



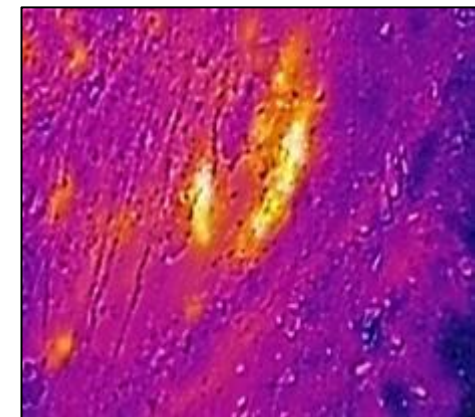
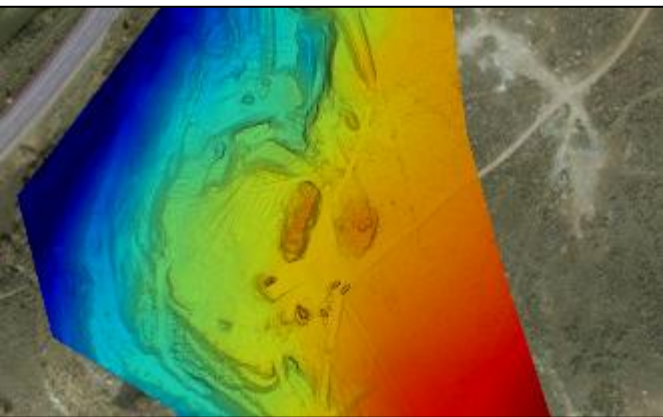
COLORADO
Division of Reclamation,
Mining and Safety
Department of Natural Resources



Long Term Review of Reclamation and Vegetation Management at Colorado's Underground Coal Fire Sites

43rd ASRS Annual Meeting – Laramie, Wyoming

June 7-11, 2026



Presenter Contact Information

Presenter

Tara Tafi

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Co-Presenter

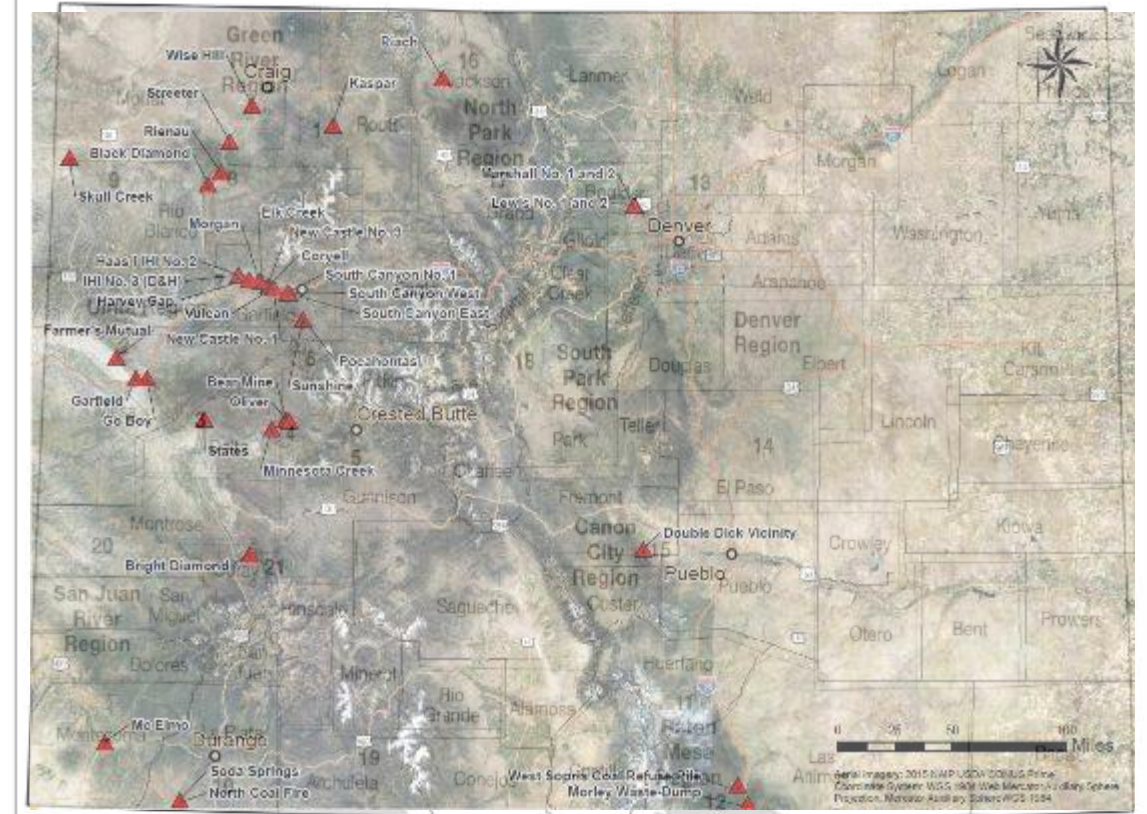
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Colorado Coal Fields and Coal Fire Locations

