# Friends of the Cheat Restoration Project Updates

(updated for July 26, 2017 River of Promise)

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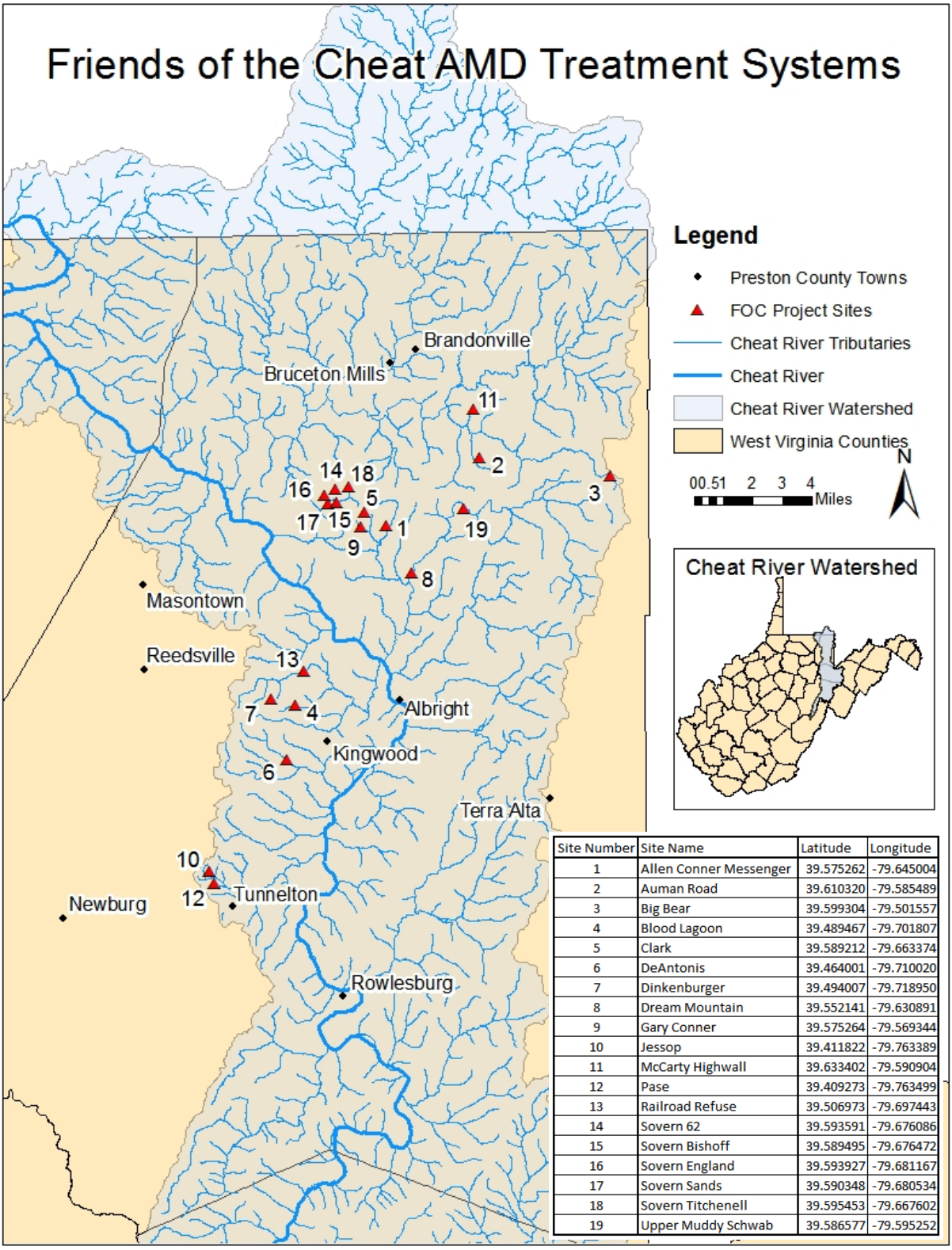


