mr. Ted Johnson
United States Nuclear
Regulatory Commission
1 Whiteflint North
11555 Rockville Pike
Rockville, MD 20852

Subject: UMTRA Project - RFL
Phase II Preliminary Design for Review
- Response to Nuclear Regulatory
Commission (NRC) Comments

Dear Mr. Johnson:

As agreed to in a conversation of this date with Mr. Grant Cherrington of this office, we are sending you by express mail a copy of the above-referenced responses. We also enclose a separate draft response to Item G1.

Should you have any comments, please advise.

Sincerely,

T. R. Wathen, P.E.
Engineering and Design Manager

TRW/GGC/bd

Attachments: As stated above

cc: Mr. Rob Cooney - MK-F

5228U/0147U

Prop. info. attached
WM-62 1/1
NL01

MORRISON-KNUDSEN ENGINEERS, INC.
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UMTRA PROJECT

INTER-OFFICE CORRESPONDENCE

TO: J. G. Oldham
Attention: J. E. Williams

LOCATION: MKF - Boise

SUBJECT: UMTRA Project - RFL Phase II - Prelim. Design for Review - Response to Nuclear Regulatory Commission (NRC) Comments

DATE: 04 April 1988

DOC. NO.: 5025-RFL-I-01-01123-00

FROM: T. R. Wathen

LOCATION: San Francisco, CA

Attached are MKE's responses to the NRC comments on the subject design package. The comments were received in letter form but have been retyped on UMTRA Document Review Forms. MKE's responses have been typed on the same forms.

Please note that the response to Comment G1 on Page 29 will be submitted under separate cover in the near future.

Should you have any comments, please advise.

T.R. Wathen

TRW/GGC/bd

5143U/0145U

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Rifle Phase II

Date: 22 February 1988

Document: Preliminary Design for Review

Commentor: NRC

Comment: Page

SW1. Gully Flow Into Interceptor Ditches

We note from our review of the calculations provided that the interceptor ditches have been designed to withstand the erosive forces produced by flood flows in gullies which generally flow perpendicularly into the ditches. However, the riprap for the ditches in these locations appears to be underdesigned.

First, it is not clear exactly how the riprap size in these locations was determined. From the calculations provided, it appears that the riprap was designed by computing the velocity produced in the gully and determining that the rock was large enough to resist this velocity. It was also assumed that the flow in the gully would spread over the rock layer, with the eventual occurrence of sheet flow. We do not consider this method of analysis to be appropriate, since it is possible that the shear forces produced in the natural gully by concentrated flows at the top of the riprapped side slope will be very large and probably greater than the shear forces for which the rock in the interceptor ditch was designed. In order to properly design the riprap in this area, the shear force produced in the natural gully should be calculated using standard computational techniques, and the riprap size (D_{50}) on the channel side slopes should then be designed to resist this shear force. Additionally, it is not clear how the extent of the additional layer riprap in the ditch was determined. While the proposed 50-foot width may be adequate for the gully analyzed, the occurrence of other gullies along the length of the ditch may dictate that additional rock be provided in those locations, also. These other gullies, even though smaller, could occur randomly and could produce extremely high shear forces due to the steep slopes involved. Therefore, it appears that additional larger riprap should be

placed all along the north slope of the interceptor ditches. Also, it is possible that the natural gully cross-section may be somewhat smaller, or more critical with regard to production of shear forces. This too, should be considered in the design of the riprap, by assuming that the gully cross-section, especially for the smaller gullies, may be different than currently exists.

Second, it appears that the additional larger riprap (as redesigned, above) should also be placed along the south side slope of the interceptor ditches and should extend all the way to the top of the south bank. The flow velocities produced in the natural gullies could be sufficient to cause excessive turbulence in the ditches along both the north and south side slopes. Such turbulence could result in large shear forces which the smaller (4-inch) rock cannot withstand. Since it will be very difficult to predict the exact location of the increased shear forces, it may be necessary to provide larger riprap at all locations along the south side slopes of the ditches. Third, some provision needs to be made with regard to the possible erosion and deepening of the natural gullies which discharge into the interceptor ditches. It appears that if the natural gullies erode several feet vertically, the erosion protection in the interceptor ditches could be undercut and severely disrupted. The design should be revised to take into account this phenomenon. The maximum gully depth should be determined and the riprap should be placed at least to that depth.

Fourth, it appears that gully inflow into interceptor ditch #2 has not been considered at all. The phenomena discussed above for ditch #1 should be factored into the design of the erosion protection for ditch #2. Unless properly designed riprap is provided, it appears that significant damage could occur, resulting in possible loss of function of the ditch. Accordingly, the design of this ditch should be modified.

