Final Revegetation Monitoring:

Block P Mill and Tailings Site, MT

Ecological Solutions Group LLC
Acknowledgements

• John Carter - The Doe Run Company
• John Hunt - Barr Engineering
• Troy Smith - Arrowhead Reclamation
• Bill Thompson - Ecological Solutions Group LLC
• Bitterroot Restoration, Inc.
Location—Little Belt Mountains
Block P Mill and Tailings Site, MT:
Zones of Contamination

Main Unit

Galena Creek

Diked Tailings

Migrated Tailings N

Migrated Tailings S

Skirt Slope

Repository Cap

Mill Site

244 m (800 ft)

N
Repository Cap

Source: MT DEQ 2004
Skirt Slope
Mill Site
Galena Creek
Diked Tailings
Migrated Tailings North
Block P Mill and Tailings Site, MT:

Bender Creek: Tailings Deposits

NW Unit

NE Unit

SE Unit

SW Unit

122 m (400 ft)
Bender Creek Tailings Deposits
Block P Mill and Tailings Site, MT:

Restoration Planning and Implementation
Consolidate, Cap and Cover
Restoration Zones—Block P:
Consolidate, Cap and Cover
Block P Mill and Tailings Site, MT:

Bender Creek: Revegetation Units

Key:
- Riparian Habitat

NW Unit, NE Unit, SE Unit, SW Unit

122 m (400 ft)
Amendments: Lime, Compost, Biosol
Overwintering
Seeding and Planting
Monitoring

- 12 transects (50 m); 36 quadrates (10 m x 10 m)
- 1.4 percent coverage of project area
Quantitative Monitoring Results
Canopy Cover Weighted for Unit Size (percent)

Average Canopy Cover Weighted for Unit Size
Canopy Cover by Habitat Type (percent)
Woody Species Survival Weighted by Area (percent)
Flooding in 2009
Volunteer Seedling Establishment
Woody Species Survival by Habitat Type (percent)
Other Volunteers
Weeds (2010 percent canopy cover)

- Oxeye daisy (*Chrysanthemum leucanthemum*) 3.62
- Canada thistle (*Cirsium arvense*) 0.21
- Field bindweed (*Convolvulus arvensis*) 0.01
- Common hound’s tongue (*Cynoglossum officinal*) 0.09

- TOTALS 3.94
Weed Cover by Habitat Type (percent)
Oxeye daisy

(Chrysanthemum leucanthismum)
Block P Mill and Tailings Site, MT:

Other Changes
Canopy Cover * Constancy = Prevalence

- Redtop (*Agrostis stolonifera*)

<table>
<thead>
<tr>
<th>Year</th>
<th>Canopy cover</th>
<th>Constancy</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>25.1</td>
<td>21</td>
<td>527.1</td>
</tr>
<tr>
<td>2010</td>
<td>19.3</td>
<td>14</td>
<td>270.2</td>
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</tbody>
</table>
Change in Prevalence

![Graph showing the change in prevalence from 2007 to 2010. The y-axis represents prevalence and the x-axis represents the years 2007 to 2010. The graph shows a peak of 596 in 2008, followed by a decline to 270 in 2010.]
Increasers

![Graph showing prevalence of different grass species over years 2007 to 2010. The y-axis represents prevalence, ranging from 0 to 700. The x-axis represents years from 2007 to 2010. The species shown are Mosses (blue), Idaho fescue (green), Sheep fescue (orange), and Bluebunch wheatgrass (red).]
Moss
(Phylum *Bryophyta*)
Block P Mill and Tailings Site, MT:

Qualitative Status
Galena Creek Zone—After
Borrow Area—Before
Lower Migrated Tailings N—Before
Lower Migrated Tailings N—After
Lower Migrated Tailings S—After
Mill Foundation—Before
Mill Foundation—After
Bender Creek—Before
Bender Creek—After
Diked Tailings and Skirt Slope—Before
Diked Tailings and Skirt Slope—After
Repository Cap—Before
Repository Cap—After
Block P Mill and Tailings Site, MT:

Takehome Messages
Block P Mill and Tailings Site, MT:

- Time is an ecologist’s friend
- When amending soils, let the reactions take place
- Let the hydrology equilibrate

- Hedge your bets
  - Plant multiple species
  - Plant multiple life forms

- Be proactive in maintenance
  - Be proactive with weed control
  - Remove tree seedlings from the cap earlier, not later

- Be prepared to observe and accept changes
Block P Mill and Tailings Site, MT:
Block P Mill and Tailings Site, MT: