April 14, 2009

To: Dana Dean, Associate Director
Internal File

From: Daron Haddock, Permit Supervisor

Re: Recommendation for additional reclamation work to be completed at the White Oak Mine, C0070001

Please find attached a technical report, which describes the findings of the staff after an August 6, 2008 inspection of the White Oak mine site. The staff and I also met on April 2, 2009 to review the findings and brainstorm ideas for correcting the problems identified.

It is evident that additional reclamation work needs to be completed at the site. The following items were specifically identified during our meeting.

1. Main Channel reconstruction and stabilization. This probably will require larger armoring and widening the channel. It may also involve trying to install some type of energy dissipation structures.
2. Fix the sinkhole that has opened up into the old mine workings. This may involve constructing a road or terrace into the site in order to get materials and equipment to the area. If done right, the terrace could be left in place to provide a break in the topography and help with erosion control. A foam or cement material may be needed to fill in the sinkhole and to seal the old works.
3. Provide some type of soil amendment or soil improvement on the bare areas. The clay soils have not proven to be good vegetative growth materials and need to be amended. Use of bio-solids, manure, or wood straw mulch may be helpful.
4. Add some additional species of plants, especially trees and shrubs. We may even want to consider non-native species such as alfalfa or yellow sweet clover. Planting Triticale (sterile wild rye) may also be beneficial for initial establishment of vegetative cover and to provide erosion control.
5. Repair some of the erosion gullies by picking the worst ones and attaching excelsior log or other sediment control device.

The access road into the site is also a concern. It appears to be eroding quickly and may pose a safety hazard for people trying to use it. Some stabilization of the road is probably warranted.

I believe the recommendations in the attached report are good ones and should be undertaken during this construction season if possible and to the extent that funding is available.

TO: Internal File

THRU: Daron Haddock, Permit Supervisor

FROM: Review Team: Priscilla Burton, David Darby, Jim Smith, Wayne Western, Joe Helfrich

RE: Technical Field Visit, Reclaimed Minesite Evaluation, White Oak Mine C0070001

Other Attendees: Louis Amodt, DOGM-AML
Steve Christensen, DOGM-Coal Program

Date & Time: August 6, 2008. 10:00 am to 3:00 pm

PURPOSE:

The purpose of the field visit was to evaluate the features and function of the reclaimed mine site. Recent inspections have identified erosion and head cutting in the main channel. Inspection Report #1739 also includes comments from this site visit.

BACKGROUND:

The Division forfeited the bond at the White Oak Mine on May 1, 2003. Chapter 7 was filed by Lodestar Energy, Inc. on July 15, 2003. The Division negotiated with the Bankruptcy Trustee and Frontier Insurance to stabilize this site. The amount of $999,000 was escrowed from Frontier Insurance Company on October 3, 2003. Ledcor (the contractor for Frontier) started work at the White Oak Mine on October 13, 2003. Ledcor left the site for the winter on December 17, 2003. Ledcor, was terminated in June 2004, monies remaining were set aside for reclamation work by AMR.

On June 18, 2004, Lodestar trustee Bill Bishop filed the master settlement between various parties (including Renco and Wexford Capital) for reclamation in a "General Settlement Fund" outside of the Lodestar bankruptcy estate. Utah received $1.217 million dollars - this was finalized by the Bankruptcy Court on August 18, 2004.

AMR programs administered the reclamation work at the White Oak Mine (AMR/007934) and at the loadout using the $1.217 million was received from the Global Settlement Agreement and funds left over from the Frontier contract. The contractor VCM was awarded the contract to continue reclamation at the White Oak Mine. Mark Wayment was awarded the reclamation work at the White Oak Loadout. Mark Wayment began work at the Loadout on October 3, 2004 and ended in December 2004. Work at the mine began in June 2005 and was completed on November 1, 2005. Work additional work was completed at the loadout on November 4, 2005. Weed control was conducted by AMR during the summer of 2006.