SECTION 2

Response: Page By: H. Majumdar
Date: 28 March 1988

Following the preliminary design submittal of November 1987, MKE has done additional work on the Interceptor Ditch 1 design while attempting to address some of NRC's concerns. This redesign effort incorporates additional design considerations, as suggested by NRC, and as agreed upon by MKE, and are mainly concerned with the following:

1. Stable riprap design for ditch bottom and sideslopes in view of concentrated gully inflows into ditch.

2. Protection of ditch from long-term natural deepening of gullies.

3. Design of Interceptor Ditch 2.

4. Potential clogging of ditch.

5. Ditch outlet stability.

MKE's design approach and results of revised design for Items 1, 2 and 3 are presented below. Items 4 and 5 have been discussed in separate sections.

1. Stable Riprap Design:

   Additional design considerations for Interceptor Ditch 1 are:

   (a) Shear forces produced by concentrated gully flows where the gullies intersect the top of the riprapped side slope of the ditch and flow down the ditch side slope.

   (b) Additional turbulence in ditch flow caused by gully flows flowing into it, which could destabilize riprap.

(c) Gullies could randomly occur and could inflow into the ditch along its entire north side slope.

(d) Riprap sizes placed on the south side slope be of the same size as on the north side slope.

NRC's suggestion that a "somewhat smaller" natural gully cross-section be considered in evaluating the shear forces, could not be incorporated in the redesign effort since it appears that a smaller cross-section most probably will have a smaller drainage area and hence a smaller gully flow depth. Consequently, and most likely, it will not produce critical shear. The present ditch riprap design has been based on the largest gully identifiable from the topo within the ditch's northerly drainage area. The drainage area of this gully is about 50 percent of the entire northerly drainage area and its cross-section adjacent to the ditch side slope is relatively narrow producing a relatively large flow depth and shear force. This gully, most likely, is not typical of other existing and future gullies, although riprap design has been conservatively designed based on shear produced by a 50 percent of entire drainage area on a relatively narrow section.

Within the gully cross-section, where it intersects the top of the ditch side slope, shear forces due to concentrated gully flow and the corresponding minimum D_{50} rock size were calculated using the U.S. Army COE's method (Ref. 1). The minimum D_{50} rock size was also calculated using the Factor of Safety Method (Ref. 2) which considers stability of the rock against sliding and overturning due to lift and drag forces.

Along the ditch side slope (5 horizontal to 1 vertical), calculations for minimum D_{50} were made by assuming that the width of the concentrated flow will be the same as the concentrated gully flow width at the top of the slope. This assumption is conservative since there is no restraint on the flow from spreading laterally giving a smaller Q per ft. width then at the top, as it flows down the side slope. The method of calculations were -- U.S. Army C.O.E.'s method (Ref. 1), Factor of Safety method (Ref. 2) and Stephenson's method (Ref. 3).

Within the Interceptor ditch itself, where the gully inflow will cause additional turbulence, the design approach was based on U.S. C.O.E.'s Hydraulic Design Criteria (Ref. 4) pertaining to stilling basin riprap design and other high-level turbulence conditions. The minimum D_{50} so obtained was larger than the corresponding D_{50} for ditch flow without any gully inflow -- the latter is usually calculated by the Factor of Safety method.

The results of these calculations are summarized in Table 1 below:

TABLE 1. Minimum D_{50} Riprap Size by Various Methods (Inch)
-- For Gully Inflow Into Ditch

Location	U.S. Army-C.O.E. (Boundary Shear)	Factor of Safety	Stephenson's	U.S. Army C.O.E. (Stilling Basin - High Turbulence)
Gully	18	18	NA	NA
Side Slope 5:1	18	21	10	NA
Ditch Bottom, including flow depth + 2 ft. Freeboard:				
East Branch	NA	NA	NA	28
West Branch	NA	NA	NA	24

NA = Not Applicable.

Along the ditch side slope D_{50} of 21 inches is proposed along entire length and both sides of ditch in view of design considerations 1(c) and (d).

Along the ditch bottom and including the flow depth plus 2 ft. freeboard, D_{50}'s of 28-inch and 24-inch are proposed along the East and the West branches. Note that corresponding D_{50}'s without gully inflow considerations are 24 inch and 20 inch.

Note that the above D_{50}'s could change somewhat as the ditch design is being further refined.

2. Protection of Ditch from Long-Term Natural Deepening of Gully:

A statistical correlation of drainage basin parameters with the existing gully depths was made (Ref. 5). THe data were measured from a 1"=200' topo with 2' contour intervals. Potential gully depth corresponding to the basin parameters - drainage area and slope, was estimated based on this correlation. The correlation showed a definite trend although the data points were considerably scattered. A positive one standard deviation line was drawn parallel to the least-square fit line.

The potential gully depth along the north side of Interceptor Ditch 1 was estimated to be about 7.5 feet, based on the plus one standard deviation line.

