

EXHIBIT S

Commonwealth of Pennsylvania
Department of Mines and Mineral Industries

MD Pollution Abatement Measures for the Beech Creek Watershed

CONSTRUCTION AND COST ESTIMATING INFORMATION

I. Preventive Measures

A. Inundate Deep Mine Workings

Construction Materials and Procedure

Clear and grub an area 50 to 100 feet wide around the periphery of the workings as necessary.

Scalp and store topsoil.

Excavate to pavement underlying coal seam, salvaging any remaining coal.

Block exposed deep mine workings with most impermeable material readily available.

Backfill to within 1 foot of desired grade with excavated material, compacting the fill as it is placed; fill to be graded to induce surface runoff.

Replace and compact topsoil over the affected area.

Lime, fertilize and plant affected area with appropriate grasses.

Unit and/or Lump Sum Costs Used for Estimating Project Cost

Major construction contract prices:

| | |
|---|--------------|
| Clear and grub | \$500/acre |
| Scalp, store and replace topsoil | \$0.60/cu yd |
| Excavate, store and replace fill material | \$0.40/cu yd |
| Lime, fertilize and seed | \$113/acre |

Engineering, legal and administrative expenses, and estimating contingencies and omissions - percent of basic construction contract price

35

Replacement

Each year for the first 3 years, replace one-third of the topsoil, lime, fertilizer and seed; one-third of the initial topsoil, lime, fertilizer and seed Project Cost used for replacement cost

Operation and Maintenance

For the first 3 years, 1% per year of the initial excavation and backfill Project Cost (excluding topsoil)

For the first 3 years, 33-1/3 % per year of the initial topsoil, lime, fertilizer and seed Project Cost

Comments

Where acid producing material is encountered during excavation, this material will be placed during backfill operation in such places and in such manner as to minimize its contact with water which may penetrate the restored area.

B. Reconstruct Stream Channels

Construction Materials and Procedure

- Purchase land for, and construct, permanent access road.
- Backfill and/or excavate existing channel to establish desired width and grade.
- Place 6 inch crushed stone base.
- Place 2 inch asphalt mat liner.

Unit and/or Lump Sum Costs Used for Estimating Project Cost

Major construction contract prices:

| | |
|-----------------------------|--------------|
| Access road, including land | \$1.16/ft |
| Excavation and/or fill | \$1.00/cu yd |
| Crushed stone | \$7.50/cu yd |
| Asphalt mat | \$1.88/sq yd |

| | |
|---|----|
| Engineering, legal and administrative expenses, and estimating contingencies and omissions - percent of basic construction contract price | 35 |
|---|----|

Replacement

Asphalt mat replaced every 30 years; initial mat Project Cost used for replacement cost

Operation and Maintenance

2% per year of initial mat Project Cost

Comments

In several instances spoil material in wet weather stream channels relocated to open channels; initial Project Cost based on earth moving; no replacement, nor operating and maintenance costs considered necessary.

C. Construct Surface and/or Ground Water Diversion Ditches

Construction Materials and Procedure

- Purchase permanent right-of-way or land for construction and maintenance of ditches.
- Use caterpillar tractor with blade or excavation equipment, construct ditches on uphill side of strip mines.

Unit and/or Lump Sum Costs Used For Estimating Project Cost

Major construction contract prices:

| | |
|----------------------|------------------------------|
| Right-of-way or land | \$0.62/ft or \$625/acre |
| Ditching | \$0.40/ft or \$1.00/cu yd |

| | |
|---|----|
| Engineering, legal and administrative expenses, and estimating contingencies and omissions - percent of basic construction contract price | 35 |
|---|----|

Replacement

None

Operation and Maintenance

50% per year of initial ditching Project Cost

D. Restore Strip Mines

Construction Materials and Procedure

Clear and grub area affected by restoration.

Backfill strip mine to within 1 foot of desired grade with material available within the watershed, compacting the fill as it is placed; fill to be graded to induce surface runoff.

Place 1 foot of compacted select fill over the area affected by restoration.

Lime, fertilize and plant area affected by restoration with appropriate grasses.