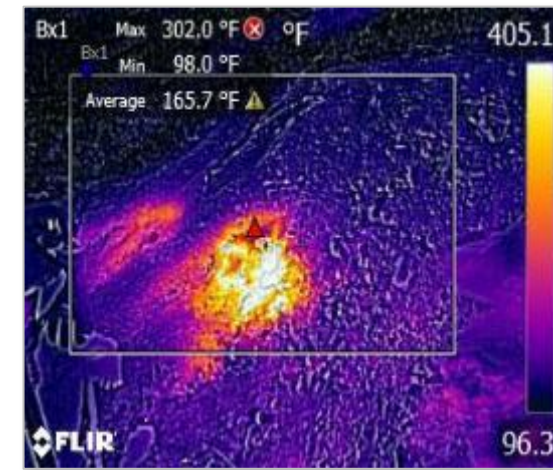


- | | | | |
|------------------|----------------------|----------------------|--------------------|
| 1. Yampa | 7. Grand Hogback | 12. Trinidad | 17. Middle Park |
| 2. Book Cliffs | 8. Danforth Hills | 13. Boulder-Weld | 18. South Park |
| 3. Grand Mesa | 9. Lower White River | 14. Colorado Springs | 19. Pagosa Springs |
| 4. Somerset | 10. Durango | 15. Canon City | 20. Nucla-Naturita |
| 5. Crested Butte | 11. Walsenburg | 16. North Park | 21. Tongue Mesa |

Colorado Coal Mine Fires – Causes and Types

Coal Fire Causes

- Human
- Wildfires
- Lightening
- Spontaneous Combustion

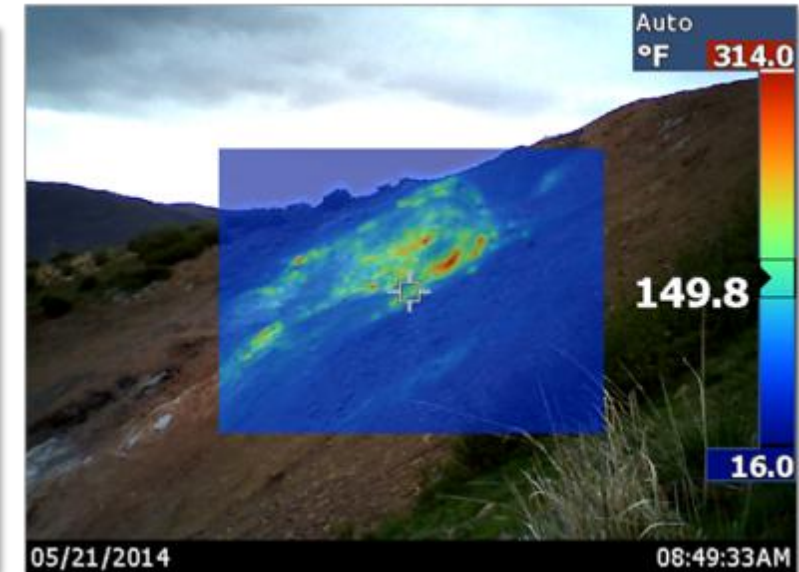


Types of Coal Fires

- **Active fire** – Quantifiable coal oxidation/combustion.
- **Dormant fire** – No quantifiable coal oxidation/combustion
- **Refuse pile fires** – Coal or coal waste piles oxidation/combustion.
- **Coal Seam Outcrop fire** oxidation/combustion of unmined in-situ coal.
- **Mitigated Fires** are coal mine fire, refuse pile, and coal seam fires that have been mitigated.

Data Collection

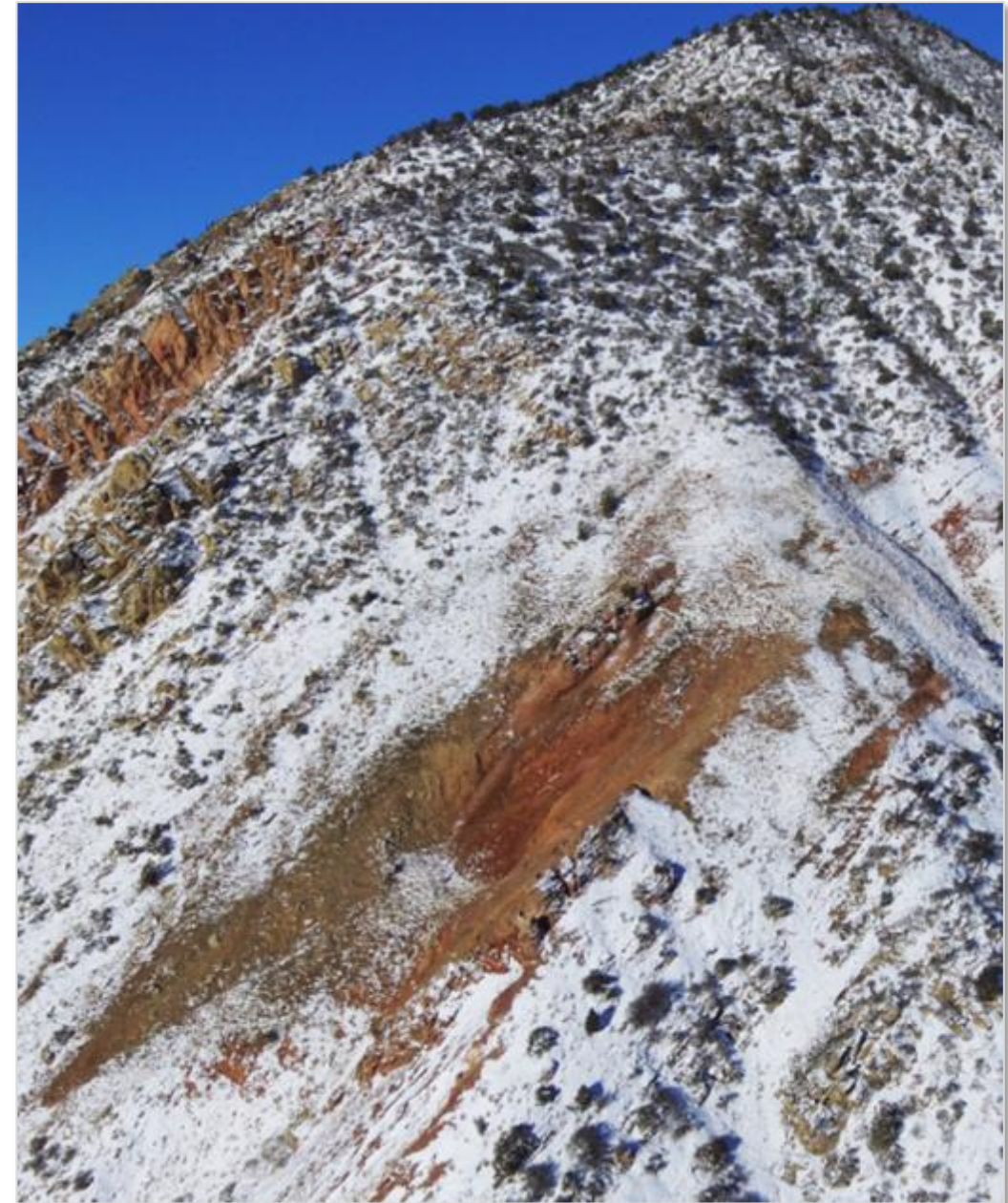
- Aerial Surveys
 - Drone flights
 - LiDAR
 - Thermal/IR
 - Ortho Imagery
- Pedestrian Survey and Mapping
 - Map all fissures/fractures/vents, air intakes, vegetation changes, heat zones and ground temps, subsidence, surface alteration, landslide scarps, etc
- Gas Compositions
 - Use 4 gas for rough estimates
 - GEM 2000 for more detailed gas %
 - VOC canisters, if needed
- Geophysics if applicable
 - Magnetometry
 - Gravity