A 7.5 foot riprapped trench is being considered along the entire north edge of Interceptor Ditch 1. It is assumed that when the ultimate gully depth occurs adjacent to this north edge, a portion of the trench riprap will collapse into a stable configuration and prevent further gully encroachment into the ditch.

3. Design of Interceptor Ditch 2:

This ditch is located north from Interceptor Ditch 1. It intercepts runoff from approximately 3 acres and directs this runoff to the west into a canyon away from the tailings embankment. This ditch will eventually deepen and erode in a northwesterly direction, posing no threat to the tailings embankment. Upon TAC's recommendation based on existing geomorphology, we decided not to provide any erosion protection for this ditch. This latter issue was discussed in the San Francisco On-Board

Review meeting of 29 October, 1987, and NRC had agreed that erosion protection of this ditch will not be necessary (Ref. 6).

Currently this ditch is being redesigned into a more efficient alignment and cross-section.

REFERENCES

1. U.S. Army, C.O.E., Hydraulic Design of Flood Control Channels, EM-1110-2-1601, Office of the Chief Engineer, July 1, 1970.

2. Stevens, Michael A., Daryl B. Simons and Gary L. Lewis, "Safety Factors for Riprap Protection", Journal of the Hydraulics Div., ASCE Proc. Paper 12115, May 1976.

3. MKE - UMTRA Design Procedures Manual.

4. U.S. Army C.O.E., Hydraulic Design Criteria, Sheet 712-1, Rev. 9-70, "Stone Stability, Velocity vs. Stone Diameter".

5. MKE - Potential Gully Depths - Estes Gulch Area, March 1988 (Prelim. Calculations).

6. MKE Document No. 5025-RFL-X-01-00711-00, Nov. 03, 1987, Meeting Notes on On-Board Review Meeting for the Rifle Site, at San Francisco, CA on October 29, 1987.

Plans for Implementation: Upon NRC and DOE's concurrence with the design procedures presented above, the calculations and the Contract Documents will be finalized and submitted to NRC and DOE for final approval.

SECTION 3

Confirmation Of Implementation:

Checked By: ______________________________, Date: ________________________

Approved By: ______________________________, Date: ________________________

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Rifle Phase II

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Commentor: NRC

Date: 22 February 1988

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SW2. Protection of Toe Ditch Berms

We note from our review of the contract drawings (RFL-DS-10-0723) that no erosion protection is proposed for the downstream slopes of the toe ditch berms that will be needed at several low points along the toe ditch (e.g. where natural gullies are crossed). It appears that some erosion protection should be provided on the slopes and at the toe of the slope, since the slopes are steep and are likely to be eroded over the 1000-year stability period. Accordingly, erosion protection should be provided in accordance with typical UMTRA design practice.

SECTION 2

Response: Page

By: H. Majumdar

Date: 28 March 1988

Agreed that erosion protection of the toe ditch berms is necessary, and currently this design is in progress. A calculation will be provided on the design of the erosion protection and Drawing RFL-DS-10-0723 and related drawings will be revised to show the erosion protection measures.

Plans for Implementation:

SECTION 3

Confirmation Of Implementation:

Checked By: ____________________________, Date: ______________________

Approved By: ____________________________, Date: ______________________

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SW3. Durability of Riprap

Specifications for riprap material presented in the preliminary design ref. indicate that the rock will meet only the following durability requirements:

Specific Gravity	- Not less than 2.55
Absorption	- Not greater than 3.00%
$NaSO_4$ Soundness	- Not greater than 25% loss (5 cycles)
LA Abrasion	- Not greater than 35% loss (100 revs)

In general, we consider that these requirements will not be acceptable to assure that the EPA long-term stability requirements will be met. Based on research performed for the NRC staff, we conclude that rock which meets only these specifications is likely to weather severely and may not meet EPA longevity standards.

While we recognize that the selected rock will likely exceed these minimum requirements, it is nevertheless possible that rock approaching the minimum limits could be used if these specifications are followed. The minimum limits should be raised and/or an acceptable quarry should be located. The source selected should be one where the rock is of good quality, based on actual durability tests.

The riprap described in this design is not considered acceptable, even if oversized. DOE should provide the basis for selection of the rock durability specifications and should provide additional information regarding the durability of the selected rock, including information and evaluations related

to oversizing. In addition, DOE should document the efforts that have been made to locate sources of good-quality rock.

SECTION 2

Response: Page By: G. Cherrington

Date: 28 March 1988

The specifications for rock riprap have been revised and the required test values upgraded to the following:

Specific Gravity	- Not less than 2.65
Absorption	- Not greater than 2.0%
$NaSO_4$ Soundness	- Not greater than 10% loss (5 cycles)
LA Abrasion	- Equal to or less than 10% loss (100 revs)

Large size rock (riprap sizes C, D and E, which vary from 22 to 50 inches in diameter) will consist of limestone taken from the New Quarry at Glenwood Springs. The rating for this rock using the NRC criteria is 80, which qualifies the rock as the best available rock in the project area.