| Site Number | Site Name | Latitude | Longitude |
|---|---|---|---|
| 1 | Allen Conner Messenger | 39.575262 | -79.645004 |
| 2 | Auman Road | 39.610320 | -79.585489 |
| 3 | Big Bear | 39.599304 | -79.501557 |
| 4 | Blood Lagoon | 39.489467 | -79.701807 |
| 5 | Clark | 39.589212 | -79.663374 |
| 6 | DeAntonis | 39.464001 | -79.710020 |
| 7 | Dinkenburger | 39.494007 | -79.718950 |
| 8 | Dream Mountain | 39.552141 | -79.630891 |
| 9 | Gary Conner | 39.575264 | -79.569344 |
| 10 | Jessop | 39.411822 | -79.763389 |
| 11 | McCarty Highwall | 39.633402 | -79.590904 |
| 12 | Pase | 39.409273 | -79.763499 |
| 13 | Railroad Refuse | 39.506973 | -79.697443 |
| 14 | Sovern 62 | 39.593591 | -79.676086 |
| 15 | Sovern Bishoff | 39.589495 | -79.676472 |
| 16 | Sovern England | 39.593927 | -79.681167 |
| 17 | Sovern Sands | 39.590348 | -79.680534 |
| 18 | Sovern Titchenell | 39.595453 | -79.667602 |
| 19 | Upper Muddy Schwab | 39.586577 | -79.595252 |

**Project:** Allen Conner Messenger
**Stream:** Glade Run | Martin Creek | Muddy Creek
**Coordinates:** 39.575262, -79.645004
**Year completed:** 2012
**Total construction:** $228,095 (Alpha Associates/CE Bolyard & Son)
**Description:** Three independent auto-flushing limestone leach beds were constructed to treat three AMD sources. Due to space limitations, no settling ponds were constructed. The ponds are set to flush on a staggered schedule so that only one pond is flushing at a time.
**Expected results:** Target 80-85% removal of acidity (245 TPY), iron (4.3 TPY) and aluminum (29.94 TPY), and manganese (5.3 TPY)
**Water quality data:** 06/28/2017

| Site | Flow (GPM) | Conduct. (µs) | Lab pH (SU) | Acidity (mg/L) | D_Al (mg/L) | D_Fe (mg/L) | D_Mn (mg/L) |
|---|---|---|---|---|---|---|---|
| ACM 1 SO | 11 | 1740 | 3.48 | 191.8 | 29.9 | 1.87 | 7.39 |
| ACM 2 SO | 47 | 1574 | 3.42 | 200.9 | 23.0 | 2.83 | 3.71 |
| ACM 3 SO | 16 | 896 | 5.15 | 26.83 | 3.35 | 0.87 | 1.11 |
| GR us ACM | 681 | 619 | 4.76 | 31.62 | 3.25 | 1.64 | 1.20 |
| GR ds ACM | 1209 | 691 | 4.71 | 47.14 | 5.49 | 1.67 | 1.55 |

**Project:** Auman Road
**Stream:** Beaver Creek | Little Sandy Creek | Big Sandy Creek
**Coordinates:** 39.610320, -79.585489
**Year completed:** Projected 2017
**Total construction:** Estimated $201,500
**Description:** The site currently consists of two small impoundments and AMD seeps from land reclaimed in 1996. The conceptual design includes open limestone channels, a flushing limestone leach bed, a settling pond, and a wetland. Engineering is expected to start in 2016/2017.
**Expected results:** 80% removal of pollutant loads. Current loads- acidity: 50 TPY, aluminum: 7 TPY, iron: 1.3 TPY, manganese: 1.9 TPY.
**Water quality data:** 06/02/2017

| Site | Flow (GPM) | Conduct. (µs) | Lab pH (SU) | Acidity (mg/L) | D_Al (mg/L) | D_Fe (mg/L) | D_Mn (mg/L) |
|---|---|---|---|---|---|---|---|
| Auman Discharge | 0 | - | - | - | - | - | - |
| Auman Pond #1 | - | 546.3 | 3.86 | 106.1 | 13.6 | 1.69 | 3.49 |
| Auman Pond #2 | - | 44.42 | 5.84 | 3.6 | 0.06 | 0.19 | 0.58 |
| Auman trib at Auman | 43 | 593.1 | 3.52 | 110.6 | 11.2 | 1.95 | 3.79 |
| Auman UNT ds discharge | 373 | 156.6 | 5.73 | 5.93 | 0.07 | 0.22 | 0.97 |
| BC at Auman Rd | 4227 | 74.31 | 6.97 | 0.88 | 0.06 | 0.05 | 0.16 |