Colorado Coal Mine Fires – Fire Activity / Hazards

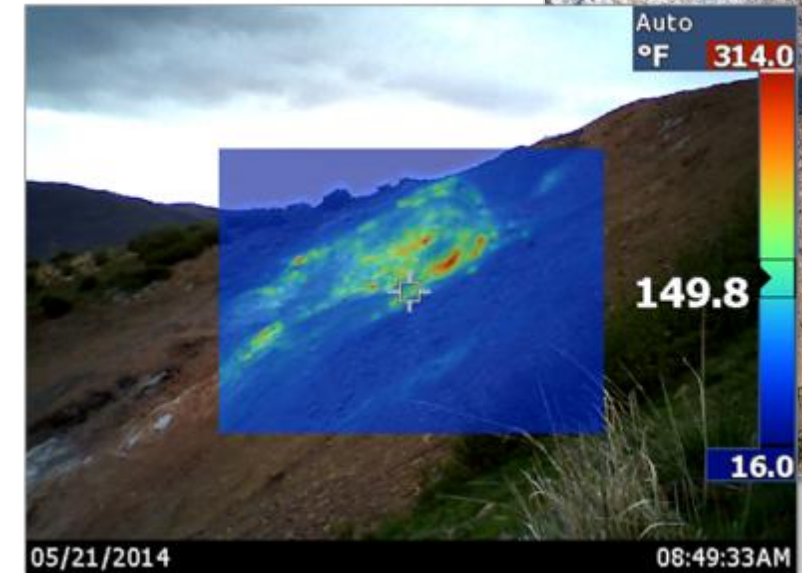
Relative Fire Activity

- **Mitigated / Dormant** – Mitigation activities completed at the site, no reported fire activity.
- **Dormant** – No observed fire activity
- **Low** – Low temperatures (<200°F), emissions, little change to the surface expression.
- **Moderate** – Increasing or variable site temperatures, emissions, and changing surface features.
- **High** – High temperatures(>600 °F), emissions, and changes to surface expression of the fire.
- **Very High** – Extreme temperatures, emissions, and changes to surface expression of the fire.

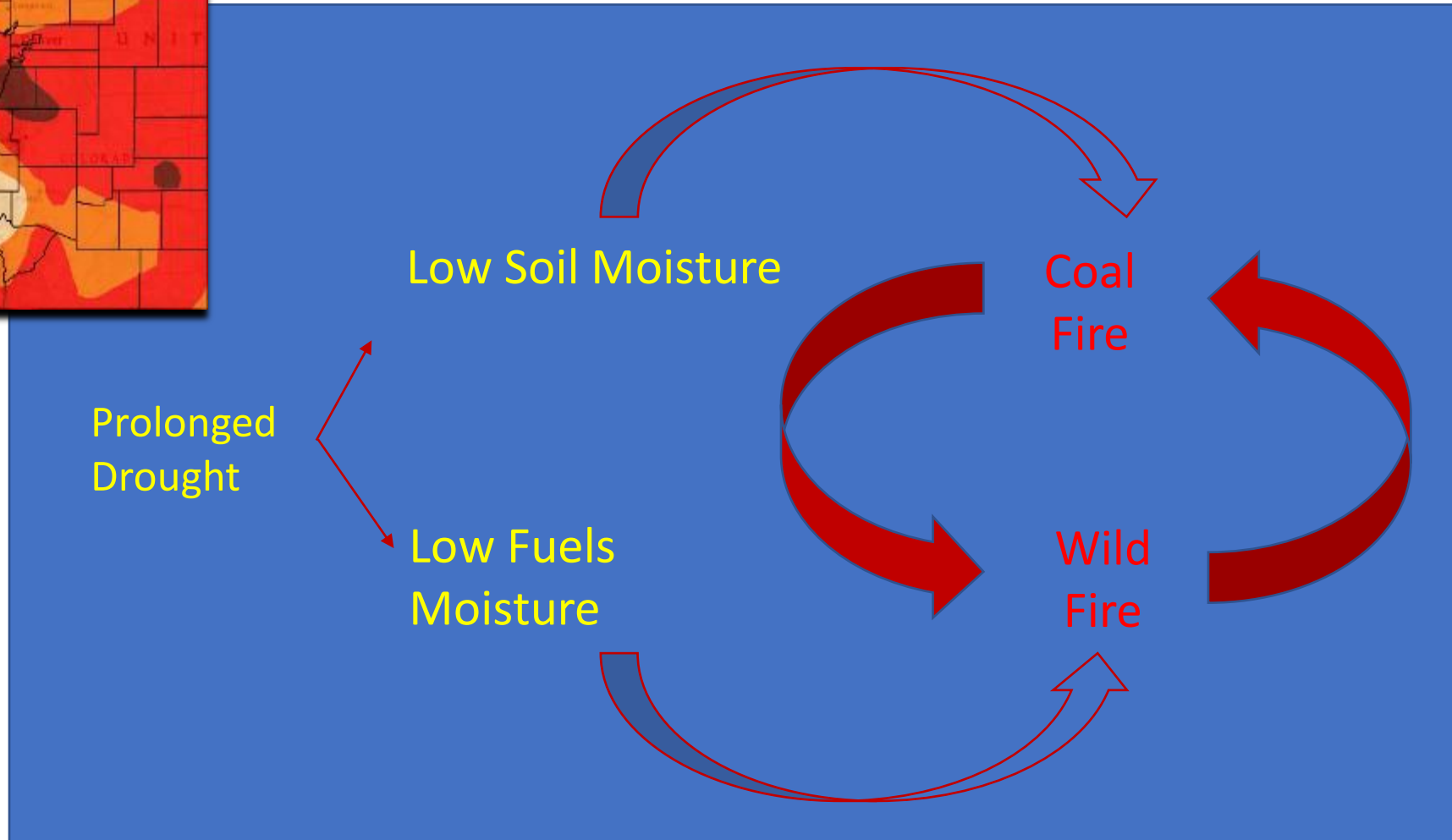
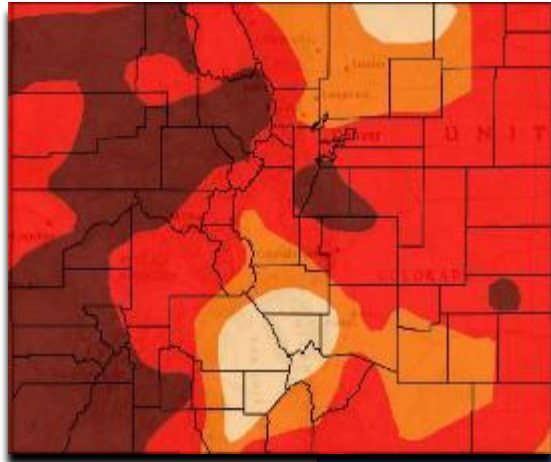


Reclamation and Management

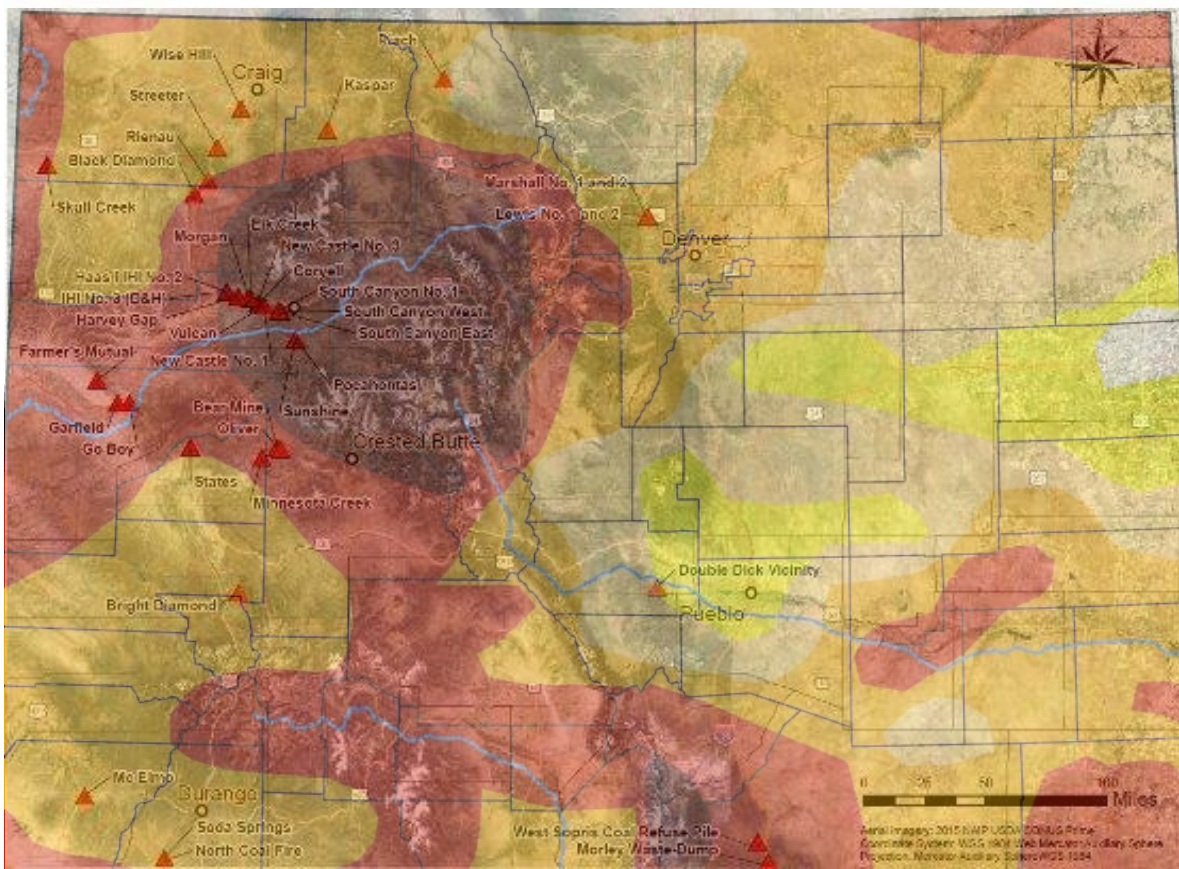
- Soil Seal/Blast-Grade
 - Axial/Wise Hill/IHI and others, done in 1960's by BoM
 - South Canyon (2020)-Very high
- Grouting
 - Harvey Gap-Moderate, , IHI-High
 - Wise Hill-High
- Excavation-Gold Standard, extinguishment possible
 - Marshall, Lewis, Skull Creek, Corley-Mitigated
 - Wise Hill-High, Black diamond Very high
- Vegetation Management
 - Black Diamond, South Canyon-Very High
 - Edwards-Moderate