The smaller size rock will be obtained from local gravel pits situated along the banks of the Colorado River. The rock rating on three local pits (Corn, Frei and Casey Concrete) using the NRC criteria ranges from 84 to 86.

Additional information is available in calculation 06-559-01-00.

Plans for Implementation:

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Confirmation Of Implementation:

Checked By: ______________________________, Date: ________________________

Approved By: _____________________________, Date: ________________________

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SW4. Clogging of Diversion Ditches.

Our review of the design of the diversion ditches indicates that the ditches will be constructed with longitudinal slopes that are less than the slopes of the natural terrain that will carry runoff into the ditches. We note that diversion ditch #2 will have a slope of 5%, while the runoff will flow into the ditches from slopes which are approximately 25%. Diversion ditch #1 will have a slope of about 6-8%, with inflow slopes of approximately 10-20%. With such large differences in slope, it is possible that large amounts of debris, rocks, and sediment will be deposited in the diversion ditches, and the ditches may not be able to adequately flush themselves, because the material deposited by the higher-velocity flows into the ditch will be larger than the material that can be moved by the lower-velocity flows immediately in the ditch.

The design of the ditches should be revised to accommodate this concern. Acceptable methods of resolution include:

a. Provide a design where the unflushable material is effectively stored in the ditch. This would require that the ditches probably be wider and/or deeper.

b. Provide information and analyses which indicate that the ditches will be self-cleaning and will never be clogged.

c. Provide analyses and data which show that unflushable sediment, rocks, and debris will not be deposited in the ditches.

SECTION 2

Response: Page By: H. Majumdar

Date: 28 March 1988

The velocities in Interceptor Ditch 1 are nearly equal to velocity in the largest gully that flows into it. Under PMF condition, velocity in this gully ranges from 10 FPS in a narrow section to 8 FPS in a relatively wide section and in the Interceptor ditch velocity is in the range of 7 to 9 FPS. While it is true that the natural terrain north of the ditch is steeper than the ditch slope, the ditch collects more runoff than provided by the natural terrain. The ditch has long 5:1 sideslopes including 10' base width. Roughly 75 percent of the runoff originates in the natural drainage area which provides the sediments and 25 percent of the runoff originates within the ditch itself, which has practically no sediments.

The gradation of a soil sample from Test Hole No. MET-12 which is located in the natural drainage area north of Interceptor Ditch 1 shows predominantly fine materials which can be moved in and out of the ditch with even lower velocities in the range of 2 FPS (fine sand, silt) to 5FPS (coarse gravel to cobbles and shingles - Ref. Ven Te Chow - Open Channel Hydraulics, 1959).

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Approved By: ____________, Date: ____________

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SW5. Protection of Downstream End of Ditches

Our review of the design of the erosion protection for the downstream end of the interceptor ditches and the toe ditch indicates that the design may not be adequate. It appears that flood flows, upon leaving the ditch, will then flow into the natural channel at a much higher velocity than the natural materials are capable of withstanding. This may lead to headcutting of the gully and undercutting of the downstream toe protection, eventually resulting in damage to the erosion protection for the ditch.

In order to properly design this end protection, the riprap should either be keyed into bedrock at these locations or be designed to fail in a manner which will not result in further damage to the ditches themselves. As designed, the erosion protection will not be capable of resisting flood flows following collapse into a scoured cross-section.

One acceptable design method would be to design the erosion protection assuming the occurrence of a natural cross-section which has been eroded to a predetermined stable elevation. The design should be revised accordingly.

SECTION 2

Response: Page By: H. Majumdar

Date: 28 March 1988

We share NRC's concern about the long-term stability of the ditch outlets in view of erosion of the natural materials and gully undercutting. Depth to bedrock is in excess of 40' and keying into the bedrock is not feasible. As suggested above, the outlets have been designed such that in the event the toe collapses, it will assume a stable configuration and gullying action will not encroach any further upstream. This method requires an estimate of the potential long-term gully depth. Accordingly, existing gully depths have been measured (from topo maps) and correlated to other basin parameters such as drainage areas and gully slopes, in the Estes Gulch area. The statistical correlation shows a lot of scatter with a large standard deviation. When using these data to predict potential gully depths, the underlying assumptions are that these existing gullies presumably have formed over the past several thousand years, and that these gully depths (as measured on topo maps) are the true depths. To account for some of these uncertainties, the positive one standard deviation line has been used in predicting potential gully depths.

Furthermore, the outlets have been provided with a gradual flare so as to reduce flow depth and shear stresses in an attempt to prevent loss of the larger-sized rocks as far as practicable.

