OGMCOAL DNR <ogmcoal@utah.gov>

RE: Re: Cottonwood/Wilberg Revised Reclamation Plan

Oakley, Dennis <Dennis.Oakley@pacificorp.com> Mon, Oct 3, 2016 at 1:28 PM
To: Steve Christensen <stevechristensen@utah.gov>
Cc: Christine Belka <cbelka@osmre.gov>, Keenan Storrar <kstorrar@utah.gov>, Daron Haddock <daronhaddock@utah.gov>, OGMCOAL DNR <ogmcoal@utah.gov>, "Semborski, Chuck" <Charles.Semborski@pacificorp.com>, "Fleck, Ken" <Kenneth.Fleck@pacificorp.com>

Steve,

I've reviewed the comments by OSM and the Division in respect to the revision of the Cottonwood/Wilberg reclamation plan. I've attached the document with our responses outlined in RED. I believe at this point we should schedule a meeting (conference call) to discuss these items of concern. Please coordinate with everyone from your end as well as OSM on a time. I believe our schedule is fairly open.

Best Regards,

Dennis Oakley

Senior Mine Engineer

INTERWEST MINING COMPANY
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dennis.oakley@pacificorp.com

From: Steve Christensen [mailto:stevechristensen@utah.gov]
Sent: Monday, September 19, 2016 1:38 PM
To: Oakley, Dennis <Dennis.Oakley@pacificorp.com>
Cc: Christine Belka <cbelka@osmre.gov>; Keenan Storrar <kstorrar@utah.gov>; Daron Haddock <daronhaddock@utah.gov>; OGMCOAL DNR <ogmcoal@utah.gov>; Semborski, Chuck <Charles.Semborski@pacificorp.com>; Fleck, Ken <Kenneth.Fleck@pacificorp.com>
Subject: [INTERNET] Re: Cottonwood/Wilberg Revised Reclamation Plan

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Good afternoon,

Comment III, b, has been removed. It was merely a reference to a Forest Service soil erosion model. The model utilized by the company is more conservative than the Forest Service model so for clarity, we took it out.

Regards,

Steve

On Thu, Sep 15, 2016 at 4:20 PM, Oakley, Dennis <Dennis.Oakley@pacificorp.com> wrote:

> Steve,
>
> I noticed in the comments document you sent that the comment in item III, b. is incomplete. Could you have the comment completed and resend?
>
> If you can give me a couple of weeks to digest these comments, that would be great. We're in the middle of the Rilda pipeline project again and I'm needed to put my efforts there. I'll let you know when I get my responses organized enough to soundly discuss these final issues.
>
> Thanks
>
> *Dennis Oakley*
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From: Steve Christensen [mailto:stevechristensen@utah.gov]
Sent: Tuesday, September 13, 2016 4:54 PM
To: Oakley, Dennis <Dennis.Oakley@pacificorp.com>
Cc: Christine Belka <cbelka@osmre.gov>; Keenan Storrar <kstorrar@utah.gov>; Daron Haddock <daronhaddock@utah.gov>; OGMCOAL DNR <ogmcoal@utah.gov>; Semborski, Chuck <Charles.Semborski@pacificorp.com>; Fleck, Ken <Kenneth.Fleck@pacificorp.com>
Subject: [INTERNET] Cottonwood/Wilberg Revised Reclamation Plan

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Good afternoon Dennis,

As we discussed, I've attached a document with outstanding concerns/issues that OSMRE and DOGM have identified relative to your most recent informal amendment to the Cottonwood/Wilberg reclamation plan.

At this point, I'd recommend that prior to submitting an amendment for formal review, we have a quick conference call and discuss the issues in the attached document.

Feel free to give me a call if you have any questions.

Regards,

Steve

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PacifiCorp Responses to OSM_DOGM Comments_10-3-16.docx
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Cottonwood/Wilberg: Revised Reclamation Plan

I. Context/Background

a. 1985 court case established regulatory frame-work that sediment ponds aren't necessarily BTCA for controlling sediment.

b. The standard/findings that DOGM must make for the proposed reclamation plan revision at the Cottonwood/Wilberg Mine Site are:

   i. The mine/reclamation plan has been designed to prevent additional suspended solids from leaving the permit area.

   ii. The mine/reclamation plan has been designed to prevent material damage to the hydrologic balance.