**Project:** Big Bear
**Stream:** Beaver Creek | Little Sandy Creek | Big Sandy Creek
**Coordinates:** 39.599304, -79.501557
**Year completed:** 2000; 2015
**Total construction:** 2000: $108,866 (Alpha Associates/Ground Breakers); 2015: $93,477 (Alpha Associates/Williams Excavating)
**Description:** 2000: Water quality is degraded by exposure to sandstone bedrock, acid deposition, and a large headwater wetland which contributes acidity. A limestone leach bed was constructed to add alkalinity. After approximately two years, it became clogged and inefficient due to lack of sediment control. 2015: The limestone leach bed was replaced and an Agri-drain and flush pipes were installed.
**Expected results:** Add alkalinity to Beaver Creek
**Water quality data:** 07/01/2016

| Site | Flow (GPM) | Conduct. (µs) | Field pH (SU) | Acidity (mg/L) | D_Al (mg/L) | D_Fe (mg/L) | D_Mn (mg/L) |
|---|---|---|---|---|---|---|---|
| BB SI | 19 | 23.58 | 6.18 | -6.20 | ND | 0.20 | 0.02 |
| **BB SO** | **19** | **7.82** | **8.44** | **-29.40** | **0.17** | **0.12** | **ND** |
| Beaver ds dam | 654 | 27.86 | 5.95 | -2.10 | ND | 0.28 | 0.10 |
| Beaver Centenary | 358 | 27.61 | 5.98 | -3.90 | ND | 0.06 | 0.03 |

**Project:** Blood Lagoon
**Stream:** Middle Fork Greens Run | Greens Run
**Coordinates:** 39.489467, -79.701807
**Year completed:** 1995, 2002; 2007
**Total construction:** 1995: $250,000 (Anker Energy); 2002: $62,750 (Triad Engineering); 2008: $224,079 (Alpha Associates/CE Bolyard & Son)
**Description:** 1995: Anoxic limestone drain (ALD) was installed to treat AMD from seep #3. Half of the iron and all of the aluminum precipitated in the drain. ALD was plugged within one year. 2002: A steel slag system was constructed, but filled with sludge. 2008: A large steel slag leach pond, limestone leach beds, and settling ponds, which were constructed.
**Expected results:** 2002: Increase pH from 3.0 to 5.5. 2008: Reductions of iron (61 tons), aluminum (23 tons), and manganese (2 tons).
**Water quality data:** 11/10/2016

| Site | Flow (GPM) | Conduct. (µs) | Field pH (SU) | Acidity (mg/L) | D_Al (mg/L) | D_Fe (mg/L) | D_Mn (mg/L) |
|---|---|---|---|---|---|---|---|
| BL #6 | 15 | 2480 | 2.44 | 792 | 61.2 | 65.6 | 5.07 |
| BL KP Out | - | - | - | - | - | - | - |
| BL SSB Out | 67 | 172 | 11.14 | -18 | 0.65 | 0 | 0 |
| **BL SO** | **303** | **1071** | **2.91** | **288** | **24.7** | **25.9** | **6.18** |
| MFG ds BL SO | 40.4 | 1036 | 2.85 | 230 | 20 | 17.5 | 1.81 |

**Project:** Clark
**Stream:** Sovern Run | Big Sandy Creek
**Coordinates:** 39.589212, -79.663374
**Year completed:** 2005
**Total construction:** $71,600 (Triad Engineering/CE Bolyard & Son)
**Description:** Land reclamation including the installation of mine seals took place in the 1990s. In 2005, Sovern Run was channeled into a composite steel slag and open limestone v-shaped ditch to provide passive treatment. An additional steel slag check dam was installed at the outlet of an unnamed tributary of Sovern run near the downstream end of the project site. *Due to landowner issues, FOC has not visited the site since 2009.
**Expected results:** Reduction of pollutants: acid (57 TPY), iron (0.84 TPY), aluminum (5.1 TPY), and manganese (0.4 TYP).
**Water quality data:** 11/20/2009*

| Site | Flow (GPM) | Conduct. (µs) | Field pH (SU) | Acidity (mg/L) | D_Al (mg/L) | D_Fe (mg/L) | D_Mn (mg/L) |
|---|---|---|---|---|---|---|---|
| **Clark SO** | **10** | **490** | **6.14** | **6.02** | **0.24** | **0.44** | **0.69** |
| Clark BOLC3 | 11 | 650 | 3.63 | 52.85 | 2.13 | 8.75 | 3.19 |
| Clark abv Dam | - | 140 | 6.9 | - | - | - | - |