Plans for Implementation:

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Confirmation Of Implementation:

Checked By: ____________________, Date: ____________________

Approved By: ____________________, Date: ____________________

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SW6. Specifications for Rock Placement

We note that relatively large riprap will be required in many locations for this design. We further note from our review of the specifications that there appear to be no special provisions to assure that this large rock will be acceptably placed. Our experience with rock of this size indicates that uniform placement may be particularly difficult to achieve.

Recognizing that very large riprap is difficult to handle, a more-detailed specification should be provided to assure that special care is taken to place the large rock in a manner where:

1) void spaces are minimized,
2) thin spots are avoided, and
3) rock of adequate size is always placed.

The specifications should be revised to accommodate this concern. Specifications which include provisions for additional or more frequent inspections, in-place gradation testing, and possible hand placement may provide acceptable resolution.

SECTION 2

Response: Page By: G. Cherrington

Date: 28 March 1988

The specifications for rock placement have been revised to address these concerns.

Plans for Implementation:

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Confirmation Of Implementation:

Checked By: ____________________, Date: ____________________

Approved By: ____________________, Date: ____________________

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SECTION 1

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G1. General: Consideration of NRC Geology/Seismology comments on the dRAP in the design

It appears that NRC's previously identified concern (NRC comments on Rifle Draft Remedial Action Plan dated July 9, 1987) about considering the Western Mountain seismotectonic province in earthquake design calculations was not incorporated in the calculations presented in the Phase II design documents. It seems only the Colorado Plateau seismo-tectonic province was considered.

For NRC's other geology/seismology dRAP comments it is unclear whether or not they were considered in DOE's design. It should be made clear that the issues raised in the comments on the dRAP have been addressed.

SECTION 2

Response: Page
By:
Date:

The response to this comment is being prepared and will be submitted separately.

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Checked By: ______________________________, Date: ________________________

Approved By: ______________________________, Date: ________________________

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G2. Fracture permeability of the foundation

No information is provided or referenced on the fracture permeability of the foundation. It is unclear whether or not the extensive fracturing of the Wasatch foundation rock, which is evident from Estes Gulch borehole logs, is considered in the design or how it might have influenced the design.

SECTION 2

Response: Page By: E. Tom
Date: 28 March 1988

Fracturing of the Wasatch foundation rock has not been considered to date in the design. This topic will be considered upon resolution of groundwater issues and design guidelines which are to be established by DOE in the near future.

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Checked By: ______________________, Date: ____________________

Approved By: ______________________, Date: ____________________

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GT1 - Disposal of Asbestos and Hazardous Waste Materials

The handling and disposal of asbestos and containers of hazardous materials with the tailings and other described contaminated and uncontaminated materials is mentioned in the subcontract documents (pages 02200-1 and 02200-18). There is no description or characterization of either the asbestos or the hazardous materials. A description of these materials, the quantities involved, and other important characteristics that ensure proper disposal of these materials should be included in future documents. The discussion should include information on any effect the inclusion of these materials will have on the design and the performance of the tailings embankment.

SECTION 2

Response: Page By: G. Cherrington

Date: 28 March 1988

The available description/characterization of the asbestos and hazardous material can be found in the Information to Bidders.

A description of the materials, quantities involved and other significant characteristics will be included in a future calculation.

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Approved By: ______________________, Date: ____________________

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GT2 - Preparation of Foundation Soils

Cross-Section A in Drawing No. RFL-DS-10-0723 of the Phase II Design Documents indicates large areas at both the north and south ends of the stabilized tailings embankment where no apparent foundation preparation will take place. However, tailings embankment details found in Drawing No. RFL-DS-10-0724 appear to contradict this. Foundation preparation is indicated on the typical detail of the south toe (Detail 2) and the apron (Details 1 and 3) drawings. This discrepancy should be corrected. Details of this foundation preparation should be included in future remedial action documents.

SECTION 2

Response: Page
Date: 24 March 1988

By: A. B. Yiadom

The discrepancy will be eliminated in the Final Design. Details of the foundation (subgrade) preparation are included in the Specifications Document (Section 02200, Article 3.7). It should be noted that as standard practice, all excavated foundation surfaces will be prepared prior to placement of additional materials or for fnal grading.