OBSERVATIONS:

On August 6, 2008, the main channel of the site exhibited radically varying degrees of stabilization (from stabilized to increasingly more eroded and un-stable as you move down gradient. Photographs from the site visit are found in the folder dated 08062008.
The upper portions of the channel (including the two undisturbed drainages) appear to have stabilized. The riprap installed in both of the undisturbed drainages was observed to be intact and collecting sediment as designed. At the confluence of the two undisturbed drainages, the main channel appears stable with no evidence of erosion or scouring. The channel's stability begins to decline and signs of excessive erosion/cutting begin approximately 70-100 yards down gradient from the high wall area. As the gradient of the channel increases, the amount of erosion/cutting from the banks becomes increasingly extensive. The riprap that was utilized to stabilize the channel is essentially gone in several sections of the channel. The filter blanket is clearly visible in several locations and is being undercut. As the reach of the channel approaches the edge of the disturbed area on the northeast end of the site, the channel has been severely impacted by high volume flows (See discussion below). The riprap that was placed in the channel has been deposited at the bottom of the gradient in the undisturbed section of the drainage (outside of the permit area).

The main channel was extensively eroded at the lower part of the reclaimed mine pad. A large sedimentation pond had existed in the channel while the mine was operating. The pond was buried during reclamation, but now erosion and head cutting has exposed the softer soils in the pond, which makes it more vulnerable to erosion. The main channel exhibits significant erosion approximately 500 feet from the bottom of the reclaimed channel. In many locations the channel liner is undercut and exposed. Loose cobbles and boulders litter the channel. The lower section of the reclaimed channel is incised to a width of 12 feet and a depth 10 feet, and even more on the out slope face of the reclaimed pad.

One of the portals on the west side of the site had subsided. It appeared that it had never been sealed and backfilled. A sinkhole approximately 40 feet in diameter exists over the portal opening. It is 20 feet deep and in the bottom there were two deeper holes that were thought to connect with the portal. The soil bridging the bottom collapsed and formed a larger hole approximately 5 feet in diameter when cobble size rocks were thrown at the bridge. The portal poses a hazard to wildlife and people traveling on foot or ATV's.

The surface of the reclaimed area at the White Oak mine was walked to evaluate the status of the vegetation and general site conditions. Areas walked included the entire perimeter, adjacent areas and three cross sections running from north to south. As of the date of the site visit there was no mulch cover and there was no protection of the soil, in the form of vegetative cover, from erosion in numerous locations throughout the site. The perimeter areas, 10'-100', exhibited more evidence of what might be considered replacement topsoil material and thus denser stands of vegetation and evidence of natural re-growth was observed creeping in from the undisturbed area.

As for the remaining portions of the site the vegetation was patchy and much sparser than comparative undisturbed areas at this point in the reclamation phase. Typically, after three growing seasons at this elevation and annual precipitation, the vegetation on the reclaimed site should be nearing 50% of the cover of the reference area. Obviously that is not the case due to the lack of suitable growth media. Very little vegetation cover is present. In fact the slope at the end of the paved road which was minimally disturbed and which is formed from native soil and subsoil (MRP, Figure 9-3) was estimated to have approximately 85% vegetative cover, but vegetative cover is reduced to less than 10% on the west slope created from excess spoil pile. [No data was collected to confirm actual percent cover for these areas.] With the moisture available at this elevation, one would expect reclamation to result in greater than 10% percent cover. Additional seeding may accelerate vegetative growth if the growth media can be improved.

