Rio Algom Mining LLC

October 17, 2006

ADDRESSEE ONLY
Mr. William Von Till, Chief
Uranium Processing Section
Fuel Cycle Facilities Branch, NMSS
Mail Stop T-8A33
U.S. Nuclear Regulatory Commission
Washington, DC 20850

Re: **License SUA-1473, Docket 40-8905**
Amendment Request – Pond 3 Erosion Protection Plan

Dear Mr. Von Till,

By this letter, Rio Algom Mining LLC (RAM) requests modification of the Pond 3 erosion protection plan previously approved by the Nuclear Regulatory commission (NRC) as part of License Amendment 51 in November 2002.

RAM proposes to eliminate the use of the secondary sand filter layer for the Pond 3 erosion protection design elements. These elements include:

1. Pond 1 apron for run-off from Pond 1 east embankment slope onto Pond 3 top surface;
2. Pond 3 east embankment slope;
3. Pond 3 east embankment toe apron for run-off from Pond 3 east embankment slope

The attached engineering evaluation report, prepared by Mr. Curt Sealy, P.E., of Maxim Technologies, provides justification for not requiring the placement of a sand layer. Additionally, this design change will not affect the long term stability of Pond 3 as the modified design will continue to provide reasonable assurance that the Pond 3 erosion protection design will meet the 1000 year design criteria specified in Criterion 6 of 10 CFR Part 40, Appendix A.

In addition to this request, Rio Algom identified a typographical error on one of the drawings associated with the previously approved plan. Review of Drawing 3 of 13 of the approved plan indicated an error in the rock size depicted on the print.

P.O. Box 218, Grants, NM USA 87020 - Tel: 505.287.8851 - Fax: 505.285.5550

The rock sizing calculations contained in the submittal for the Pond 1 apron for run-off from Pond 1 east embankment slope onto Pond 3 top surface established a rock size for the apron of D_{50} = 7.8 inches. The original print incorrectly assigned a D_{50} = 12 inches. RAM has revised Drawing 3 of 13 to reflect the approved rock size of D_{50} = 7.8 inches. The corrected Drawing 3 of 13 is included within the attached technical report.

Rio Algom is willing to meet with NRC staff to further discuss this modification request to facilitate a timely review and approval process. Please contact me if you have any questions or are in need of additional information related to this modification request.

Regards,

Peter Luthiger
Manager, Radiation Safety
and Environmental Affairs

Attachment: As stated

xc: T. Fletcher
R. Jones (KM)
R. Lukes (NRC)
C. Sealy (Maxim – w/o attachment)
File

MAXIM TECHNOLOGIES
A DIVISION OF TETRA TECH, INC.

10601 Lomas. NE, Suite 106
Albuquerque, NM 87112
Office 505.237.8440
Fax 505.237.8656

October 13, 2006

Mr. Terry Fletcher
Rio Algom Mining, LLC
Highway 605 & 509
Grants, NM 87020

Reference: Amendments to Erosion Protection Drawing for Pond 3 area
Task 3 Design Report
Ambrosia Lake Mill, Grants, NM

Dear Mr. Fletcher,

As requested by Rio Algom Mining, LLC, Maxim Technologies has conducted a review of the erosion protection design for the Pond 3 area. Specifically, this office reviewed the erosion protection rock sizing and the need for a secondary sand filter beneath the primary filter material being placed under the riprap erosion protection material.

The following is a summary of our findings and drawing revisions on the above issues

- Rock sizing – we reviewed the rock size requirements at the Pond 1-Pond 3 interface. The correct rock size is D_{50}=7.8 inches. Drawing 3 of 13 has been corrected to reflect this value.