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Approved By: ______________________________, Date: ________________________

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GT3 - Shear Strength Tests and Values

In the NRC staff comments on the dRAP and the dEIS on the Rifle UMTRA sites, staff had several concerns regarding the shear strength tests and values reported in these documents. In reviewing the soil properties for design (Calculation No. 06-525-05-00), staff concludes that, for the most part, these concerns have not been addressed in the Preliminary Design documents. These concerns are reiterated below. These concerns must be addressed in future design or remedial action documents.

a) The shear strength value reported for the foundation soil is still based on only one laboratory test. Staff continues to recommend additional tests to fully characterize this material.

b) The shear strength value reported for the sand-slime tailings is based on one unconsolidated-undrained triaxial test. Staff continues to recommend additional tests to fully characterize this material.

c) The shear strength values reported for the foundation soils, remolded ("radon barrier") soils, and the tailings materials are all based on non-standard "staged" triaxial shear strength tests. Staff continues to be concerned over the use of this non-standard test, and continues to recommend the use of standard engineering practice where triaxial compression tests are performed on several samples of the same material at the same density and moisture content.

SECTION 2

Response: Page ______________________ By: A. B. Yiadom

Date: 24 March 1988

Additional tests (MKE investigation program, 1987) have been carried out since the Preliminary Design to fully characterize the foundation soil and the other material components of the embankment pile. These test results will be included in the Final Design.

Recent test results from single-stage tests on remolded foundation soil (radon barrier) confirmed results previously obtained in multi-stage triaxial tests.

Because of the difficulty in obtaining enough undisturbed samples of the foundation soils for single stage tests, multi-staged tests were generally performed, and only one single stage test (one confining pressure) is being performed to verify the multi-stage test results.

Single staged triaxial tests are performed to evaluate the shear strength.

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Approved By: ______________________, Date: ______________________

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GT4 - Subpile and Offpile Materials

Design properties of the off- and subpile materials reported in Calculation No. 06-525-05-00 are assumed based on limited available information reported in the dRAP. The assumed values are within reasonable ranges of values, considering that these materials should be similar to the soils characterized at the Old and New Rifle sites. However, these materials make-up approximately 22% of the estimated total of all materials that wil be disposed of, and the offpile materials will be placed over the tailings materials in a separate layer, as shown on the drawings in the subcontract documents. Therefore, these materials should be characterized separately and completely, and the use of assumptions justified if they will be used. These characterizations should appear in future design and remedial action documents.

SECTION 2

Response: Page By: A. B. Yiadom/E. C. Tom

Date: 24 March 1988

Additional geotechnical investigations (MKE, 1987) have been carried out and laboratory test results are being used to characterize the subpile and offpile materials. It should be noted that the Old Rifle site subpile and offpile/windblown materials (approximately 8% of total of all materials) may be mixed with the New Rifle tailings during disposal cell placement in order to achieve possible savings in scheduling time and construction cost.

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Approved By: ______________________, Date: ________________

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GT5 - Properties of Sand-Slime Mixtures

Values for in-situ dry density, moisture content, and moisture content vs. dry density (standard proctor test) reported in Calculation No. 06-525-05-00 for the sand-slime fraction of the tailings from the Old Rifle site are based on laboratory tests on either 2 (in the case of the in-situ dry density and the moisture content) or 1 (in the case of the standard proctor test) laboratory test. The sand-slime fraction of the Old Rifle tailings will comprise approximately 12% of the estimated total amount of tailings to be disposed of. Therefore, these values should be based on results from a more reasonable number of tests considering the significant contribution the material makes to the total amount of material. These additional test results should appear in future design or remedial action documents.

SECTION 2

Response: Page

By: A. B. Yiadom

Date: 25 March 1988

Additional tests are being carried out to fully characterize the sand-slime mixtures and the other tailings materials. The results will be included in the Final for Review.

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GT6 - Boring and Test Pit Identifications

The identification numbers for borings 917, 918, and 919 have been changed on sheet 30 of Calculation No. 06-525-05-00. According to details provided in Appendix A of the Preliminary Design documents, these changes are erroneous.

SECTION 2

Response: Page

By: A. B. Yiadom

Date: 25 March 1988

TAC in their dRAP used the boring numbers 917, 918 and 919 interchangeably with numbers 925, 926 and 927 respectively. Thus both sets of numbers will be indicated on sheet 30 and on applicable drawings for clarification. (The dRAP document used the 917, 918 and 918 numbers, whereas the laboratory results and the boring location map used the 925, 926 and 927 set of numbers.)

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GT7 - Young's Modulus for Tailings

In Calculation No. 06-525-09-00, there is a statement that no triaxial testing of compacted tailings materials has been done, and therefore, assumptions are made regarding the parameter values needed to calculate the Young's Modulus for these materials. However, results from triaxial tests on tailings materials are reported in Figures D.4.54 through D.4.58 in the dRAP. This conflict should be resolved, preferably by additional triaxial testing that is recommended in staff comment GT/3.

SECTION 2

Response: Page   By: A. B. Yiadom
Date: 25 March 1988

Additional triaxial tests have been performed and the results will be used to calculate the Young's Modulus for the tailings, if needed. Triaxial test results are reported in the dRAP, however, stress-strain data were not reported. Therefore it was not possible to calculate the Young's Modulus from the figures in the dRAP. Calculation No. 06-525-09-00 has been superseded, and the new calculation (06-543-05-00) does not require the Young's Modulus.

