Beneficial Uses of CCR’s
Mining Reclamation

OSU CCR Summit
May 13, 2016
Columbus, Ohio
Reclamation of Abandoned Mined Lands (AML)

- AML sites can pose risks to both the public and environment
  - disrupting flow of nearby surface water streams,
  - discharging highly acidic and metal-enriched acid mine drainage (AMD),
  - creating Dangerous highwalls, and degrading habitat for wildlife

- Over 6,000 recorded abandoned underground mines

- About 120,000 acres of unreclaimed surface mined lands in need of reclamation
Reclamation of AML sites improves the environment and eliminates health and safety hazards within AML impacted regions

• Since the inception of Ohio’s AML program
  – Nearly 150 million dollars have been expended; resulting in nearly 30,000 acres of AML reclamation

• Ohio’s inventory estimates that nearly 50 thousand acres remain unfunded
  – at an estimated cost of $308 million
  – Including nearly 500k ft. of dangerous highwalls

• Funds are limited
  – Therefore; need for cost-effective innovative approaches to AML reclamation, i.e. CCR’s
Regulation of CCR material at mine sites

• Currently OSMRE is working with USEPA to develop federal regulations for placement of CCR’s
  – Both abandoned unreclaimed mine lands and active sites
  – The Division has developed statute that address placement of CCR’s – including beneficial use
  – Division reviews placement case-by-case
  – Division supports OSM taking lead in development of rule
Ohio’s Regulatory Landscape
CCR Placement

• In 1999, Ohio legislature amended ORC 1513 and transferred authority for regulation of CCR beneficial use applications to the Ohio Department of Natural Resources.
  – Review on a case-by case basis

• Prior to 1999 CCR material was approved under OEPA’s Division of Surface Water.
  – At both abandoned and active mine sites
Ohio is a leader in reclamation of AML sites using FGD material

<table>
<thead>
<tr>
<th>site name</th>
<th>type</th>
<th>tons of FGD</th>
<th>year</th>
<th>acres</th>
<th>length of highwall eliminated</th>
<th>RA</th>
<th>status</th>
<th>Cost $</th>
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<tr>
<td>Otsego</td>
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<td>1992</td>
<td>9</td>
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<td>Fleming</td>
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<td>Freeport</td>
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<td>Broken- Aro</td>
<td>coal refuse/UGM</td>
<td>29,000</td>
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<td>8</td>
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<td>Robert-Dawson (AEP administered contract)</td>
<td>UGM injection</td>
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<td>Conesville Prep Plant</td>
<td>highwall</td>
<td>1,700,000</td>
<td>2004</td>
<td>30</td>
<td>1800</td>
<td>DMRM</td>
<td>complete</td>
<td>no-cost</td>
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<td>2011</td>
<td>109</td>
<td>2400</td>
<td>DMRM</td>
<td>final closure</td>
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<td>Conesville Five Points Ph III</td>
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<td>2016</td>
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# Ohio and innovation of CCR Placement

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<th>status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conesville Prep Plant Coal Waste Disposal</td>
<td>coal refuse</td>
<td>587,000 over 30 years</td>
<td>2000</td>
<td>29 acres as of 2008</td>
<td>n/a</td>
<td>OEPA</td>
<td>ongoing by Oxford Mng.</td>
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<td>Central Ohio Coal Company (COCO) coal refuse disposal facility</td>
<td>coal refuse</td>
<td>75,000</td>
<td>1999</td>
<td>20 acres of coal refuse dam embankment</td>
<td>n/a</td>
<td>OEPA</td>
<td>complete</td>
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<tr>
<td>Cardinal Ohio American Energy Permit D-2304</td>
<td>highwall/pit</td>
<td>400,000 gypsum</td>
<td>2011-2015</td>
<td>10</td>
<td>775 AML and 635 active</td>
<td>DMRM</td>
<td>under DMRM phase III</td>
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<tr>
<td>total</td>
<td></td>
<td>1,062,000</td>
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<td>59</td>
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</tbody>
</table>

**COCO - Completed 1999**

- 30" Compacted FGD
- 18" Resoil
- Coal Refuse Dam
- Pond
Benefits of CCR Projects for Mine Reclamation

• Reclamation of underground and surface mined areas significantly improve environmental and safety problems; and are completed at no or minimal cost to the state.

• Ohio citizens benefit by reduced landfilling, recreation opportunities and economic development in economically challenged areas of the state.

• Coordination between, governmental agencies, power generating utilities, Ohio Coal Companies, and academia can and do lead to future beneficial projects.

• Active mine operators can also participate within their coal applications, including remining operations.

• Ohio continues to be an outspoken supporter of incentives for remining:
  – Including supporting and participating in industry/government workgroups to promote remining.
Conesville Five Points Phase I & II highwall reclamation demo project site- Coshocton County

- Includes robust groundwater and surface water monitoring
  - Data collected from 9 groundwater wells
  - 3 surface water monitoring sites
- Data collection for over one year prior to placement, during construction (OSU) and for 5 years post construction (AEP)
- 109 acres to be reclaimed
- 2,400 of highwall eliminated
- 1.6 million tons of CCR materials placed
Use of Appalachian Regional Reforestation Initiative – Forestry Reclamation Approach

- End dumping spoil piles as medium for tree seedlings (right)
- Tree seedlings planted in Spring of 2016
- Steep slopes planted with grass and legume cover
Five Points Phase III highwall reclamation project site in Coshocton County- 2016

- 2,000 linear feet of highwall will be eliminated
- 110 acres of pits/spoil will be reclaimed
- Nine groundwater monitoring wells installed and actively monitored by AEP.
- OSU’s role is to review water quality monitoring data and develop site-specific geochemical model
- Division design/construction oversite
- No-cost project to the state
BU application was approved in 2011 as an amendment to permit D-2304

- Five GW monitoring wells are being actively monitored by OSU
- Mine spoil was placed in pit bottom above predicted water table (center)
- 400,000 tons of FGD gypsum was placed between 2012 and 2014

- Murray Energy Corp: Cardinal Star Ridge D-2304 (Pit #22) in Jefferson County
(CCR) FGD gypsum fill provided volume of additional material to successfully reclaim this AML site and active highwall

- Final reclamation included elimination of 775 ft. of dangerous AML highwall and 600 feet of active highwall
  - Site subject to DMRM phase III release requirements
Gavin AMD abatement demonstration project- Gallia County, Stingy Run watershed

- Near Gavin Power Plant
  - AMD is being generated by abandoned underground and surface coal mines
- Demonstrate beneficial use of FGD to mitigate AMD sources
  - Prevent pollution to Kyger Creek Watershed
- DMRM’s staff reviewing AEP’s BUA – potentially large multi phase project
- Completion?
Moving Forward/Tomorrow’s Landscape

• Potential FGD project sites
  – Many eligible sites (highwalls) near power plants
  – Estimated 500 million cubic yards of potential placement within 15 miles of source
  – Projects completed at no cost to the state

• Market conditions affect CCR availability/placement
  – Reduction in coal burn = reduced availability of CCR material
  – Jeopardizes on-going/future projects
  – Future reclamation next 5-10 yrs?

• MSHA’s stay out stay alive campaign (SOSA)
  – Reminder of dangers associated with abandoned mine lands, and the importance of continuation of this important partnership.

• Environmental/water quality monitoring an important component
  – OSU/Industry monitoring for water quality
    • Generally at least 5-yrs following completion of project – must continue to ensure projects are viable/approvable
CCR’s: Successful Mine Reclamation