The majority of the site is comprised of rocky crusted clay material. The species composition however is much better than expected. All but two species in the seed mix were present as well as natural invasion from nine additional species. The following species from the seed mix were observed: Bluebunch Wheatgrass, Western Wheatgrass, Slender Wheatgrass,

Mountain Brome, Canby Bluegrass, Showy Goldeneye, White Yarrow, Engleman Aster, Silky Lupine, Mountain Big Sagebrush, Aspen, White fir, Sub-alpine fir, Blue spruce and Woods Rose. Species observed that were not in the seed mix included Mountain Snowberry and Creeping Oregon Grape. Additional species observed included Smooth Brome, Currant, vetch spp, penstomen spp, Western Coneflower, Geranium, thistle, lupine, and Willow spp. Noxious weeds, mostly thistle, need to be eliminated as there are several large pockets located near the perimeter.

With vegetation of the regarded spoil slopes less than 10%, and no mulch cover, there is no protection of the soil from erosion. The slope must be reduced and temporary barriers to flow must be established along the fall line.

The slopes have no grade breaks and the reclaimed west slope is convex in shape. After the surface was graded, the site was roughened (gouged with a trackhoe) to retain runoff and promote vegetation growth. Only a handful of gouges remain intact. Erosion rills and gullys are occurring down the fall line and extend through the gouged areas all the way from the highest point on the reclaimed hillside, down to the main channel. Gullys were noted to be several feet deep and 18 - 24 inches wide. Several erosion gullies were observed in areas of known springs (particularly on the southwest slopes).

Soil texture and chemical characteristics may be of importance to a stabilization plan and to vegetation establishment. Surface soil was sampled on the (mostly barren) east facing slope. Soil was collected from the surface four inches at random locations across the slope. All soil was combined into one sample. Soil was allowed to dry and was delivered to BYU Laboratory for analysis of pH, EC, SAR, texture, B, %carbonate and clay type. Sub-sample locations were photographed and the following was noted: Rock fragment cover = 70%, surface soil is gray shale. The site has no grade breaks and is convex in shape. After the surface was restored, the site was gouged to retain runoff and promote vegetation growth. Only a handful of gouges that remain intact. Erosion rills and gullys are occurring down the fall line and extend through the gouged areas all the way from the highest point on the reclaimed hillside, down to the main channel. Gullys were noted to be several feet deep and 18 - 24 inches wide.

Since soil texture and chemical characteristics may be of importance to a stabilization plan and to vegetation establishment, the surface soil was sampled on the (mostly barren) east facing slope. Soil was collected from the surface four inches at random locations across the slope. All soil was combined into one sample. Soil was allowed to dry and was delivered to BYU Laboratory for analysis of pH, EC, SAR, texture, B, %carbonate and clay type. Sub-sample locations were photographed and the following was noted: Rock fragment cover = 70%. Surface soil is gray shale. Photographs from the site visit are found in the folder dated 08062008.

Soil testing results (attached) indicate that the soil is a clay loam with neutral pH 7.19.

Vegetation establishment is made difficult by the concave slope and the erosivity of the fine textured soil (36% clay). Clay textured soils also have low moisture availability and compact easily (poor aeration). These physical problems can be alleviated somewhat by not working the soil when it moist and by the application of mulch. Woodstraw™ mulch was recently used on the East Mountain reclamation site successfully (similar climate). See information available on the web at http://www.woodstraw.com

Chemically, the main limiting factor to vegetation establishment is the fixation of phosphorus by clay particles and by calcium. This soil has a high calcium content (283 ppm) in relation to phosphorus (2.29 ppm). Inorganic phosphorus levels should be ten times the reported level. Phosphorus is a macronutrient for plant growth that is necessary for cell division and seed formation and that is important in root development. Phosphorus fertilizer should not be broadcast over the area, but should be applied along with organic matter in specific locations where plants can utilize the phosphorus and increases to the phosphorus loading of streams will be avoided. Overtime, more will become available to the soil as soil minerals weather and soil microbial reactions occur.