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GT8 - Material Geotechnical Characteristics

Following the review of the dRAP and of all Volumes of Calculations for the Phase II Preliminary Design of the Rifle, CO UMTRA tailings embankment, it must be noted that considerable inconsistencies are present in the descriptions of and the characterizations of the subpile materials, offpile contaminated materials, and the windblown tailings which will be disposed of in the embankment.

In the dRAP, subpile materials are described, along with tailings materials, as "onpile and subpile contamination". Also, in the dRAP, contaminated materials that are near the existing piles and the former mill locations are considered as "off-pile" contamination. Within this material will be some small patches of windblown tailings that are near the aforementioned locations. Windblown tailings are considered a separate type of contaminated material, and are so described.

In the Phase II Preliminary Design, these materials are not characterized clearly in these same categories. In Calculation No. 06-525-05-00, Geotechnical Characteristics, the off-pile and subpile materials are characterized together, while the tailings are characterized separately. In Calculation No. 06-525-09-00, "Settlement Analysis", the materials are characterized in the same divisions as the dRAP. Windblown tailings are not separately characterized in either calculation. These inconsistencies cause confusing use of material geotechnical properties which need to be resolved. First, since the off-pile contaminated materials are to be placed in the embankment as a wholly separate layer, they need full characterization. The

curent Phase II Preliminary Design documents use only assumptions regarding the properties of this material.

Second, the subpile materials need to be correctly considered together with the tailings materials for disposal in the embankment, and they require additional characterization, as previously discussed in comment GT/4.

SECTION 2

Response: Page By: A. B. Yiadom/E. C. Tom
Date: 25 March 1988

In the Final Design, the following contaminated materials are characterized individually with their own parameters:

i) Tailings
ii) Subpile materials
iii) Offpile/windblown materials

The subpile materials are defined as contaminated foundation materials below the tailings piles. Any other materials not classified as tailings and subpile materials will be considered as offpile or windblown materials.

Since the windblown materials are actually in-situ materials contaminated by small amounts of windblown deposited tailings, they are essentially the same soil as those of the offpile materials and are therefore grouped together as the same type. Please also see the response to comment GT4 for mixing of some of those groups during disposal placement.

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GW1. General: No Accompanying Analyses Demonstrating Compliance with EPA Standards for Ground-Water Protection

No analyses or calculations demonstrating how the disposal design will result in the remedial actions meeting EPA ground-water protection standards accompany the design for the disposal of the Rifle tailings. NRC technical staff cannot review the merits of the disposal design, or the contribution of the design to protection of ground water, without accompanying rationale or calculations, especially when so little information on ground-water resources was available in the RAP/EIS. NRC staff cannot review ground-water protection aspects of the design until the rationale, calculations and analyses are supplied for NRC review.

SECTION 2

Response: Page
Date: 28 March 1988

By: G. Cherrington

This work is on hold pending guidance on scope and approach which will be determined by the Joint Study Group (MKE/MKF/TAC/DOE/NRC) on infiltration and groundwater issues.

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GW2. Drawing RFL-PS-10-0710, Subcontract Documents, Locations of Water Retention Basin and/or Water Treatment Facility (New Rifle)

The drawing does not show where the water retention basin and/or the water treatment facility will be located on the construction site at New Rifle. Because of the volumes of water resulting from desaturation of the tailings, and the current levels of contamination expected to be present, a waste water treatment facility will almost assuredly be needed. NRC staff request that DOE document the location and capacities of the water retention basin and treatment facility so that potential effects on the hydrologic regime can be assessed.

SECTION 2

Response: Page

By: H. Majumdar

Date: 28 March 1988

Drawing RFL-PS-10-0710 does show the locations of the wastewater retention basin and the treatment plant pad - on the southwest corner of the site. However, these facilities have not been labeled as such. A wastewater treatment plant in the (200-300) gpm capacity range is now being considered, and will operate full time at the New Rifle processing site. It will be located adjacent to the retention basin.

The retention basin and the wastewater treatment plant location will be labeled in Drawing RFL-PS-10-0710.

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GW3. Drawing RFL-DS-10-0723, Subcontract Documents, Tailings Embankment Design

Cross-section A of the subject drawing indicates that the foundation colluvium soil will be "prepared" after a minor amount of excavation. NRC staff is unsure of the rationale associated with this design component. Also, the Preliminary Design does not describe the final conditions of this portion of the embankment, specifically the hydraulic conductivity of the prepared foundation. The hydraulic conductivity is important, in this case, because water may accumulate in the base of the containment cell if the substrate becomes nearly impermeable, resulting in increased saturation and leaching of the tailings. This potential also has geotechnical implications if the tailings become saturated and lose strength. NRC technical staff requests that DOE specify the final anticipated conditions of the "prepared foundation", and analyze whether the foundation will inhibit downward flow of water (and leachate) and promote its accumulation in the base of the containment cell.