**Project:** DeAntonis
**Stream:** Morgan Run
**Coordinates:** 39.464001, -79.710020
**Year completed:** 2007; 2009
**Total construction:** 2007: $102,588 (Alpha Associates); 2009: $43,650 (Alpha Associates/CE Bolyard & Son)
**Description:** 2007: A limestone leach bed was constructed at the draining portal. Freshwater was directed through a steel slag leach bed. A sludge pond allowed mixing and precipitation from both leach beds. 2009: A freshwater basin installed to supply steel slag bed and limit sedimentation. Sludge was also removed and disposed of at T&T #3.
**Expected results:** Reductions of 25,459 pounds/year of iron, 6,780 pounds/year of aluminum, 883 pounds/year of manganese.
**Water quality data:** 10/06/2016

| Site | Flow (GPM) | Conduct. (µs) | Field pH (SU) | Acidity (mg/L) | D_Al (mg/L) | D_Fe (mg/L) | D_Mn (mg/L) |
|---|---|---|---|---|---|---|---|
| DeAnt SI | 3 | 2460 | 2.68 | -844 | 62.9 | 103 | 3.62 |
| DeAnt SSB Out | - | - | - | - | - | - | - |
| **DeAnt SO** | **1.2** | **1861** | **2.59** | **-438** | **52.6** | **23.7** | **3.61** |
| Morgan us DeAnt | 21 | 220 | 3.75 | -36 | 3.87 | 0.28 | 1.7 |
| Morgan ds DeAnt | 28 | 364 | 3.54 | -70 | 6.86 | 1.7 | 1.72 |

**Project:** Dinkenburger
**Stream:** North Fork Greens Run | Greens Run
**Coordinates:** 39.494007, -79.718950
**Year completed:** 2003; 2011
**Total construction:** 2003; 2011: $113,591 (Alpha Associates/Williams Excavating, LLC)
**Description:** 2003: A small dike was constructed to improve a pool at the mouth of the portal. Water discharged into a limestone leach bed, down a limestone rip rap channel, through a culvert under the road. A storm in 2005 clogged the leach bed with organic material. In 2006, the leach bed was wrapped in fabric to prevent further clogging. 2011: An auto flushing limestone leach bed replaced the original leach bed. Water discharges through a culvert under the road and flows through an open limestone channel with sheet piling prior to flowing into the stream.
**Expected results:**
**Water quality data:** 06/01/2017

| Site | Flow (GPM) | Conduct. (µs) | Lab pH (SU) | Acidity (mg/L) | D_Al (mg/L) | D_Fe (mg/L) | D_Mn (mg/L) |
|---|---|---|---|---|---|---|---|
| Dink SI | 9 | 1527 | 2.73 | 703.4 | 50.6 | 112 | 6.35 |
| **Dink SO** | **6** | **973.8** | **3.01** | **217.2** | **23.2** | **5.95** | **3.95** |
| Dink Trib us SO | 42 | 288.3 | 3.75 | 56.65 | 4.85 | 0.72 | 1.15 |
| Dink Trib ds SO | 26 | 362.2 | 3.83 | 50.19 | 6.40 | 1.23 | 1.46 |

**Project:** Dream Mountain
**Stream:** Muddy Creek
**Coordinates:** 39.552141, -79.630891
**Year completed:** 2012
**Total construction:** $361,792 (Potesta & Associates/CE Bolyard & Son)
**Description:** Open limestone channels collect and convey water from five portals on the Dream Mountain Game Ranch property to one common point (DM Comb Sources). Two freshwater tributaries are conveyed to a steel slag leach bed. Water mixes in a sludge pond prior to discharging through two constructed wetlands.
**Expected results:** 80% reduction of pre-construction loads. Removal of 416,416 pounds/year of acid, 64,528 pounds/year of iron, and 4,016 pounds/year of manganese, as well as generating additional alkalinity.
**Water quality data:** 02/02/2017

| Site | Flow (GPM) | Conduct. (µs) | Lab pH (SU) | Acidity (mg/L) | D_Al (mg/L) | D_Fe (mg/L) | D_Mn (mg/L) |
|---|---|---|---|---|---|---|---|
| DM Comb Sources | 440 | 1395 | 2.81 | 364.4 | 29.0 | 25.8 | 1.97 |
| DM SSB Out | 268 | 384.0 | 8.01 | 38.98 | 0.07 | ND | 0.03 |
| **DM SO** | **537** | **809.5** | **3.30** | **162.5** | **17.3** | **8.77** | **1.20** |
| MC us DM SO | 19538 | 175.0 | 7.00 | 2.42 | ND | ND | 0.12 |
| MC ds DM SO | 12778 | 202.2 | 6.53 | 13.7 | 0.07 | 0.06 | 0.19 |