Colorado and the Western US Unique Coal Fire Environment



Persistent Drought



Current Drought Conditions in CO, June 2, 2026

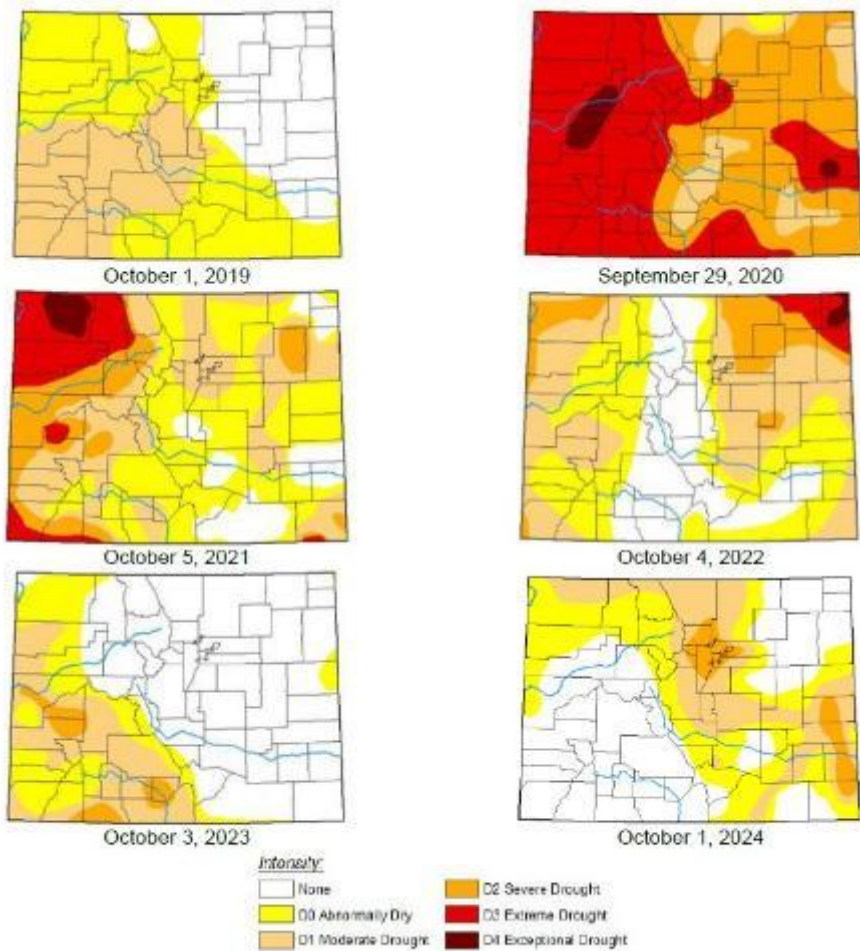


Figure 2-4 – Colorado Drought Monitoring Maps, 2019-2024. Data from droughtmonitor.inl.edu.

Vegetation Challenges

- Emissions and heat drive loss of native vegetation
- Weeds and cheatgrass LOVE warm bare ground
- Fire LOVES Weeds
- Surface changes, new vents
- High consequences of wildfire
- Weed seed bank on reclaimed sites