- Filter Layers (Bedding Material) – The use of multi-layer filters below the rock protection layer for the Pond 3 area was analyzed. The result of the analysis is presented in a design memorandum attached to this letter. The analysis shows that a primary filter having the gradation as shown on the plans will meet the required criteria for protection and that a secondary filter (sand layer) is not needed. Drawings 3, 4, and 5 representing the channel for the Pond 3 area have been revised with the secondary sand layer removed. Please note that slight adjustments to dimensions of the channels and other design features have been made due to the removal of the secondary sand layer.

- An additional detail on Drawing 4 of 13 has been provided to illustrate the crest of Pond 3 and the blending of the side slope erosion protection (D_{50}=12") with the Pond 3 surface erosion protection (D_{50}=1.0").

- Drawing 5 of 13 has been revised to extend the D_{50}=1.0" rock along the northeast and east sides of the Pond 3 embankment at the toe of the erosion protection apron. The extended rock shall be blended to match the natural grade surface within an approximate 10-foot distance.

MAXIM

After reviewing this letter, drawings and design memorandum, if you have any questions, please do not hesitate to contact this office, 505-237-8440.

Sincerely,

Curtis O. Sealy, P. E.
Maxim Technologies

Amendment to the Pond 3 area

Erosion Protection

Submitted April 22, 2005 and July 28, 2003

Rio Algom Mining, LLC

Ambrosia Lake Mill, Grants, New Mexico

By
Maxim Technologies
Albuquerque, New Mexico

October 13, 2005

October 13, 2006

Design Memorandum for Placement of Filter Layers (Bedding Media) Below Riprap – Pond 3 Erosion Protection and Erosion Protection for the Area North of Pond 1

Rio Algom Mining Company

Ambrosia Lake Mill, New Mexico

Where riprap is placed on hydraulic structures for erosion protection it is well understood that a filter layer (bedding material) is necessary between the native fine grained materials (protected soil) and the coarse riprap. The locations where filter layers are generally required beneath riprap include dams, tailings impoundment covers including side slopes, toes of slopes, and transition areas. Flow impact areas, stilling areas and channels also require the use of filter layers underneath riprap. The primary purpose of the filter layer is to bed the riprap and prevent the loss of the protected soil into the coarse stone. The filter material also prevents penetration of rock into the soil and prevents soil erosion due to flow at the soil/rock interface. The layer also serves to inhibit pooling of precipitation and runoff from infiltrating into the impoundment cover. For the case of tailings pile covers and open channels, the situation differs from seepage through dams because of the lack of a significant hydraulic gradient from the native protected soil into the rock Water tends to move along the interface between the coarse riprap layer and the protected fine grain soil layer. In this case the need for a fine bedding layer below the primary filter (multiple filters) is seldom justified. However, the need for an additional bedding layer below the primary filter can be analyzed by methods presented in the USNRC regulatory guidance documents.

The issue becomes the potential for loss of fine grained material at the interface of the filter material and native soil. If the interstitial flow velocity at the primary filter/soil interface is insufficient to move soil particles then a secondary filter material is not required. USNRC guidance documents NUREG-4620 and NUREG-1623 recommends an analysis proposed by Leps (1973)[1] be used to evaluate the interstitial velocity at the filter/soil interface.

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[1] Leps, J. M., "Flow through Rockfill," **Embankment Dam Engineering,** John Wiley and Sons, pp 87-107 1973

Leps investigated the flow through rock and determined the following relationship based on properties of the porous media.

$$V_v = Wm^{0.5} I^{0.54} \quad (1.1)$$

Where Vv is the average velocity of water (inches/sec) in the voids of the rockfill, W is an empirical constant for a specific rock material, m is the hydraulic mean radius and I is the hydraulic gradient. Table 1 presents a series of empirically derived values for the hydraulic mean radius, m, and the $Wm^{0.5}$ parameter as developed by Leps and presented in NUREG-4620.

Table 1
Empirically derived values for equation 1.1

Rock Size (Inch)	m (Inch)	$M^{0.5}$ ($Inch^{1/2}$)	$Wm^{0.5}$ (Inch/sec.)
3/4	0.09	0.30	10
2	0.24	0.49	16
6	0.75	0.87	28
8	0.96	0.98	32
24	3.11	1.76	58
48	6.43	2.54	84

Using equation 1.1 the allowable velocity was calculated for the following parameters.