II. OSM comments/concerns prior to formal submittal:

1. The primary concern is the storm flow from the adjacent undisturbed areas (i.e. flows that would not report to the 6-7 rock-lined channels that would be established on the reclaimed side slopes of the mine-site). OSM is concerned about this flow reporting directly to the newly constructed pocks. The current model submitted for review does not take into account the undisturbed flow that would report to the pocks below the cliff faces. Provided two suggestions:

   a. Update model with "worse-case" scenario (i.e. model the largest undisturbed water-shed area that does not report to one of the rock-lined channels) or

   b. Design/construct some type of rock-lined channel/diversion around the pocked area at the toe of the cliffs so that the undisturbed drainage wouldn't report to the pocks.

Response:

EarthFax Engineering modeled five areas above the disturbed that would establish an overland flow of storm water onto the pocks (refer to Appendix D "ADEQUACY OF RECLAMATION GOUGES AT THE COTTONWOOD/WILBERG MINE FOR INTERCEPTING RUNOFF AND SEDIMENT FROM ADJACENT UNDISTURBED AREAS"). The area/acreage is described as IBA-1/3.57 ac., IBA-2/1.99 ac., IBA-3/5.03 ac., IBA-4/10.56 ac., and IBA-5/4.98 ac. All overland flows from the undisturbed areas to disturbed areas have been accounted for (refer to response in III. a. iii). However, there has been some concern as to the accuracy of the areas of each site. Below is an explanation of how IBA areas were delineated.

In 2013, Energy West Mining Company (now known as Interwest Mining Company) contracted Aero-Graphics to conduct an aerial survey of the entire disturbed area of the Grimes Wash facility. In this method of surveying, ground control points are set by conventional surveying methods and then flagged so they can be seen in photographs taken from the air. Approximately four ground survey markers were set as control for the Grimes Wash aerial survey. Several photographs are taken along multiple flight lines. Overlapping photographs taken from successive viewpoints along the flight line produces a stereoscopic view of the ground surface. These views of the overlapping photograph pairs are call "models" in the

photogrammetric process. Elevations of the ground surface of the survey area are then calculated using a computer-aided stereoplotter and verified using the multiple ground survey control points. A digital elevation model of the ground surface is created using photogrammetric surveying.

Sub-centimeter precision on the x-y plane can be achieved. The elevations can be read from photographs with a precision of one-half foot. Mapping contours are constructed from the digital elevation model with very high accuracy.

Because of the accuracy of the photogrammetric survey, Interwest Mining was able to delineate precise IBA areas.

EarthFax obtained the 2013 contour map from Interwest Mining to conduct its modeling of the runoff from the IBA areas. Interwest reasons that the runoff volumes that EarthFax calculated are over-estimated because storm runoff estimation is based on an average consistent slope. However, the actual topographic surface within the Grimes Wash area contains many benches on the hillslopes where rock outcrops are vertical and much of the runoff can trapped on the adjacent benches allowing runoff to flow into cracks. These irregularities are difficult to account for using a digital terrain model. Ground proofing the site verifies this reasoning.

A discussion will be added to the text of the reclamation describing this survey method.

2. 2nd concern is the rip rap sizing. It's important that the rip rap installed in the newly established channel be diverse enough in size so as to insure proper locking of the rip rap (i.e. an assortment of large, medium and small sizes of rip rap).

Response:
The design for the main channels (based on shear stress calculations) requires a D15 of 1.2', a D50 of 3', and a D100 of 3.75'. The filter depth measures 20" with a gradation between 1/32 " to 7 ½". Gradation of the riprapped channel will comply with the definition of D50… "the riprap diameter in feet such that 50% of the stones have a diameter smaller than D50". Compliance with this definition will produce a stable riprapped channel with sufficient gradation to "tie in" the larger rocks in place to resist movement and the potential for failure.

