STATE OF WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION

OFFICE OF SPECIAL RECLAMATION

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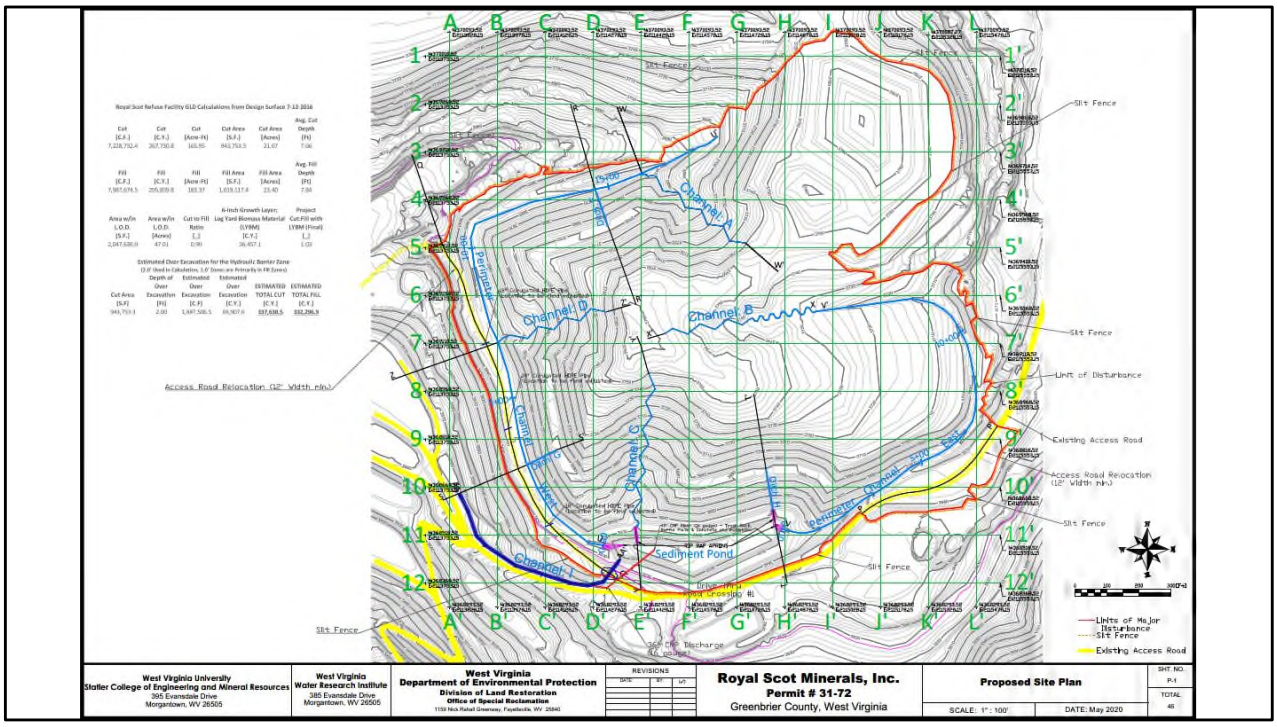
From the Fayetteville Office of Special Reclamation, a presentation on Royal Scot 31-72 by Nathan Parks and Rick Pino.