Slope = 20 percent

D_{50} rock size = 1 inch

$Wm^{0.5}$ = 12 interpolated from Table 1.

$$\text{Then } Vv = \frac{12(0.2)^{.54}}{12 \text{ (Unit Conversion)}} = 0.42 \text{ ft/sec}$$

Generally sizes of rock in the filter layer range from 3/16 inch to an upper limit of 3 to 3 ½ inches, depending on the gradation of the riprap. Typically, the filter blanket thickness is one-half the riprap layer thickness.

A series of tests were conducted at Colorado State University by Abt and Ruff[2] (1985) and Equation 1.1 was found to be accurate within ± 15%.

The USNRC guidance document NUREG-1623 suggests that when the computed interstitial velocity is less than 0.5 feet/sec a secondary filter below the primary rock filter may not be needed. When velocities are between 0.5 and 1.0 feet/sec the need for a filter

[2] Abt, S. R. and Ruff, J. R., 1985 Preliminary Results of Interstitial flow and Overtopping flow tests on riprap. Presented to the Nuclear Regulatory Commission, Silver Spring, Maryland, November 21, 1985.

layer will be dependent upon the type of soil material placed at the interface. The guidance further recommends that a filter be provided for interstitial velocities that exceed 1.0 feet/sec.

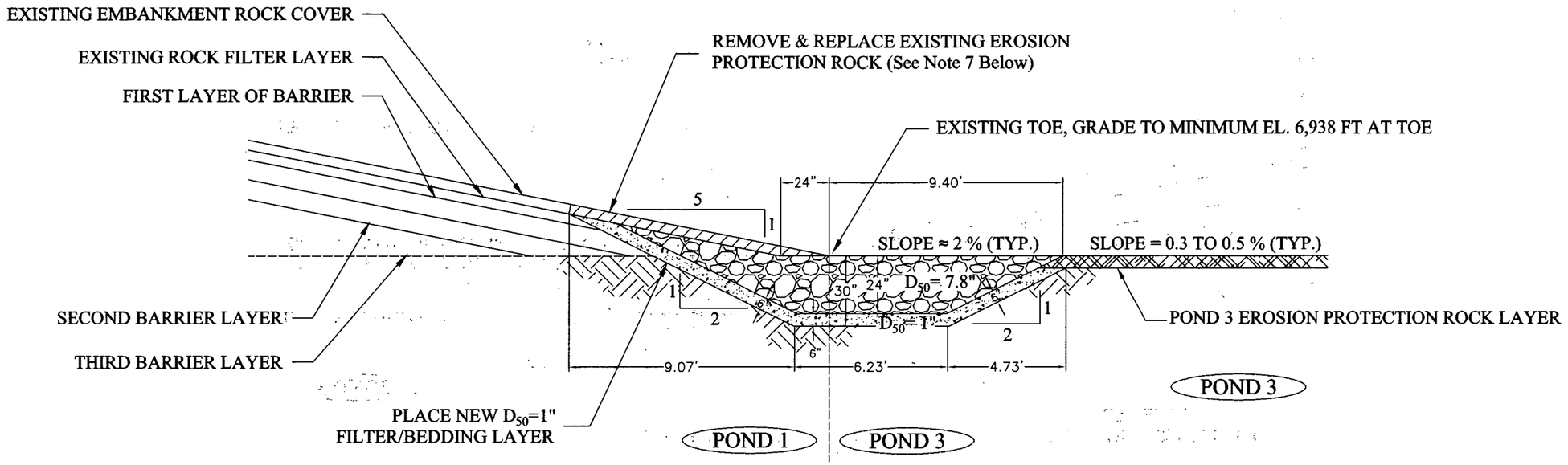
Using equation 1.1 with a primary filter blanket gradation below the riprap shown in Table 2, the interstitial velocity at the filter /soil interface for a 20 percent slope will be 0.4 feet/second. Consequently a secondary filter layer (sand) between the primary filter blanket and soil interface will not be required for slopes less than this value.