Vegetation Management Strategies – Project Examples

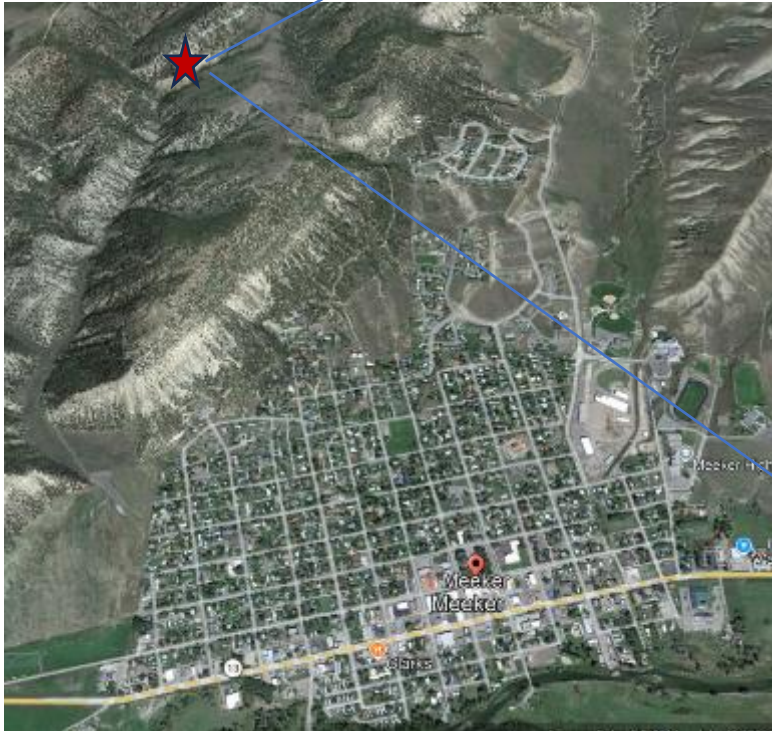
PROJECT EXAMPLES

Black Diamond – Mitigation and On-going Management
Skull Creek – Full Mitigation and Reclamation



Black Diamond Coal Mine Fire

Approximately 1.0 mile from Meeker Center
0.6 mile from closest residence
1.3 miles up Anderson Gulch



Black Diamond Coal Mine Fire

Background and Previous Work

- 1989: Black Diamond Fire identified in Statewide Inventory, low activity
- 2001: Likely fire start from coal fire
- 2003: Vegetation Clearing, herbicide application
- 2005: statewide Fire Inventory
- 2009: Vegetation Clearing, herbicide application
- 2012: Vegetation Clearing, herbicide application
- 2013: statewide fire Inventory
- 2016: Excavation of the two portals and surface expression of fire
- 2018: Statewide Fire Inventory
- 2020: Site monitoring
- 2023: Site monitoring, changes in fire noted, tech memo issued
- 2025: Site monitoring, no significant changes noted
- 2026: Site monitoring, significant changes noted
- 2026: Emergency fuels reduction needed



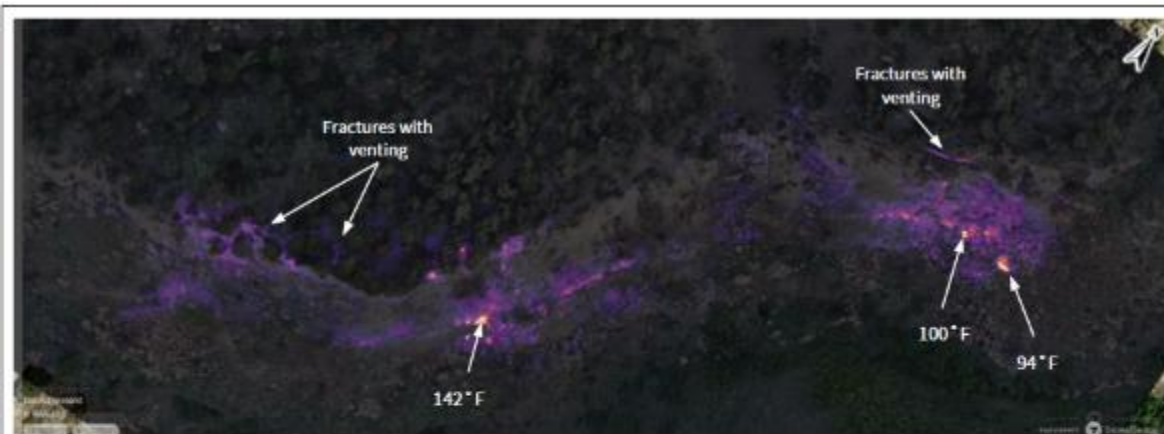
Black Diamond Coal Mine Fire 2016 Mitigation



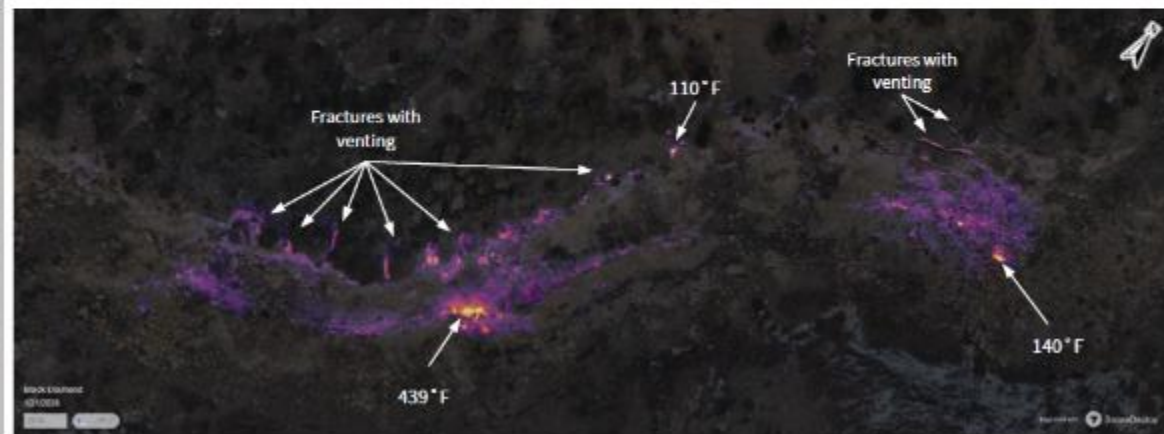
Black Diamond Coal Fire Mitigation - Final Walkthrough 9/14/16