**Project:** Gary Conner
**Stream:** Glade Run | Martin Creek | Muddy Creek
**Coordinates:** 39.575264, -79.659344
**Year completed:** 2011
**Total construction:** $411,227 (Potesta & Associates/CE Bolyard & Son)
**Description:** The site consist of several seeps of acidic water that combine into one drainage path. Over a mile of open limestone channels collect the water and convey it to a limestone leach bed, settling pond, and aerobic wetland area. The project was designed by Potesta & Associates, Inc. *Due to landowner issues, FOC has not accessed between LSB 1 and Glade Run Road since 2012.
**Expected results:**
**Water quality data:** 08/28/2015*

| Site | Flow (GPM) | Conduct. (µs) | Field pH (SU) | Acidity (mg/L) | D_Al (mg/L) | D_Fe (mg/L) | D_Mn (mg/L) |
|---|---|---|---|---|---|---|---|
| GC Comb Seeps | 146 | 1631 | 3.80 | 166 | 25.4 | 0.30 | 17.0 |
| GC LSB 1 | 146 | 1621 | 3.99 | 172 | 25.6 | 0.30 | 17.5 |
| **GC SO*** | - | - | - | - | - | - | - |
| GC at GRR | 166 | 1521 | 3.97 | 150 | 21.6 | 1.51 | 12.9 |

**Project:** Jessop
**Stream:** Pase Tributary | Pringle Run
**Coordinates:** 39.411722, -79.763389
**Year completed:** 2009
**Total construction:** $113,228 (Triad Engineering/CE Bolyard & Son)
**Description:** Open limestone channels collect seeps from two portals. A steel slag leach bed was placed upstream of the portals in a freshwater channel to boost alkalinity. A limestone leach bed was constructed below the confluence of the AMD and freshwater.
**Expected results:** Reductions of 1,201 pounds/year of iron, 3,521 pounds/year of aluminum, and 323 pounds/year of manganese.
**Water quality data:** 10/28/2014

| Site | Flow (GPM) | Conduct. (µs) | Lab pH (SU) | Acidity (mg/L) | D_Al (mg/L) | D_Fe (mg/L) | D_Mn (mg/L) |
|---|---|---|---|---|---|---|---|
| Jessop AMD 1 | 85 | 1028 | 2.98 | 230 | 17.3 | 4.58 | 1.55 |
| Jessop AMD 2 | 1 | 790 | 3.04 | 150 | 13.6 | 10.2 | 1.24 |
| Jessop SSB Out | 9 | 218 | 6.14 | - | 0.16 | 0.11 | 0.03 |
| **Jessop SO** | **96** | **682** | **3.34** | **120** | **11** | **2.69** | **1.13** |
| Pase UNT 3 DS Jessop | 32 | 595 | 3.46 | 110 | 10.5 | 2.09 | 1.2 |

**Project:** McCarty Highwall
**Stream:** Beaver Creek | Little Sandy Creek | Big Sandy Creek
**Coordinates:** 39.633402, -79.590904
**Year completed:** 2001
**Total construction:** $72,784 (Triad Engineering/Grafton Coal Company)
**Description:** Two seeps formed a small stream that flows south into Beaver Creek. Several other small seeps are picked up by the UNT. A series of open limestone channels and a steel slag leach bed were constructed downstream of the first two seeps.
**Expected results:**
**Water quality data:** 08/05/2016

| Site | Flow (GPM) | Conduct. (µs) | Field pH (SU) | Acidity (mg/L) | D_Al (mg/L) | D_Fe (mg/L) | D_Mn (mg/L) |
|---|---|---|---|---|---|---|---|
| MH LSB In | 28 | 537 | 6.39 | 2.9 | ND | 0.16 | 1.49 |
| MH SO | 15 | 482 | 6.27 | -23.8 | ND | ND | 0.47 |