Table 2
Primary Filter Material Gradation
Ambrosia Lake, Facility
Rio Algom Mining Company, LLC

Sieve Designation	Percent Passing
3"	100
2"	80-100
¾"	20-70
3/8"	10-30
No 4	0-10

Curtis O. Sealy, P.E.

POND 1 EROSION PROTECTION APRON
FOR RUN-OFF FROM POND 1 EMBANKMENT SLOPE ONTO POND 3 SURFACE
Typical Section



NOTES:

1. Rock Riprap for erosion protection aprons shall be placed in conformance with Appendix F of *Design of Erosion Protection for Long-Term Stabilization,* U.S. Nuclear Regulatory Commission's NUREG - 1623 Draft Report.
2. Erosion protection aprons shall be sloped to the downstream edge with a minimum slope of two percent or at a slope that matches the slope of the natural ground, should it be steeper than two percent.
3. Erosion protection apron excavations shall be constructed with 2H:1V slopes to permit placement of the filter materials as shown above. No tailings shall be excavated. The toe of tailings determines the alignment of erosion protection apron.
4. The erosion protection apron shall be constructed of a rock diameter D_{50} = 7.8" conforming to the following radation:

Sieve Designation	Percent Passing
12"	100
9"	60 - 85
6"	5 - 30
4"	0 - 5

5. The erosion protection filter/bedding layer shall be placed at a minimum thickness of 6" along the length of the apron. The filter/bedding layer shall extend up the 2H:1V sides and end below the Pond 3 erosion protection rock. Filter/bedding material shall be spread and compacted in one layer.
6. The erosion protection apron filter/bedding layer shall be constructed of a rock diameter D_{50}=1", conforming to the following gradation:

Filter/Bedding Gravel

Sieve Designation	Percent Passing
3"	100
2"	80 - 100
3/4"	20 - 70
3/8"	10 - 30
No.4	0 - 10

7. Existing erosion protection disturbed during construction of the erosion protection aprons shall be replaced in a manner that maintains existing slopes and riprap conditions as approved previously by the U.S. Nuclear Regulatory Commission. Care shall be taken in removing and stockpiling the riprap such that the material is not degraded or otherwise damaged. Rock degraded or otherwise out of conformance with the NUREG 1623 due to removal and replacement methods shall be replaced with similar approved materials. Care should be taken so that existing tailings are not disturbed during erosion protection apron construction.
8. The erosion protection apron shall be constructed continuously from the north embankment erosion protection channel/apron (north end of Pond 3) to the south embankment erosion protection channel/apron (south end of Pond 3).
9. The erosion protection apron shall be constructed level from the north end to the south end to prevent longitudinal flows within the apron. The erosion protection apron shall be constructed such that flow from the embankment will flow perpendicular to the apron and onto the Pond 3 surface where it will drain away from the erosion protection apron.

1 in = 5 ft

CURTIS O. SEALY NEW MEXICO 10084 LICENSED PROFESSIONAL ENGINEER

CURTIS O. SEALY, PE

10/13/06
DATE

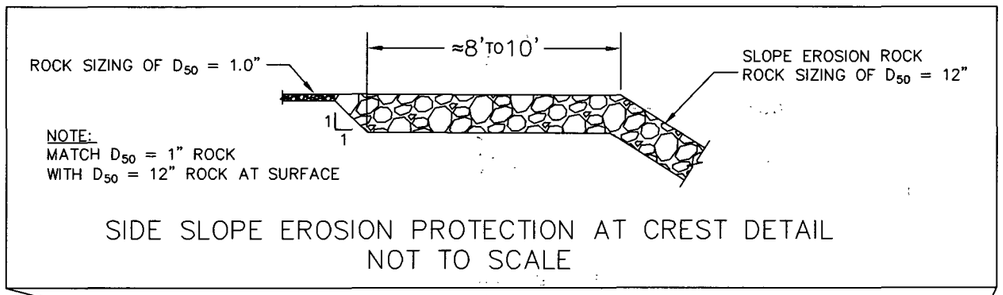
AMBROSIA LAKE MILL
RIO ALGOM MINING, LLC.
GRANTS, NEW MEXICO
TASK 3 EROSION PROTECTION
POND 1 TOE EROSION PROTECTION APRON

MAXIM TECHNOLOGIES INC

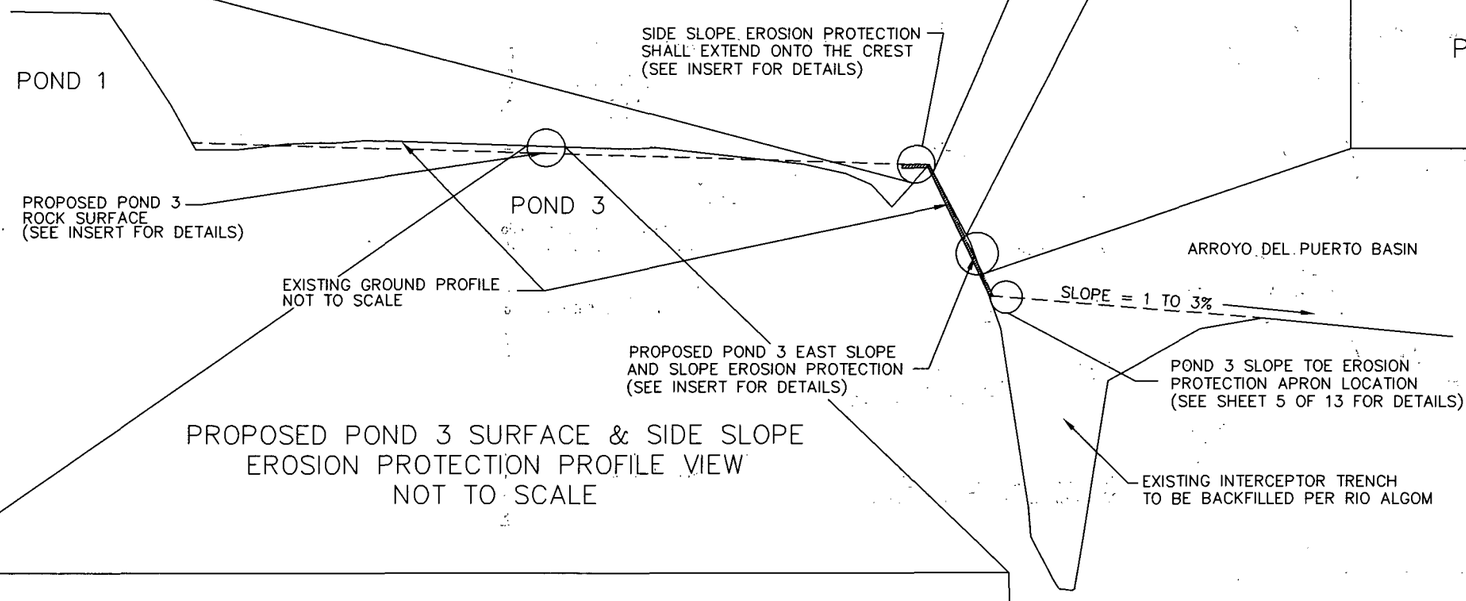
PROJECT No. 1690030-300
FILE NAME: 1690030S3-R2.DWG
DRAWING BY: RLH 2/28/02
MODIFIED BY: EJS 10/4/06
REVIEWED BY: COS