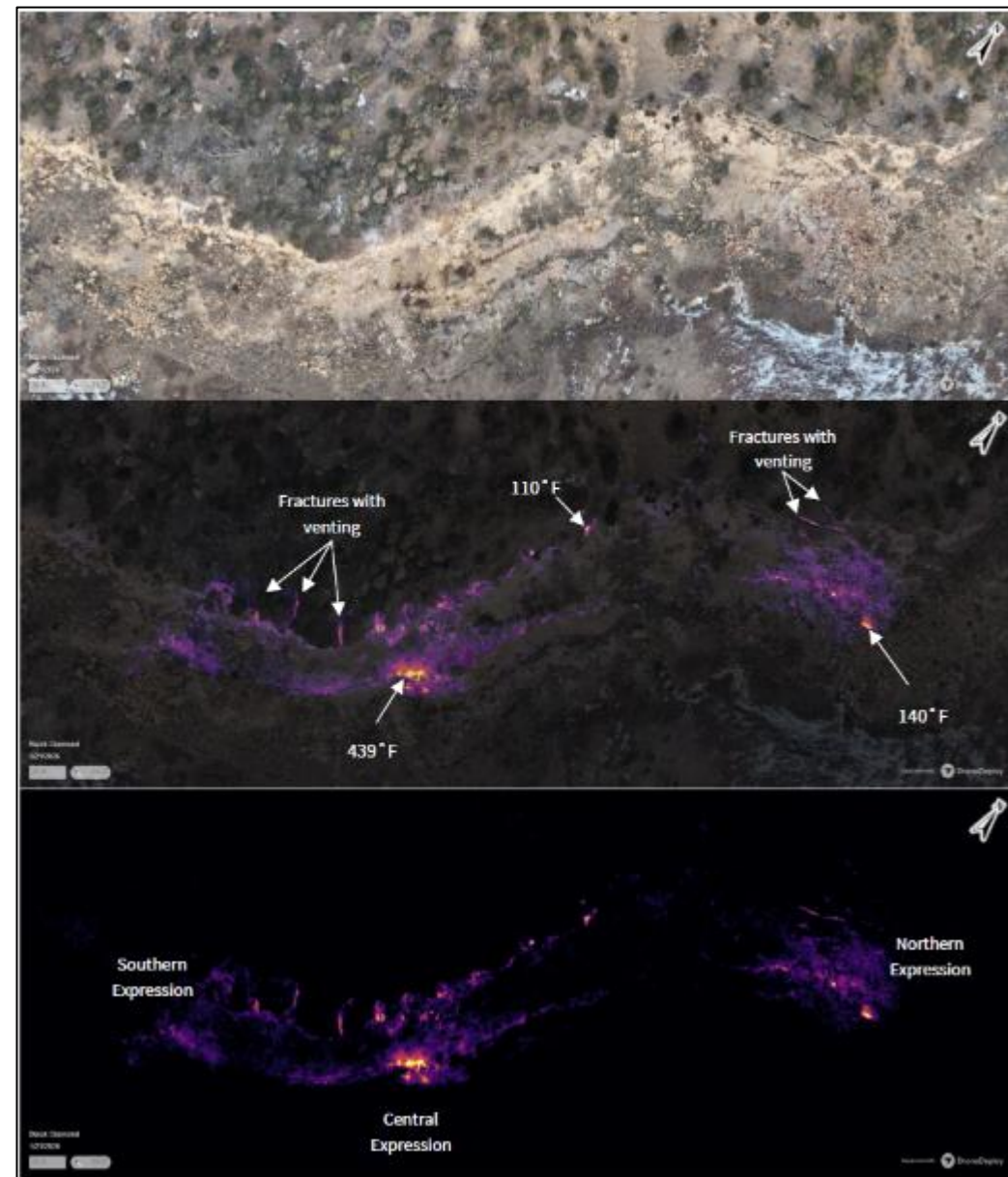
January 21, 2026 Inspection



2023: Thermal symbology constrained between 30-70°F, ambient temperature was 41°F.



2026: Thermal symbology constrained between 15-70°F, ambient temperature was 9°F.