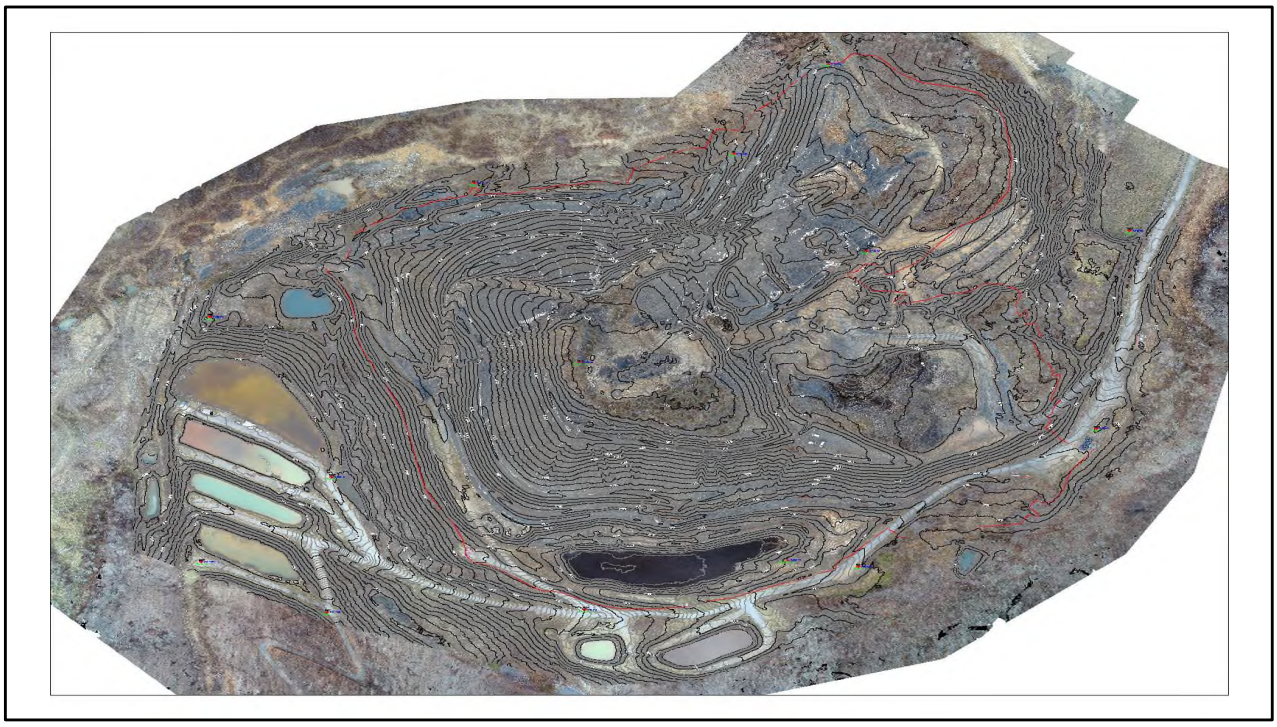
ROYAL SCOT
31-72
Greenbrier County

Google Earth (December 2003) image of permit 31-72 overview showing additional areas to be regraded under no cost agreement.

Google Earth image of 31-72 overview (June 2016) showing additional areas regraded and refuse area to be regraded.



Refuse regrade design by West Virginia University.



Drone flight showing ortho and contours by Mike Shank, WVDEP IT Support, and staff with project construction limits in red.

DESIGN COLLABORATION

- Coordinated with the Office of Surface Mining to fund West Virginia University's geomorphic landform design.
- Evaluated M-Gro (short paper fiber) verses Log Yard Biomass Material (LYBM) via test plots.
- Collaborated with WVU and OSM regarding the original design.

Cover Material Test Plots

In order to evaluate the two different materials, coal refuse was regraded to mimic geomorphic landform design. The top one-foot was mixed with M-Gro at either 20% M-Gro to 80% refuse, 40% M-Gro to 60% refuse or had a one-foot layer of LYBM placed. While each material and/or ratio proved to be beneficial to plant growth, the M-Gro plots were subject to "burn-out" of the vegetation due to the refuse being exposed and mixing proved to be problematic. The LYBM plot grew more consistent vegetation and in less time. The M-Gro plots caught up to the LYBM plot in 2 to 3 years.

Photographs follow:

Dozer spreading residuals

Once compressed, residuals were difficult to integrate with the refuse.

Coal Refuse Test Plots prior to seeding.

Drone view of test plots.

Test plots during the first season of vegetation – note areas of yellowing and exposed refuse due to burnout.

In the foreground, Log Yard Biomass Material Test Plot during the first season of vegetation.

Core sampling at the Allegheny Wood Products (AWP) Smoot Sawmill.

Core samples from AWP Smoot Sawmill. After laboratory testing, discussion with Tim Keeney, Soil Scientist with Pace Analytical, it was determined that only a 6-inch layer of LYBM is necessary to sustain vegetative growth. This reduced the amount of LYBM needed by half, which saved a substantial amount of money and alleviated the need to transport from a 2nd borrow site which was approximately 43 miles away (1.5 hours one way). Other than the quality of the material, only grasses will be allowed, because woody growth would penetrate the barrier zone and increase infiltration. Thus 6-inches of growth medium will be sufficient.