Along with the soil test results, the laboratory provides fertilizer recommendations. These recommendations indicate high levels or boron, copper, manganese and zinc levels and consequently, no fertilization for these micronutrients would be required for agronomic crops. These "high" micronutrient values are not excessive, and are not toxic to vegetation. When available in print, ongoing work by MW Paschke of the Forest, Rangeland, & Watershed Sciences at Colorado State University will provide more information concerning the threshold values for native plant species toxicity to metal concentrations. The micronutrient levels reported are tens of thousands times less than those authorized by the EPA Part 503 Rules for land application of sludge and the protection of plants, grazers, predators and humans.

RECOMMENDATIONS:

The site needs extensive repair work. The channel needs repair. The portals need to be sealed properly. The slope should be reworked to break the long convex slope. Originally, the reclamation plan called for benches and grade breaks (MRP, Vol. 3, Reclamation Plan, page R-2 of 37). If there is not sufficient funds to fully rework the slope, barriers to flow must be established perpendicular to the fall line at random locations as described below.

1. At random locations in each major gully, material should be moved to fill in gullies, thereby developing small grade breaks that will speed up the process of filling in the gully.

2. Where gully's are graded as described above, the soil surface should be roughened. Erosion control logs should be installed in gullies above and below the grading work described in item #1, to slow water as it approaches the graded soil and to catch soil

washed from the recently graded site.

3. Protection for soils should be accomplished by transplanting evergreen ground cover or small shrubs above each erosion control log to take advantage of the saturated conditions created by the erosion control log.

   Suggestions for evergreen ground cover are Arctostaphylos uva-ursi; Mahonia (Berberis) repens; Paxistima canbyi.

   Suggestions for small evergreen shrub species Artemesia sp.; Mahonia (Berberis) aquifolium; Juniper horizontalis.

   Suggestions for deciduous shrub species include Amelanchia utahensis; Cowania mexicana; Rhus trilobata; Ribes alpinum; Sheperdia Canadensis; Symphoricarpos albus.

4. Phosphorus fertilizer mixed with organic matter should be placed in the planting hole with the woody plant. Phosphorus should be incorporated at ½ the recommended agronomic rate or 45 lbs. of P_2O_5/acre.

5. The regraded soil should be reseeded and Triticale (sterile annual rye). The triticale will provide a quick growing tall stand of grass that will provide shade and protect slower growing native species and which will create a standing mulch to lessen raindrop impact and slow overland flow.

6. Woodstraw™ mulch should be applied to the surface of the re-graded gullies to provide wind protection and shade for seeds and to reduce overland flow.

7. Extensive stabilization is needed for the main channel at the site. The channel has been excessively scoured and eroded approximately 70-100 yards down gradient from the former highwall area. In order to stabilize the channel several techniques could be utilized. The channel alignment is straight. Establishing some degree of sinuosity may help to reduce flow velocities during storm events. Energy dissipation could also be achieved by constructing a sediment pond/basin or series of small pools to provide some dead storage and retention of water during high intensity/short duration events. Although the riprap that was installed in the channel was scoured out, it would appear (based upon rainfall data) that excessive storm events were responsible for the dislodging and removal of the material. Riprap should be re-installed. More robust techniques for keying in the riprap could be explored in order to provide the material with a higher probability of remaining in place during short duration/high intensity rainfall events.

8. The gullies that were observed on the reclaimed slopes should be either be armored with additional riprap if necessary and/or install additional erosion/sediment control structures at intervals along the gradient. The sediment control measures could include the installation of straw/hay bales, Excelsior logs, silt fences etc. The sediment control measures would need to be properly installed by trenching (to insure adequate soil contact and prevent undercutting) and keying the structures (utilizing rebar). In addition, they would require routine maintenance (particularly after large rainfall events).

9. Noxious weeds, mostly thistle, need to be eliminated as there are several large pockets located near the perimeter.

Attachments
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Photo 3. Channel after repairs, July 2005.

Photo 1. Reclaimed channel after 100year-24hour + storm event.

Photo 2. Reclaimed channel after 100 year-24 + storm event.