**Project:** Pase Active Treatment
**Stream:** Pase Tributary | Pringle Run
**Coordinates:** 39.409273, -79.763499
**Year completed:** 2005; 2012; 2017
**Total construction:** 2004: $142,150 (Triad Engineering/CE Bolyard & Son); 2006: $XXX,XXX; 2012: $341,064 (Skelly and Loy/CE Bolyard & Son); 2017: $99,979 (BioMost, Inc./Solid Rock Excavating)
**Description:** 2004: A vertical flow bioreactor was constructed in sequence with an anoxic limestone drain. 2006: A limestone leach bed was added above the vertical flow bioreactor, new organic material was added to the vertical flow bioreactor, and rapid flushing valves were added to the ALD. 2012: A 70-ton lime dosing silo was installed to treat acidic mine water from a forebay, followed by two settling ponds and a constructed wetland. 2016: A MixWell, A-Mixer, and trompe were installed to increase mixing. Additionally, a sludge pump and sludge lines will be installed.
**Expected results:** 2017: remove 100% of the acid load, reduce iron and aluminum loads by greater than 95%.
**Water quality data:** 05/24/2017

| Site | Flow (GPM) | Conduct. (µs) | Lab pH (SU) | Acidity (mg/L) | D_Al (mg/L) | D_Fe (mg/L) | D_Mn (mg/L) |
|---|---|---|---|---|---|---|---|
| Pase SI | - | 870 | 3.07 | 177.8 | 15.8 | 6.1 | 1.93 |
| Pase Trompe Out | 85 | 485.8 | 8.96 | -4.69 | 1.34 | ND | ND |
| **Pase WL Out** | **1** | **347.9** | **7.23** | **-9.33** | **0.05** | **ND** | **0.54** |
| Pase UNT 3 Mouth | 26 | 289.9 | 4.66 | 36.74 | 4.59 | 0.15 | 1.15 |
| Pase us UNT 3 | 88 | 439.2 | 3.76 | 68.27 | 8.10 | 1.61 | 1.46 |
| Pase ds UNT 3 | 125 | 419.1 | 4.05 | 59.82 | 6.85 | 1.14 | 1.32 |
| Pase Trib Mouth | 530 | 287.6 | 3.82 | 42.50 | 4.44 | 0.80 | 0.71 |

**Project:** Railroad Refuse
**Stream:** North Fork Greens Run | Greens Run
**Coordinates:** 39.506973, -79.697443
**Year completed:** 2015
**Total construction:** $271,500 (BioMost/Solid Rock Excavating)
**Description:** Water is conveyed from three portals through an open limestone channel to an oxidation precipitation channel, an auto-flushing limestone leach bed with syphon system, a settling pond, a mixed-media vertical flow pond, and constructed wetland.
**Expected results:** Discharge neutral pH, >1 mg/L aluminum, >5 mg/L iron, discharge additional alkalinity
**Water quality data:** 06/01/2017

| Site | Flow (GPM) | Conduct. (µs) | Lab pH (SU) | Acidity (mg/L) | D_Al (mg/L) | D_Fe (mg/L) | D_Mn (mg/L) |
|---|---|---|---|---|---|---|---|
| RR TOLC | 4 | 876 | 3.00 | 351.8 | 25.2 | 91.8 | 1.45 |
| RR SP Out | 13 | 451 | 4.58 | 28.46 | 4.43 | 0.74 | 1.11 |
| **RR WL Out** | **26** | **400.1** | **7.08** | **-85.1** | **ND** | **0.28** | **0.94** |
| NFG US RR | 2437 | 102.1 | 5.16 | 6.81 | 0.07 | 0.02 | 0.23 |
| NFG DS RR | 2860 | 81.82 | 7.08 | 2.34 | ND | ND | 0.25 |
| NFGR Sawmill | 5173 | 337.1 | 6.41 | 6.90 | ND | 0.02 | 0.17 |