Unit and/or Lump Sum Costs Used For Estimating Project Cost

Major construction contract prices:

| | |
|---|--------------|
| Clear and grub | \$250/acre |
| Move and place fill material (other than select material) | \$0.62/cu yd |
| Move and place select fill material | \$0.75/cu yd |
| Lime, fertilize and seed | \$113/acre |

Engineering, legal and administrative expenses and estimating contingencies and omissions - percent of basic construction contract price

35

Replacement

Each year for the first 3 years, replace one-third of the select fill, lime, fertilizer and seed; one-third of the initial select fill, lime, fertilizer and seed Project Cost used for replacement cost

Operation and Maintenance

For the first 3 years, 1% per year of the initial backfill Project Cost (excluding select fill)

For the first 3 years, 33-1/3% per year of the initial select fill, lime, fertilizer and seed Project Cost

Comments

Where acid producing Refuse is used to meet fill requirements, this Refuse would be placed below the ground water table where it would be continuously inundated, or sufficiently high to avoid being wetted by a fluctuating water table.

E. Move Refuse Into Strip Mines

Construction Materials and Procedure

Move and place Refuse into inactive strip mines.

Unit and/or Lump Sum Costs Used For Estimating Project Cost

| | |
|---|--------------|
| Major construction contract price: | |
| Move and place Refuse | \$0.62/cu yd |
| Engineering, legal and administrative expenses, and estimating contingencies and omissions - percent of basic construction contract price | 35 |

Replacement

None

Operation and Maintenance

None

F. Eliminate Deep Mine Workings (Same procedure followed for Excavate and Restore Subsidence Areas)

Construction Materials and Procedure

- Clear and grub affected area.
- Scalp and store topsoil.
- Excavate to stable subgrade.
- Backfill to within 1 foot of desired grade, compacting the fill as it is placed; fill to be graded to induce surface runoff.
- Replace and compact topsoil over the affected area.
- Lime, fertilize and plant affected area with appropriate grasses.

Unit and/or Lump Sum Costs Used For Estimating Project Cost

| | |
|---|--------------|
| Major construction contract prices: | |
| Clear and grub | \$500/acre |
| Scalp, store and replace topsoil | \$0.75/cu yd |
| Excavate, store and replace fill material | \$0.62/cu yd |
| Lime, fertilize and seed | \$113/acre |
| Engineering, legal and administrative expenses, and estimating contingencies and omissions - percent of basic construction contract price | 35 |

Replacement

Each year for the first 3 years, replace one-third of the topsoil, lime, fertilizer and seed; one-third of the initial topsoil, lime, fertilizer and seed Project Cost used for replacement cost

Operation and Maintenance

- For the first 3 years, 1% per year of the initial excavation and backfill Project Cost (excluding topsoil)
- For the first 3 years, 33-1/3% per year of the initial topsoil, lime, fertilizer and seed Project Cost

G. Close Deep Mine Entries

Construction Materials and Procedure

- Construct conventional concrete block seal; or
- Construct impermeable seal utilizing double plug of limestone chips and grout; or
- Seal Entry by packing with impermeable material;
- Divert surface water flows away from Entry.

Unit and/or Lump Sum Costs Used for Estimating Project Cost

Major construction contract prices:

Price per seal normally varies depending on method utilized and problems encountered at each site \$1,500 to \$18,500

Engineering, legal and administrative expenses, and estimating contingencies and omissions - percent of basic construction contract price 35

Replacement

None

Operation and Maintenance

1% per year of initial seal Project Cost

Comments

Selection of method of closing Entry dependent upon existing conditions.

H. Chemically Neutralize Strip Mines

Construction Materials and Procedure

- Prepare lime slurry and pump onto the surface of impoundments within the strip mine, and onto the adjacent ground surface, recirculating water through impoundments until all water in impoundments is neutralized.
- Spread agricultural lime over, and scarify into affected area in sufficient amounts to offset acid leaching therefrom.

Unit and/or Lump Sum Costs Used for Estimating Project Cost

Major construction contract prices:

| | |
|----------------------|-------------------|
| Laborer | \$100/day |
| Supervisor | \$150/day |
| Truck Rental | \$750/month |
| Pump Rental | \$350-\$750/month |
| Lime Spreader Rental | \$500/month |
| Agricultural Lime | \$6/ton |
| Calcium Oxide | \$30/ton |

Engineering, legal and administrative expenses, and estimating contingencies and omissions - percent of basic construction contract price 35

Replacement

Repeat entire procedure during second six months of the initial year, and repeat once during each of the second and third years

Operation and Maintenance

For the second and third years, 50% per year of the initial Project Cost

Comments

Soil treatment during first three years should help additional surface areas to support vegetation where none would otherwise grow until most of the acid had leached from these areas.

II. Collection System

A. Flow Equalization Basins

Construction Materials and Procedure

- Purchase land for permanent access road and basin.
- Construct permanent access road.
- Install electric lines to metering device.
- Construct basin.
 - Clear and grub
 - Perform earthwork for shaping basin (assumed suitable material for fill available within the watershed); all fill to be compacted
 - Basin walls to have top width sufficient to accommodate trucks
 - Construct inlet and outlet structures; outlet structure to contain either rate-of-flow control and metering devices, or pump stations
 - Construct overflow structure; place protective coating on exposed surfaces
 - Place 4.4 pounds of bentonite per square foot over the wetted area; mix in top 2 inches
 - Construct basin bypass
 - Lime, fertilize and plant with appropriate grasses all inner slopes above maximum liquid level, and all outer slopes
- Construct surface water diversion ditches on uphill side of basin.
- Install fence around basin.

Unit and/or Lump Sum Costs Used For Estimating Project Cost

Major construction contract prices:

| | |
|-----------------------------|--------------|
| Basin site land | \$625/acre |
| Access road, including land | \$1.16/ft |
| Clear and grub | \$500/acre |
| Earthmoving and placing | \$0.62/cu yd |
| Ditching | \$0.40/ft |

Outlet structure: rate-of-flow control device capacities range from 112 to 3,250 gpm, construction contract prices from \$10,800 to \$19,300; pump station capacities range from 1,530 to 17,500 gpm, construction contract prices from \$172,000 to \$463,000

| | |
|-----------------------------|--------------|
| Reinforced concrete | \$125/cu yd |
| Furnish and place bentonite | \$0.24/sq ft |
| Lime, fertilize and seed | \$113/acre |
| Fencing | \$6.88/ft |

Engineering, legal and administrative expenses, and estimating contingencies and omissions - percent of basic construction contract price 35

Replacement

Outlet structure and equipment, and complete pump station replaced every 30 years, overflow structure concrete replaced every 90 years; initial Project Cost for these items used for replacement cost

Operation and Maintenance

5% per year of initial Project Cost for access road, earthmoving, and furnishing and placing bentonite

2% per year of initial outlet structure and fencing Project Cost

Based on Design Average volumes: yearly pump station supervision and labor costs are \$7,200; yearly power (\$0.02 per kilowatt hour) costs range from \$1,050 to \$47,100; yearly maintenance and miscellaneous costs range from \$3,600 to \$9,700

Comments

Design Maximum volumes used for sizing basins.

Pump stations used in lieu of outlet structures at some locations; Design Wet Weather volumes used in sizing pumps.

B. Conveyance Sewers

Construction Materials and Procedure

Purchase permanent right-of-way for sewers.

Excavate trench; place vitrified clay and/or reinforced, lined concrete sewer; backfill.

Construct manholes at 1,000 foot intervals and at changes in direction and grade.

Where applicable, construct transition structure from MD Discharge Point to conveyance sewer.

Unit and/or Lump Sum Costs Used For Estimating Project Cost

Major construction contract prices:

| | |
|---|-----------|
| Right-of-way | \$0.62/ft |
| Excavate, furnish and install sewer, and backfill; sewers range from 6 to 120 inches in diameter, construction contract price from \$12.65 to \$462 per foot (assumed 50% rock) | |
| Transition structure | \$6,250 |

Engineering, legal and administrative expenses, and estimating contingencies and omissions - percent of basic construction contract price 50

Replacement

Sewers replaced every 90 years, transition structures every 60 years; initial Project Cost less right-of-way used for sewer replacement cost, initial transition structure Project Cost used for replacement cost

Operation and Maintenance

1% per year of initial Project Cost, less right-of-way

Comments

Twice Design Wet Weather, and Design Maximum volumes used for sizing conveyance sewers.