Side channels were designed based on the HEC 11 modeling software. This model also relies on the tractive forces of water in determining the riprap sizing. Stability of riprap is a function of its size and gradation of material constructed in the channel to resist the tractive forces exerted by flowing water. Interwest Mining feels these two design methods for developing a stable channel are considered prudent engineering practices.

It should be noted that both the main channels and side channels have been designed above the regulatory minimum design storm. The main channels have been designed to handle a 100yr/24hr storm event and the side channels have been designed to handle a 25yr/6hr event.

III. DOGM comments/concerns to be addressed prior to formal submittal

a. Appendix D 'Precipitation data and other calculations'

i. The NOAA Atlas 14 document highlights a 100 yr 24 hr event, however in subsequent calculations a 100 yr 6 hr event is used as the worst case scenario. This must be made consistent.

Response:

The NOAA Atlas 14 table highlighting a 100yr/24hr storm event in Appendix D will be changed to highlight a 100yr/6hr storm event.

ii. Analysis: p. 5 'Runoff from Undisturbed Area above Disturbed'. Pock volume calculations assume runoff volumes from upgradient undisturbed hillslopes are distributed equally among pocks at the disturbance interface. This is not a reasonable assumption because contributing hillslope lengths vary due to the peaked shaped of contributing areas.

Finding: The amendment must provide calculations addressing the worst case scenario of runoff volumes from undisturbed hillslopes. Calculations must show large pocks are able to control runoff volumes from the longest hillslope lengths, which appear to be upwards of 900' in area IBA-4.

Response:

The reported hillslope length (refer to Appendix D, ADEQUACY OF RECLAMATION GOUGES AT THE COTTONWOOD/WILBERG MINE FOR INTERCEPTING RUNOFF AND SEDIMENT FROM ADJACENT UNDISTURBED AREAS) is 1379 feet. The analysis conducted is based on two different shapes of pocks; truncated sphere and truncated pyramid. The Utah Coal Regulations and SMCRA require that final reclamation areas control flows from a 100yr/6hr event. The report finds that by using the truncated pyramid shaped pocks, there is a 10.6% capacity in excess of runoff plus precipitation. Therefore, calculations do address the required scenario of runoff volumes through the disturbed areas.

iii. Analysis: Hillslope areas and channel networks were calculated using a, '30 meter DEM and the TOPAZ model to build a channel network' for Grimes Wash (WEPP Watershed Online GIS; http://forest.moscowfsl.wsu.edu/fswepp/). Contributing undisturbed hillslope areas are determined to be:

1. IBA-1 = 5.1 ac
2. IBA-2 = 2.7 ac
3. IBA-3 = 7.6 ac
4. IBA-4 = 17.6 ac
5. IBA-5 = 4.7 ac

The amendment appears to underestimate the contributing undisturbed hillslope areas by half an acre to as much as seven acres for hillslopes IBA-1 through IBA-4.

Finding: The amendment must detail the method(s) used for determining the areas of undisturbed hillslope and sub-catchments. The method(s) must clear up these discrepancies found in contributing areas.

Response:
Refer to response in II.b. The amendment will describe the methods used for determining the digital elevation model that is used to create the topographic map in the Grimes Wash area. X, Y, and Z measurements have a +/- 6" accuracy which is much more precise than the 30 meter DEM utilized for building the channel networks using the TOPAZ model.

b. Appendix F 'Hydrologic Calculations'
   i. Analysis: The rip rap design in Figures 2 and 3 is inadequate. Rip rap within reclaimed channels must be twice the depth of the D_{50}. This reduces channel flow shear stresses on the underlying filter bed preventing failure of the filter bed and subsequent channel failure(s).
   Findings: The depth of rip rap in Figures 2 and 3 must be increased to be twice the depth of the D_{50} placed in the channel.