**Project:** Sovern 62
**Stream:** Sovern Run | Big Sandy Creek
**Coordinates:** 39.593591, -79.676086
**Year completed:** 1998; 2003; 2010
**Total construction:** 1998: $50,665 (Triad Engineering/Grafton Coal Company); 2003: $12,772 (Grafton Coal Company); 2010: $235,139 (Alpha Associates/CE Bolyard & Son)
**Description:** 1998: Gravel sized limestone was pneumatically injected into the mine portal and a dam was constructed to collect treated water. An open limestone channel was constructed below the pond. 2003: Steel slag was added to the pond and rip rap was added to the channel. 2010: A steel slag leach bed, open limestone channels, limestone separation dam, and series of settling ponds including a final wetland polishing pond were constructed. Additionally, a steel slag leach bed ("Bishoff") was constructed.
**Expected results:** 80% reduction of Al, Fe, and acidity.
**Water quality data:** 08/16/2016

| Site | Flow (GPM) | Conduct. (µs) | Field pH (SU) | Acidity (mg/L) | D_Al (mg/L) | D_Fe (mg/L) | D_Mn (mg/L) |
|---|---|---|---|---|---|---|---|
| Sov 62 TOLC | - | - | - | - | - | - | - |
| Sov 62 LSB SI | 8 | 831 | 3.13 | 172.6 | 16.1 | 22.9 | 2.84 |
| Sov 62 Slag Out | 0.1 | 209 | 7.40 | -55.5 | ND | 0.04 | 0.51 |
| **Sov 62 SO** | **11** | **483** | **4.33** | **47.3** | **5.13** | **1.62** | **1.99** |

**Project:** Sovern Bishoff
**Stream:** Sovern Run | Big Sandy Creek
**Coordinates:**
**Year completed:** 2009
**Total construction:**
**Description:**
**Expected results:**
**Water quality data:** 08/16/2016

| Site | Flow (GPM) | Conduct. (µs) | Lab pH (SU) | Acidity (mg/L) | D_Al (mg/L) | D_Fe (mg/L) | D_Mn (mg/L) |
|---|---|---|---|---|---|---|---|
| Bishoff SO | 7 | 151 | 7.79 | -23.3 | ND | 1.18 | 0.14 |

**Project:** Sovern England
**Stream:** Sovern Run | Big Sandy Creek
**Coordinates:** 39.593927, -79.681167
**Year completed:** Projected 2017
**Total construction:** Expected $169,525 ($340,181 including OALMR reclamation project)
**Description:** Land reclamation completed by OAMLR (Solid Rock Excavating) in 2016. Hedin Environmental is working on designing and constructing a drainable limestone bed.
**Expected results:** Removal of 142 pounds/day of acidity, 8 pounds/day of aluminum, 2 pounds/day of iron, and 2 pounds/day of manganese.
**Water quality data:** 06/16/2017

| Site | Flow (GPM) | Conduct. (µs) | Lab pH (SU) | Acidity (mg/L) | D_Al (mg/L) | D_Fe (mg/L) | D_Mn (mg/L) |
|---|---|---|---|---|---|---|---|
| Sov Eng Comb Portals | 11 | 120.4 | 4.80 | 13.19 | 0.63 | 1.57 | 0.65 |
| Sov Eng 006 | 60 | 155.6 | 7.61 | -2.45 | ND | 0.04 | 0.40 |
| Sov Hudson | - | - | - | - | - | - | - |

**Project:** Sovern Sands
**Stream:** Sovern Run | Big Sandy Creek
**Coordinates:** 39.590348, -79.680534
**Year completed:** 2007; 2011
**Total construction:** ~$500/25 ton truck load of 97% calcium carbonate dust as needed
**Description:** Periodically, limestone fines are shoveled instream in Sovern Run in cooperation with the landowner.
**Expected results:** Added alkalinity instream.
**Water quality data:** 06/16/2017

| Site | Flow (GPM) | Conduct. (µs) | Lab pH (SU) | Acidity (mg/L) | D_Al (mg/L) | D_Fe (mg/L) | D_Mn (mg/L) |
|---|---|---|---|---|---|---|---|
| Sov Sands DS | 4 | 316.6 | 4.60 | 43.85 | 6.37 | 0.25 | 1.46 |
| Sov Sands US | - | - | -- | - | - | - | - |