KNOWN SITE CHALLENGES

- WEATHER
- BRIDGING THE SLUDGE DISPOSAL AREA
- WEATHER – 2 INCHES OF SNOW IN LATE APRIL
- CLEANING SLUDGE HOLDING POND AND SHAPING IT TO PROVIDE SEDIMENT CONTROL
- MIXING SLUDGE WITH COARSE REFUSE TO PROVIDE STABIL FILL – 20% SLUDGE MAX
- WEATHER – 1.21 INCHES OF RAIN IN 23 MINUTES
- COVER SOIL BORROW SITE - +/-18 MILES, 35 MINUTES ONE WAY
- COORDINATING BETWEEN ALLEGHENY WOOD PRODUCTS (ACTIVE SAWMILL), PRIME CONTRACTOR AND SUBCONTRACTOR
- REVEGETATION – SLOPES, WIND, WEATHER

WEATHER

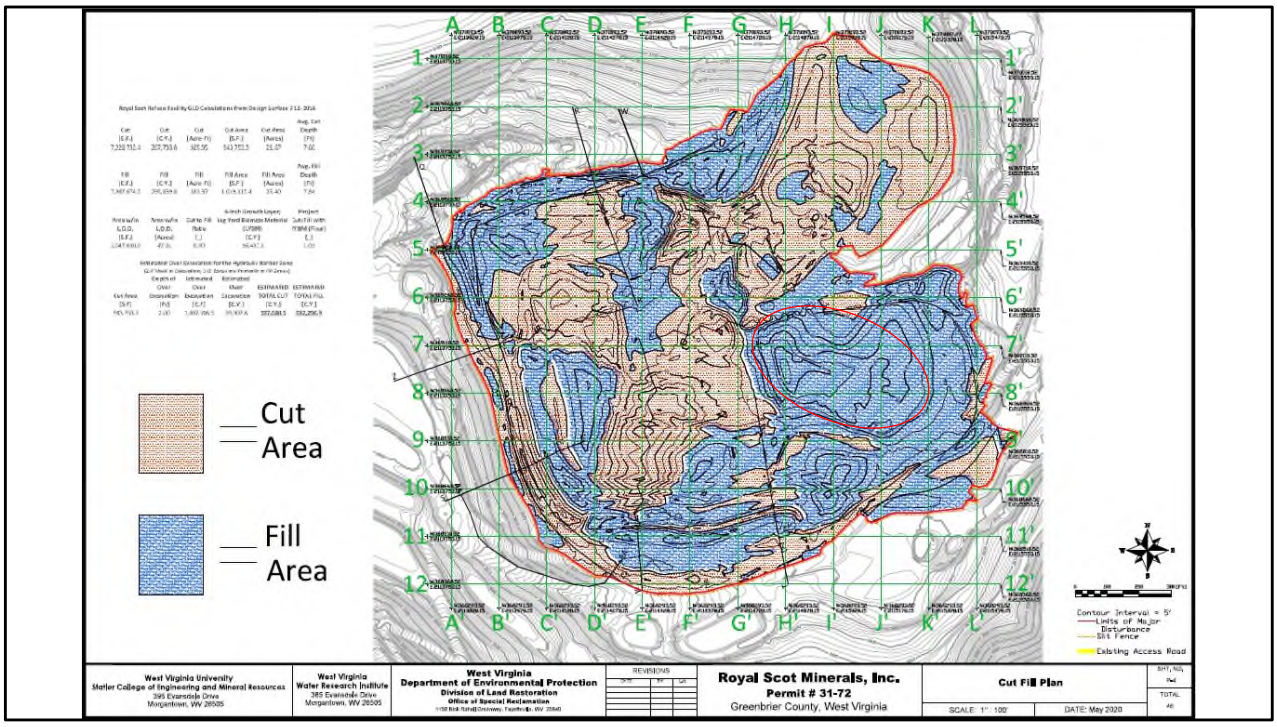
Snow in late April is not uncommon. On this mountain, snow in late May wouldn't have been a surprise.

Now you see it.

Now you don’t. The contractor utilized specific equipment patterns to mitigate issues and promote safety on the site. Utilized CB radios to communicate on site.

How many and what equipment do you see? This photo may be to narrow in scope, but the contractor was actually operating two dozers, one roller and one excavator in the immediate area, plus a few hauling trucks kept coming thru.

EXISTING SLUDGE DISPOSAL AREA



This site generates a lot of Acid Mine Drainage and with the treatment of AMD comes metal sludge. This site has been a water treatment site for nearly forty years so there has been several areas utilized for the disposal of this inert sludge material. One of these sludge disposal areas is within the footprint of the Geomorphic Landform Design regrade. This sludge disposal area is to be utilized again to dispose of the existing sludge in the Sedimentation Pond area as this pond will be repurposed into a stormwater retention structure. The old sludge disposal area was the largest/deepest fill area on the site.