POND 3 - POND SURFACE AND EAST EMBANKMENT EROSION PROTECTION

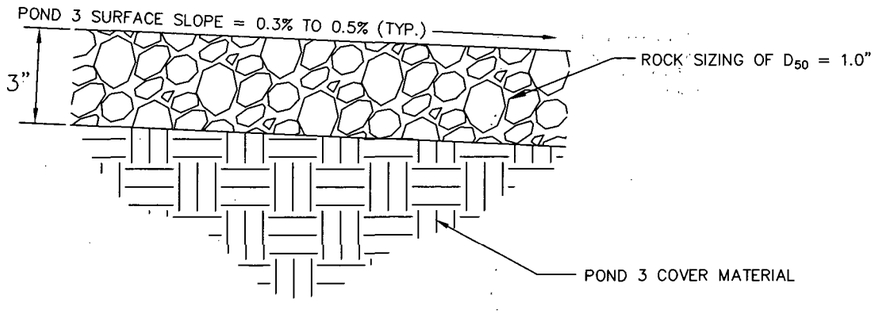
Typical Sections



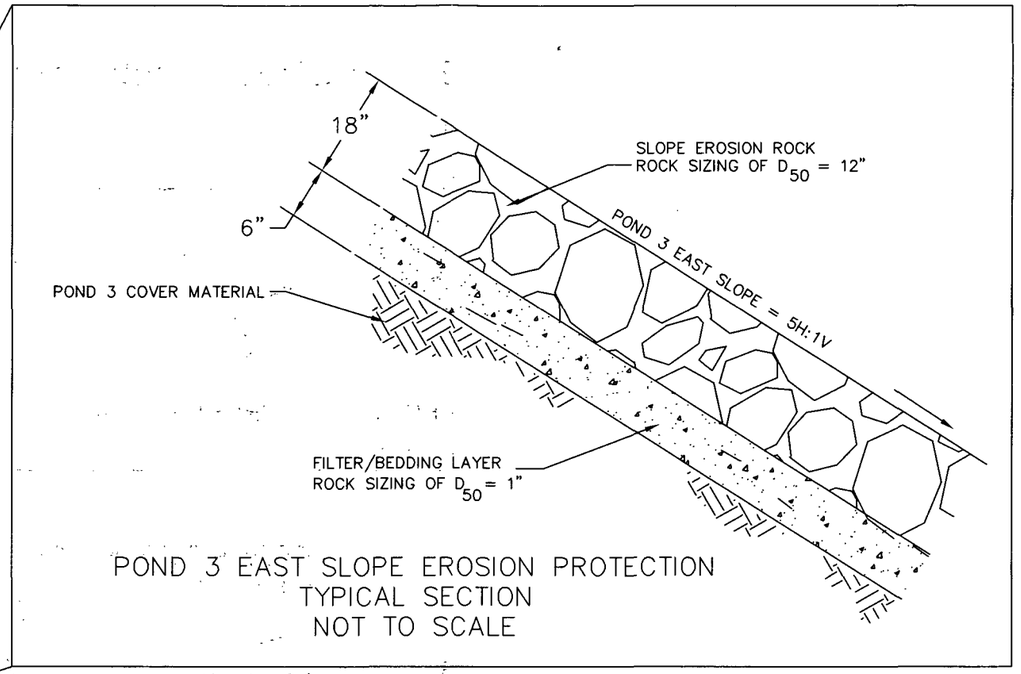
SIDE SLOPE EROSION PROTECTION AT CREST DETAIL
NOT TO SCALE



PROPOSED POND 3 SURFACE & SIDE SLOPE
EROSION PROTECTION PROFILE VIEW
NOT TO SCALE



POND 3 SURFACE EROSION PROTECTION TYPICAL SECTION
NOT TO SCALE



POND 3 EAST SLOPE EROSION PROTECTION
TYPICAL SECTION
NOT TO SCALE

NOTES:

1. Rock Riprap for erosion protection shall be placed in conformance with Appendix F of *Design of Erosion Protection for Long-Term Stabilization*, U.S. Nuclear Regulatory Commission's NUREG - 1623 Draft Report.
2. The erosion protection for the surface of Pond 3 shall be constructed of a rock diameter D_{50} = 1.0" conforming to the following gradation:

Erosion Protection Rock (D_{50} = 1.0")	
Sieve Designation	Percent Passing
3"	100
2"	80 - 100
3/4"	20 - 70
3/8"	10 - 30
No.4	0 - 10

3. Erosion protection on the east embankment slope of Pond 3 shall be constructed of a rock diameter D_{50} = 12.0" and Dhall be placed on a minimum 6" thick filter/bedding layer, and conform to the following gradation:

Erosion Protection Rock (D_{50} = 12")	
Sieve Designation	Percent Passing
18"	100
14"	60 - 90
12"	25 - 50
10"	10 - 30
6"	0 - 10

4. The erosion protection filter/bedding layer shall be placed at a minimum thickness of 6" along the length of the slope. The filter/bedding layer shall extend the full slope length. Filter/bedding material shall be spread and compacted in one layer, and be constructed of a rock diameter of D_{50} = 1" conforming to the following gradation:

Filter/Bedding Gravel (D_{50} = 1.0")	
Sieve Designation	Percent Passing
3"	100
2"	80 - 100
3/4"	20 - 70
3/8"	10 - 30
No.4	0 - 10

CURTIS O. SEALY
NEW MEXICO
10084
LICENSED PROFESSIONAL ENGINEER

CURTIS O. SEALY, PE

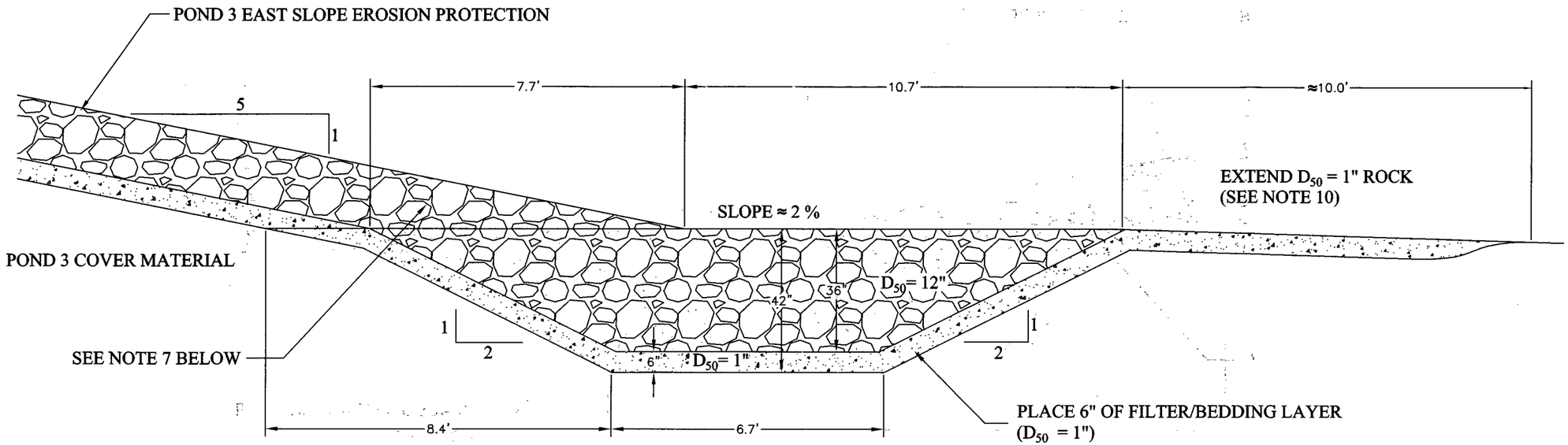
10/13/06
DATE

AMBROSIA LAKE MILL
RIO ALGOM MINING, LLC.
GRANTS, NEW MEXICO
TASK 3 EROSION PROTECTION
POND 3 TOE EROSION PROTECTION DETAILS