**Project:** Sovern Titchenell
**Stream:** Sovern Run | Big Sandy Creek
**Coordinates:** 39.595453, -79.667602
**Year completed:** 2005; 2015
**Total construction:** 2005: $174,420; 2015: $216,001 (Skelly and Loy/Solid Rock Excavating)
**Description:** 2005: An open limestone channel transported water to a limestone leach bed and a steel slag check dam before discharging into a wetland. An acidic pond was treated by a similar limestone pond and steel slag check dam system. 2015: Steel slag in the upper area was removed and replaced with an auto-flushing limestone leach bed. The lower limestone leach bed was removed and replaced with a larger auto-flushing limestone leach bed. The lower steel slag bed was removed and replaced with a settling pond.
**Expected results:** Removal of 7.89 pounds/day of Al and 44.49 pounds/day of Fe.
**Water quality data:** 01/13/2017

| Site | Flow (GPM) | Conduct. (µs) | Lab pH (SU) | Acidity (mg/L) | D_Al (mg/L) | D_Fe (mg/L) | D_Mn (mg/L) |
|---|---|---|---|---|---|---|---|
| Titch Borehole | 4 | 108 | 4.93 | 19.35 | 0.27 | ND | 0.07 |
| Titch U LSB Out | 109 | 124 | 7.27 | -14.92 | ND | 0.06 | 0.07 |
| Titch L WL Out | - | - | - | - | - | - | - |
| Titch L LSB Out | 272 | 96.31 | 4.78 | 16.84 | 1.15 | 0.13 | 0.37 |
| Titch L SP Out | - | - | - | - | - | - | - |
| **Titch SO** | **490** | **144** | **5.23** | **13.22** | **0.47** | **0.08** | **0.52** |

**Project:** Upper Muddy Schwab
**Stream:** Muddy Creek
**Coordinates:** 39.586577, -79.595252
**Year completed:** 2005; 2015
**Total construction:** 2005; 2015: $360,000+
**Description:** 2005: Three limestone leach beds were constructed to treat seeps. 2015: A large auto-flushing limestone leach bed and settling pond was constructed downstream of the three original leach beds. Original ponds were stirred.
**Expected results:** 2015: 80% reduction of acidity (from 192,000 lbs/yr), 90% reduction of aluminum (from 16,220 lbs/yr), and neutral discharge
**Water quality data:** 06/09/2017

| Site | Flow (GPM) | Conduct. (µs) | Lab pH (SU) | Acidity (mg/L) | D_Al (mg/L) | D_Fe (mg/L) | D_Mn (mg/L) |
|---|---|---|---|---|---|---|---|
| UMS sp1 | - | - | - | - | - | - | - |
| UM Schwab LSB#1 Out | - | - | - | - | - | - | - |
| UMS sp2 | - | - | - | - | - | - | - |
| UM Schwab LSB#2 Out | - | - | - | - | - | - | - |
| UMS sp3 | - | - | - | - | - | - | - |
| UM Schwab SLB#3 Out | - | - | - | - | - | - | - |
| UMS AFLSB Out | - | - | - | - | - | - | - |
| **UMS SP OUT** | 1 | 849 | 6.80 | 20 | ND | 0.02 | 1.18 |
| Muddy us UMS | 10542 | 91.66 | 7.10 | -2.0 | 0.08 | 0.03 | 0.03 |
| Muddy ds UMS | 10023 | 84.24 | 7.19 | -8.0 | 0.09 | 0.05 | 0.07 |

**Project:** Cheat Mouth Sweep
**Description:** Friends of the Cheat periodically samples AMD impaired streams at their confluence with the Cheat River as a “Cheat Mouth Sweep.”
**Water quality data:** 04/02/2017

| Site | Flow (GPM) | Conduct. (µs) | Lab pH (SU) | Acidity (mg/L) | D_Al (mg/L) | D_Fe (mg/L) | D_Mn (mg/L) |
|---|---|---|---|---|---|---|---|
| Greens at Greens Run Rd | - | - | - | - | - | - | - |
| Heather Mouth | 7473 | 286.4 | 3.64 | 46.56 | 4.04 | 3.3 | 0.33 |
| Lick Mouth | 21912 | 549.1 | 3.32 | 104 | 9.01 | 13.3 | 0.37 |
| Morgan Mouth | 22848 | 320.9 | 3.50 | 60.96 | 5.89 | 7.75 | 0.62 |
| Muddy Mouth | High | 241.3 | 6.34 | 10.35 | ND | 0.74 | 0.43 |
| Pringle Mouth | 26127 | 192.0 | 4.23 | 31 | 3.09 | 1.2 | 0.33 |

*Note minimum detection limits for metals by EPA 200 Series Methods:

| | |
|---|---|
| Dissolved Al: | 0.0459 mg/L |
| Dissolved Fe: | 0.0179 mg/L |
| Dissolved Mn: | 0.00230 mg/L |