Central Contracting elected to place two 4-foot lifts of coal refuse across the old sludge disposal area to bridge the area prior to blending the existing sludge from the sediment pond into the refuse. Blending was necessary to provide stability of the sludge. Did we mention weather impacts?

A little better view of the area. Approximately 4 (?) surface acres of old iron sludge had to be bridged, while maintaining sufficient refuse to mix with the sludge to be relocated.

SLUDGE HOLDING / SEDIMENT POND

Initial sludge removal operations - Central Contracting left a dike of iron sludge to keep the stormwater away as they excavated the material.

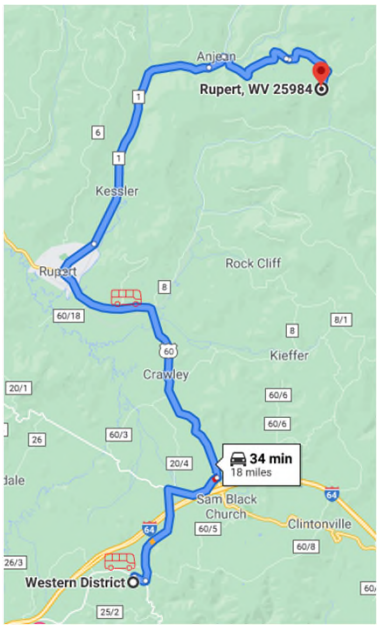
Central Contracting attacked the sludge removal operations from both ends of the pond.

Mid-August 2021 – placing LYBM in Sediment Pond this provides not only a growth medium but also aids in sealing the pond.

August 26, 2021 – clearing remaining mud/muck to facilitate installation of the principal spillway

COVER MATERIAL BORROW SITE

Drone flight with ortho and contours by Mike Shank and staff showing Smoot AWP sawmill operations with mill, log yard, storage area and biomass borrow area. Specific Log Yard Biomass Material (LYBM) borrow area, logistics of access thru active sawmill.