MAXIM TECHNOLOGIES INC

PROJECT No. 1690030-300
FILE NAME: 1690030S4-R1.DWG
DRAWING BY: RLH 2/25/02
MODIFIED BY: EJS 10/4/06
REVIEWED BY: COS

POND 3 - TOE EROSION PROTECTION APRON - EAST EMBANKMENT
FOR RUN-OFF FROM POND 3 EMBANKMENT SLOPE
Typical Section



NOTES:

1. Rock Riprap for erosion protection aprons shall be placed in conformance with Appendix F of *Design of Erosion Protection for Long-Term Stabilization,* U.S. Nuclear Regulatory Commission's NUREG - 1623 Draft Report.
2. Erosion protection aprons shall be sloped to the downstream edge with a minimum slope of two percent or at a slope that matches the slope of the natural ground, should it be steeper than two percent.
3. Erosion protection apron excavations shall be constructed with 2H:1V slopes to permit placement of the filter materials as shown above.
4. The erosion protection apron shall be constructed of a rock diameter D_{50} = 12" conforming to the following gradation:

Sieve Designation	Percent Passing
18"	100
14"	60 - 90
12"	25 - 50
10"	10 - 30
6"	0 - 10

5. The erosion protection filter/bedding layer shall be placed at a minimum thickness of 6" along the length of the apron. The filter/bedding layer shall extend up the 2H:1V sides and end below the Pond 3 erosion protection rock. Filter/bedding material shall be spread and compacted in one layer.
6. The erosion protection apron filter/bedding layer shall be constructed of a rock diameter D_{50} = 1", and conform to the following gradation:

Filter/bedding Gravel

Sieve Designation	Percent Passing
3"	100
2"	80 - 100
3/4"	20 - 70
3/8"	10 - 30
No.4	0 - 10

7. Existing erosion protection disturbed during construction of the erosion protection aprons shall be replaced in a manner that maintains existing slopes and riprap conditions as approved previously by the U.S. Nuclear Regulatory Commission. Care shall be taken in removing and stockpiling the riprap such that the material is not degraded or otherwise damaged. Rock degraded or otherwise out of conformance with the NUREG 1623 due to removal and replacement methods shall be replaced with similar approved materials. Care should be taken so that existing tailings are not disturbed during erosion protection apron construction.
8. The erosion protection apron shall be constructed continuously from the north embankment erosion protection channel/apron (north end of Pond 3) to the south embankment erosion protection channel/apron (south end of Pond 3).
9. The erosion protection apron shall be constructed level from the north end to the south end to prevent longitudinal flows within the apron. The erosion protection apron shall be constructed such that flow from the embankment will flow perpendicular to the apron and onto the Pond 3 surface where it will drain away from the erosion protection apron.
10. Extend the D_{50}=1" rock along the Northeast and East sides of the Pond 3 embankment at the toe erosion protection apron. The extended rock shall be blended to match the natural grade surface within an approximate 10-foot distance.

1 in = 3 ft

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CURTIS O. SEALY, PE

10/13/06
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AMBROSIA LAKE MILL
RIO ALGOM MINING, LLC.
GRANTS, NEW MEXICO
TASK 3 EROSION PROTECTION
POND 3 TOE EROSION PROTECTION APRON

MAXIM TECHNOLOGIES INC

PROJECT No. 1690030-300
FILE NAME: 1690030S5-R1.DWG

DRAWING BY: RLH 1/19/02
MODIFIED BY: EJS 10/4/06
REVIEWED BY: COS

SCIENTISTS AND ENGINEERS
COMMITTED TO CLIENT SATISFACTION

MAXIM
TECHNOLOGIES

A DIVISION OF TETRA TECH, INC.