Also related to this concern is the configuration of the excavated containment cell along the A center line, at approximately station 23+00. It appears that a minor flank of foundation soil, sloping towards the center of the cell, will remain unexcavated. This design, with a cell base slope of 8%, will likely result in accumulation of leachate in the area of the slope break. The accumulation will become more pronounced if the foundation soil is compacted to a minimum hydraulic conductivity. Although the flank in itself is not a concern, the sloping cell base, used in conjunction with the flank could result in accumulation of water, leachate generation, and subsequent formation of seeps in the toe ditch.

DOE should evaluate the potential for accumulation in the southern end of the cell, and analyze the design for seepage emanating from the cell base. The design should be modified, if necessary, so that water will not concentrate in any area of the containment cell.

SECTION 2

Response: Page By: E. C. Tom
Date: 24 March 1988

The "prepared" foundation is standard practice for an excavated foundation surface prior to placement of fill to assure a good bonding between the fill and the foundation.

Hydraulic conductivity of the prepared foundation and other leachate accumulation related issues are to be resolved later pending outcome of studies by the UMTRA Joint Study Group on infiltration and groundwater issues.

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GW4. Calculation No. 06-514-01-00, Volume I, Geohydrology Summary

After estimating the dewatering rate necessary to desaturate the tailings, RAC technical staff "strongly recommended that more data be obtained for use in these calculations" (Sheet 2). The reason for this statement is that only two values for transmissivity, storativity and hydraulic conductivity of the alluvial aquifer were available from the site characterization. The RAC also recommends that "excavation be performed in the drier season (if possible)", because the ground-water levels and dewatering rates will be lower. NRC staff also requests that DOE obtain additional data characterizing the ability of the alluvium to transmit water, specifically transmissivity, storativity and hydraulic conductivity. The requested additional information will improve predictions for dewatering rates, water treatment/storage capacities, and possible environmental impacts from discharge into the Colorado River (for the NPDES permit).

SECTION 2

Response: Page By:
Date:

The calculation has been superseded by MKE Calc. No. 06-546-04-00. The preliminary calculation indicates that there were two hydraulic conductivity values. However, in our final calculation we have used an average of the ten hydraulic conductivity values obtained by TAC and presented in the EIS.

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GW5. Calculation No. 06-524-14-00, Volume III, Size of Retention Basins

The Preliminary Design omitted references #2 and #3 (calculation numbers 06-515-01-00 and 06-515-02-00) which deal with sizing of the retention basins for the New and Old Rifle sites. DOE should provide these references for NRC review.

SECTION 2

Response: Page
Date: 28 March 1988

By: H. Majumdar

These two referenced calculations were presented as part of the Phase I submittal.

Plans for Implementation: See above.

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GW6. Calculation No. 06-524-14-00, Volume III, Size of Retention Basins

This calculation describes the method of sizing the retention basins for the New and Old Rifle sites. The method appears to consider only surface water runoff expected to occur during excavation. The design does not appear to consider additional volumes of waste water from dewatering of the tailings which are below the water table. DOE should indicate whether these retention basins are designed to store only surface water runoff, or whether additional volumes from dewatering are expected.

SECTION 2

Response: Page

By: H. Majumdar

Date: 28 March 1988

The above-mentioned calculation has been revised (which is now Calc. No. 06-524-14-01), and included in Vol. I of Rifle Phase II Final Design Calculations for Review. This Calculation is intended to estimate only the surface runoffs resulting from mean monthly runoffs (including snowmelt). Results from this calculation plus results from other calculations for 10-year 24-hour storm, sediments, dewatering inflows go into a separate Calculation, which combines all these flows for designing the wastewater facilities. The new calculation is numbered 06-554-01-00 and entitled "Wastewater Handling - Wastewater Treatment Facilities Design and Staging".

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GW7. Calculation No. 06-525-06-00, Volume IV, Radon Barrier Design - Thickness

The final radon barrier thickness of 3.5 feet proposed for the Estes Gulch site, is only designed to minimize radon exhalation rates. Potential infiltration through the cover was not considered. The cover design must be thick enough, and compacted to a low enough hydraulic conductivity to also minimize infiltration and leachate generation. DOE should analyze the cover to predict whether the cover is thick enough to minimize infiltration to meet EPA standards for ground-water protection.

SECTION 2

Response: Page
Date: 28 March 1988

By: E. C. Tom

Final design of the radon barrier to minimize infiltration is on hold pending outcome of a study by the UMTRA Joint Study Group on infiltration and groundwater issues.

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