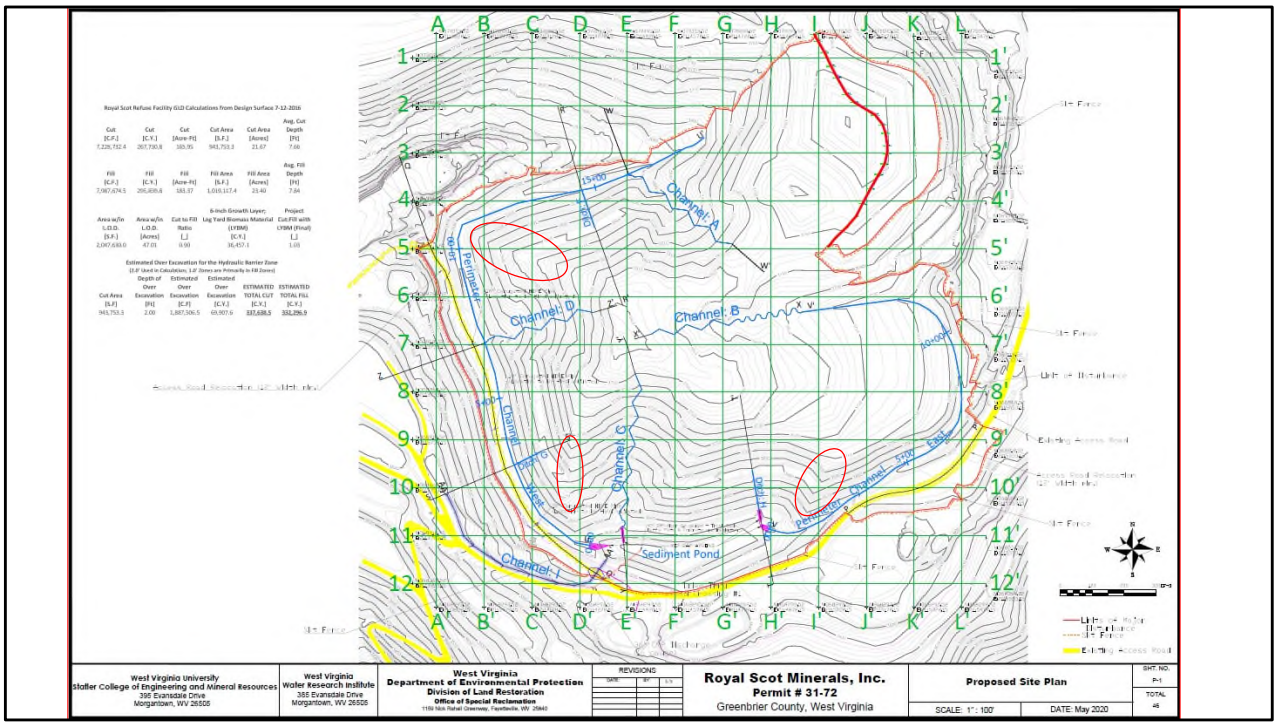


LYBM hauling route. Note the two schools that could have been impacted. It was estimated that more than 1700 loads would need to be hauled. Hauling trucks were to have a specific path thru the sawmill to mitigate disruption of operations. Central Contracting was able to initiate and complete borrow operations while local schools were on summer break.

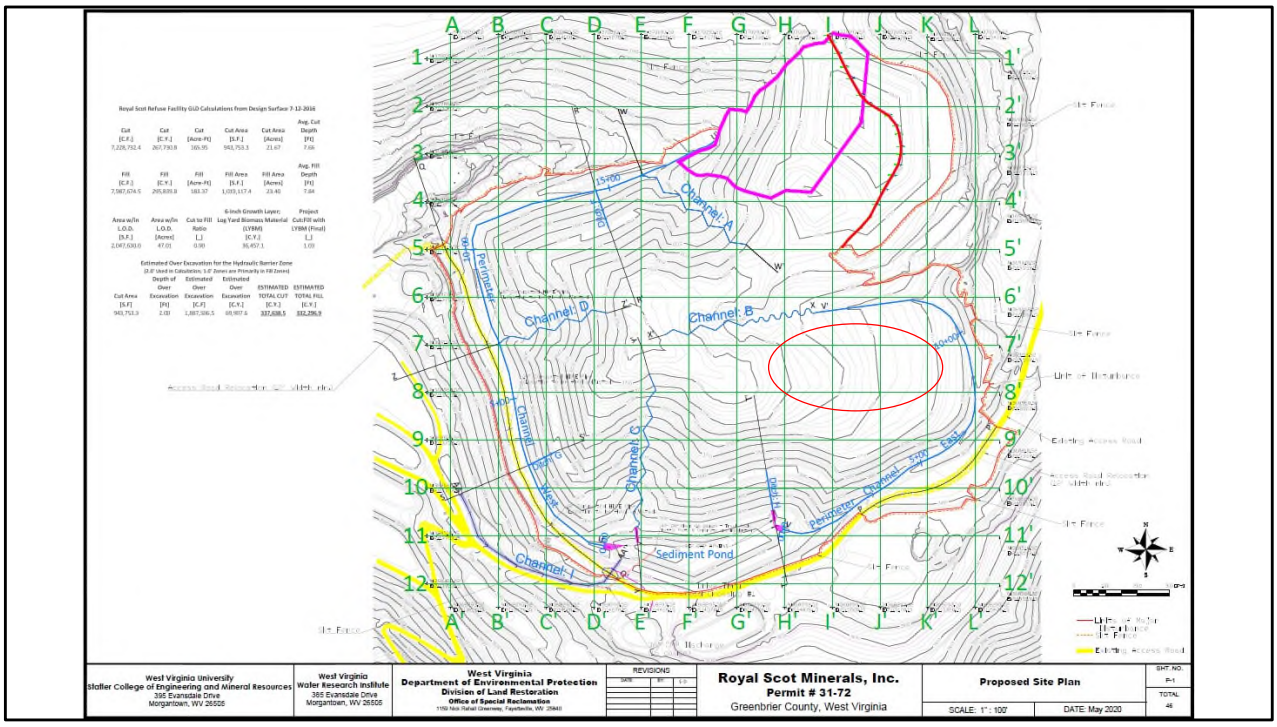
Borrow Site before removal of LYBM

Borrow Site after removal of LYBM. The WVDEP benefited tremendously from material harvested as Allegheny Wood Products provided this at no cost to the WVDEP. Allegheny Wood Products benefited by regaining valuable real-estate for future disposal of an organic waste product that may benefit another industry in the future. This partnership, lead by John Dilorenzo of Allegheny Wood Products, is an example of how different industries can work together to the benefit of both.