Response:
Interwest Mining disagrees with the Divisions statement that the "reclaimed channels must be twice the depth of the D50." The design of the side channels were developed using HEC 11, whereas the design of the main channels were developed using the engineering design principles from Brown and Clyde, 1989, "Design of Riprap Revetment". Hydrologic Engineering Circular No. 11, US Department of Transportation, Federal Highway Administration. HEC 11 bases the channel thickness on the stability of the riprap used. Stability is a function of rock size and gradation of the material and not the thickness of the constructed channel. HEC 11 uses the following criteria:

1. It should not be less than the spherical diameter of the D100 (W100) stone, or less than 1.5 times the spherical diameter of the D50 (W50) stone, whichever results in the greater thickness.

2. It should not be less than 12 in (30 cm) for practical placement.

3. The thickness determined by either 1 or 2 should be increased by 50 percent when the riprap is placed underwater to provide for uncertainties associated with this type of placement.

4. An increase in thickness of 6 to 12 in (15 to 30 cm), accompanied by an appropriate increase in stone sizes, should be provided where riprap revetment will be subject to attack by floating debris or ice, or by waves from boat wakes, wind, or bedforms.

D100 is described in HEC 11 as a stone size of 1.5D50 – 1.7D50.

As an extra protective measure, the side channels have been designed for the flow from a 25yr/6hr storm event. Minimal regulatory requirements only call for a design utilizing a 10yr/6hr storm event for "DIVERSION OF MISCELLANEOUS FLOWS".

If the Division disagrees with these calculations based on published design criteria, please cite references that suggest a thickness requirement of twice the depth of the D50.

ii. Analysis: The sections of reclaimed channel most prone to knickpoint failure will be at the confluence of the left and right forks along the main channel and the confluence of subcatchment channels with the main channel. It will be critical to reduce shear stress on the channel bed and banks above, at, and below these junctions. Has the Permittee considered incorporating large woody debris into the reclaimed channels to help prevent failures? Incorporation of LWD similar to the channel reclamation designs at the Deer Creek mine may help increase reclamation success.

Response:

The main channel has been over-designed to handle the flow from a 100yr/24hr storm event. The designed peak flow in the left fork is 656 cfs with a velocity of 15.2 ft/sec. The designed peak flow for the right fork is 416.3 cfs with a velocity of 13.5 ft/sec. The designed peak flow for the channel below the forks is 1072.3 cfs with a velocity of 17.3 ft/sec. In comparison, the peak flow from the individual side channels never exceeds 49.97 cfs and the velocity never exceeds 10.05 ft/sec. Riprap sizing in both the designs of the main and side channels use equations that are based primarily on velocity of flow and the weight of the material and its ability to resist the tractive forces exerted by flowing water. Because the riprap in the main channel is sized for higher velocities of flow, Interwest believes the risk for knickpoint failure is minimal.

To reduce the risk of failure within the side channels, 3-foot diameter boulders will be placed randomly in the channel bottoms spaced approximately 10 to 15 feet apart along the length of the channel. These "obstructions", as presented by Arcement and Schneider (1989), increase the roughness coefficient to n=0.03. This increased the total roughness of the channel to n=0.07 which minimizes those flow velocities.

iii. Table 2 needs a more detailed narrative. It appears the table is divided by rain event size, but this should be made clear. 'Filter gradation check' needs a narrative describing the process.

Response:

Actually, Table 2 represents the calculated gradation of riprap (from D15 – D100) based on the calculated D50 in Table 1. The filter gradation check is based on the listed gradation criteria. If the gradation falls with the confines of the criteria, then the size of the filter gradation checks (confirmed).

c. 'Plate 4A'

i. Silt fences are the only acceptable form of treating runoff during reclamation. Designs of a properly installed silt fence with a cleanout schedule must be provided.

Response:

Plate 4A will be changed to include only silt fences for treating runoff during reclamation operations.

IV. As discussed during the field visit in July, OSMRE strongly encourages PacifiCorp to install remote ISCO samplers to begin capturing sedimentation values for the site.

Response:

Interwest Mining has included samplers as part of the final reclamation monitoring objectives.