C. Underground Conduits

Construction Materials and Procedure

Purchase land for underground conduit sites.

Clear and grub area to be affected.

Scalp and store topsoil.

Excavate to extent necessary to cut into deep mine workings desired to be interconnected.

Lay reinforced, lined concrete pipe and/or stainless steel pipe to interconnect deep mines.

Backfill to within 1 foot of desired grade, compacting the fill as it is placed; fill to be graded to induce surface runoff.

Replace and compact topsoil over the affected area.

Lime, fertilize and plant affected area with appropriate grasses.

Unit and/or Lump Sum Costs Used For Estimating Project Cost

Major construction contract prices:

| | |
|--|--------------|
| Conduit site land | \$625/acre |
| Clear and grub | \$500/acre |
| Scalp, store and replace topsoil | \$0.75/cu yd |
| Excavate, store and replace fill material | \$0.62/cu yd |
| Furnish and install sewer; sewers range from 18 to 48 inches in diameter, construction contract price from \$22.45 to \$172 per foot | |
| Lime, fertilize and seed | \$113/acre |

Engineering, legal and administrative expenses, and estimating contingencies and omissions - percent of basic construction contract price

35

Replacement

Conduit replaced every 90 years; initial Project Cost less conduit site land used for replacement cost

Operation and Maintenance

None

Comments

These underground conduits would serve as an alternative to a conventional conveyance sewer; rock falls inside the underground mine workings could affect hydraulic feasibility.

D. Open Channels

Construction Materials and Procedure

- Purchase right-of-way for open channels.
- Excavate to proper channel dimension and grade.
- Place 6 inch crushed stone base.
- Place 2 inch asphalt mat liner.
- Where applicable, construct transition structure from MD Discharge Points to open channel.

Unit and/or Lump Sum Costs Used For Estimating Project Cost

Major construction contract prices:

| | |
|------------------------|--------------|
| Right-of-way | \$0.62/ft |
| Excavation and/or fill | \$1.00/cu yd |
| Crushed stone | \$7.50/cu yd |
| Asphalt mat | \$1.88/sq yd |
| Transition structure | \$6,250 |

Engineering, legal and administrative expenses, and estimating contingencies and omissions - percent of basic construction contract price

35

Replacement

Asphalt mat replaced every 30 years, transition structures every 60 years; initial Project Cost for these items used for replacement cost

Operation and Maintenance

2% per year of initial mat Project Cost

Comments

Design Maximum volumes used for sizing open channels.

III. Treatment Measures

A. Treatment Facilities - Chemically Neutralize, Oxidize and Settle

Construction Materials and Procedure

- Purchase land for plant site and access road.
- Construct permanent access road.
- Prepare site including installation of electric lines.
- Construct treatment plant.
 - Control building
 - Concrete block superstructure with brick facing; contains wet well, AMD pumps, equipment controls, laboratory, sludge vacuum filters
 - Oxidation - flocculation tanks
 - Concrete construction
 - Clarifier - thickener tanks
 - Concrete construction
 - Sludge holding tank
 - Concrete construction
 - Interunit piping
 - Lined cast iron
 - Outfall sewer to receiving stream
- Install fence around site.

Unit and/or Lump Sum Costs Used For Estimating Project Cost

Major construction contract prices:

Complete treatment facilities including land, access road, site preparation and fencing; plants range in size from 0.28 to 25.2 mgd, construction contract prices from \$41,500 to \$1,680,000

Engineering, legal and administrative expenses, and estimating contingencies and omissions - percent of basic construction contract price

25

Replacement

Treatment facilities replaced every 30 years; initial Project Cost used for replacement cost

Operation and Maintenance

Based on Design Average volumes: yearly supervision and labor costs vary from \$3,600 to \$96,000; yearly power (\$0.02 per kilowatt hour) costs from \$750 to \$20,500; yearly chemical costs from \$1,000 to \$185,000; yearly maintenance and miscellaneous costs from \$550 to \$30,000

Engineering, administrative and other expenses, and estimating contingencies and omissions - percent of basic operating and maintenance cost

10

Comments

Design Wet Weather volumes used for sizing treatment plant; assumed sludge cake would be disposed of in watershed strip pits.