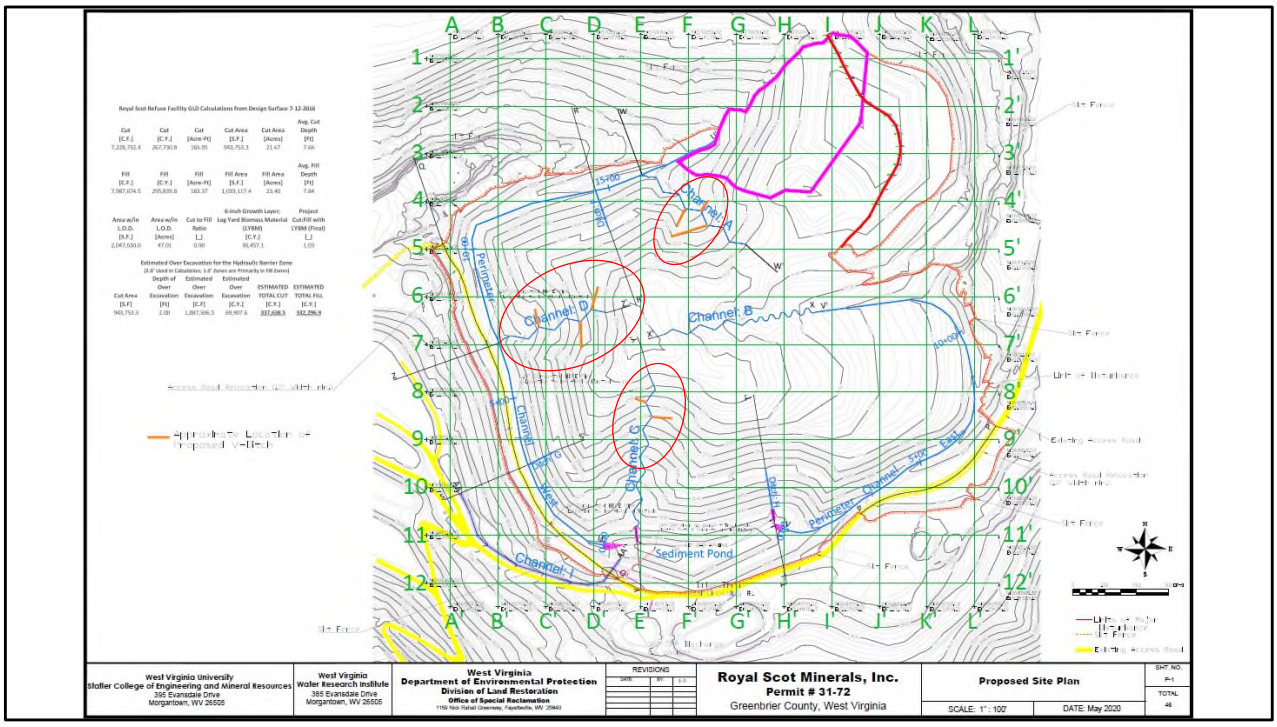
CONSTRUCTION ISSUES



smoothing of crisp ridges in design grades, pulling back the limits of disturbance in the northeast corner to minimize disturbance of original ground



allowable percentage of sludge to be mixed with refuse for stability (stability allowed 20% - however, workability ended up at less than 5%), revising the regrade in the northeast area to account for material balance due to material shrinkage and material volume loss from no disturbance in the pullback area. Adjusting the northeast area did not affect the geomorphic configuration.



the need for finger drains to prevent erosion on long uninterrupted slopes – a 1-foot deep V-Ditch was added to the contract and placed as directed by the on-site WVDEP representative, in order to be responsive to field conditions and place the finger drains appropriately

COMBINING IRON SLUDGE WITH COAL REFUSE

Placement of AMD Sludge to dry out for the weekend.

Addition of a layer of coal refuse. The AMD sludge ended up squeezing out like jelly against the hillside, resulting in picking it back up and re-spreading it in order to blend it into the fill material.

Mixing of AMD Sludge with Coal Refuse – note the depth of the windrows. The operators had a steep learning curve – due to the fluid nature of the material, the dozers became stuck several times.

After initial placement and mixing operations, Central Contracting elected to place the iron sludge on a slope in order to allow it to dewater and be more manageable when mixing with coal refuse. This required double-handling the material but made the mixing much easier.

SLOPE EROSION AND RESOLUTION

Note erosion reel to the left of the compaction technician.

V-Ditches added to Channel D. Dozer spreading LYBM.

Finally, a Google Earth image showing property to be acquired for further water treatment.

QUESTIONS?

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