March 24, 2026 Site Visit





Black Diamond Mine Fuels Reduction Project

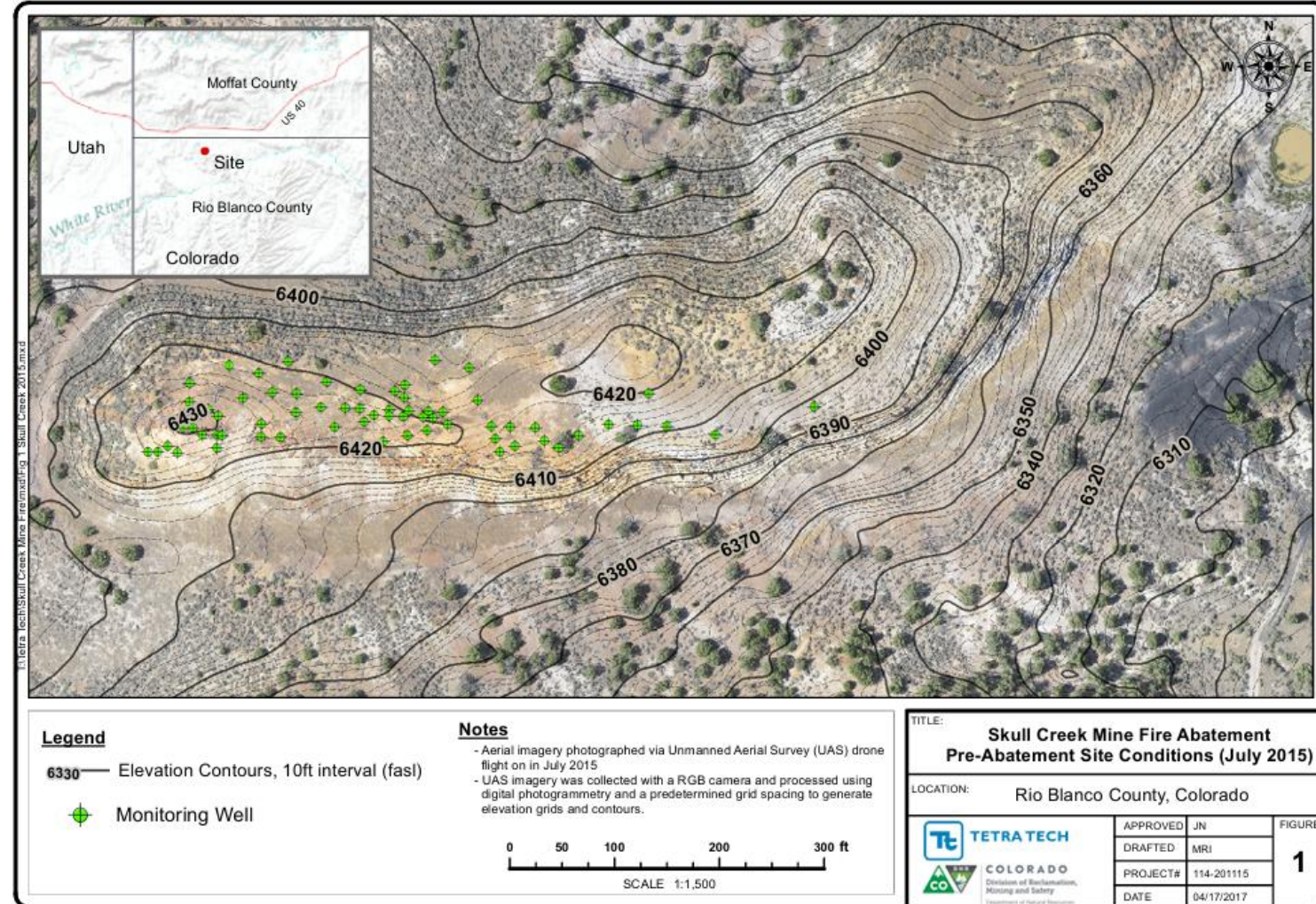
- Precautionary fuels reduction to minimize wildfire danger from underground fire-need to remove combustible material from around venting areas
- Project started 5/12/2026
- Access through Anderson Gulch along former mine road
- 1.5 acres of trees/vegetation was removed from above the fire and within the fractured area
- 300' long bench was established below the fire to catch any materials that may roll off of the cliff face
- Project took 2 weeks
- At landowner request, trees were crushed and buried on-site
- Pre-emergent, 7 acres



Skull Creek Coal Mine Fire

Site History

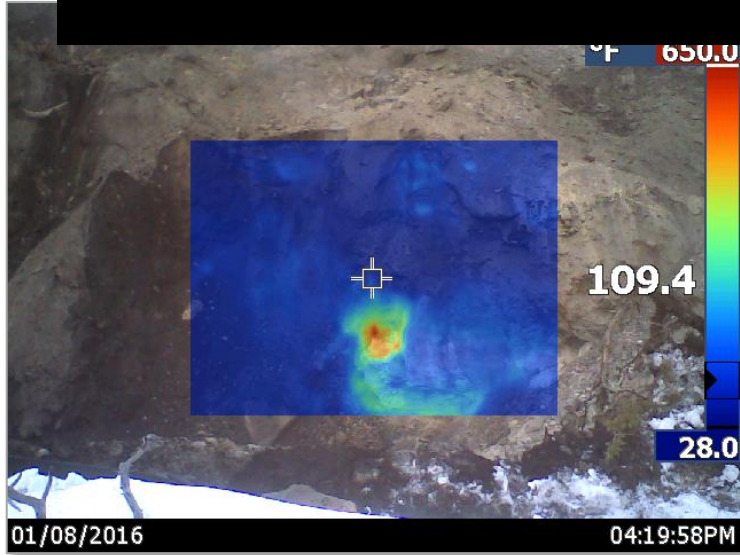
- Local “pick-n-shovel” mine supporting local ranchers.
- No historical documentation.
- 1960’s Bureau of Mines blasted and capped portions of the site.
- 1989 – Statewide inventory.
- 1990’s additional investigations.
- 1990’s pilot test mitigation – negative pressure.
- 2005 Statewide Inventory
- 2013 Statewide Inventory
- 2015-2016 Mitigation – Mass Excavation, Regrade, and Reveg.
- 2018 Statewide Inventory
- 2024 Statewide Inventory – No Further Action.



Skull Creek Coal Mine Fire - Pre-Construction Meeting October 13, 2015



Skull Creek Coal Mine Fire – Construction Week of January 18, 2016



Skull Creek Coal Mine Fire – Construction Week of January 4, 2016



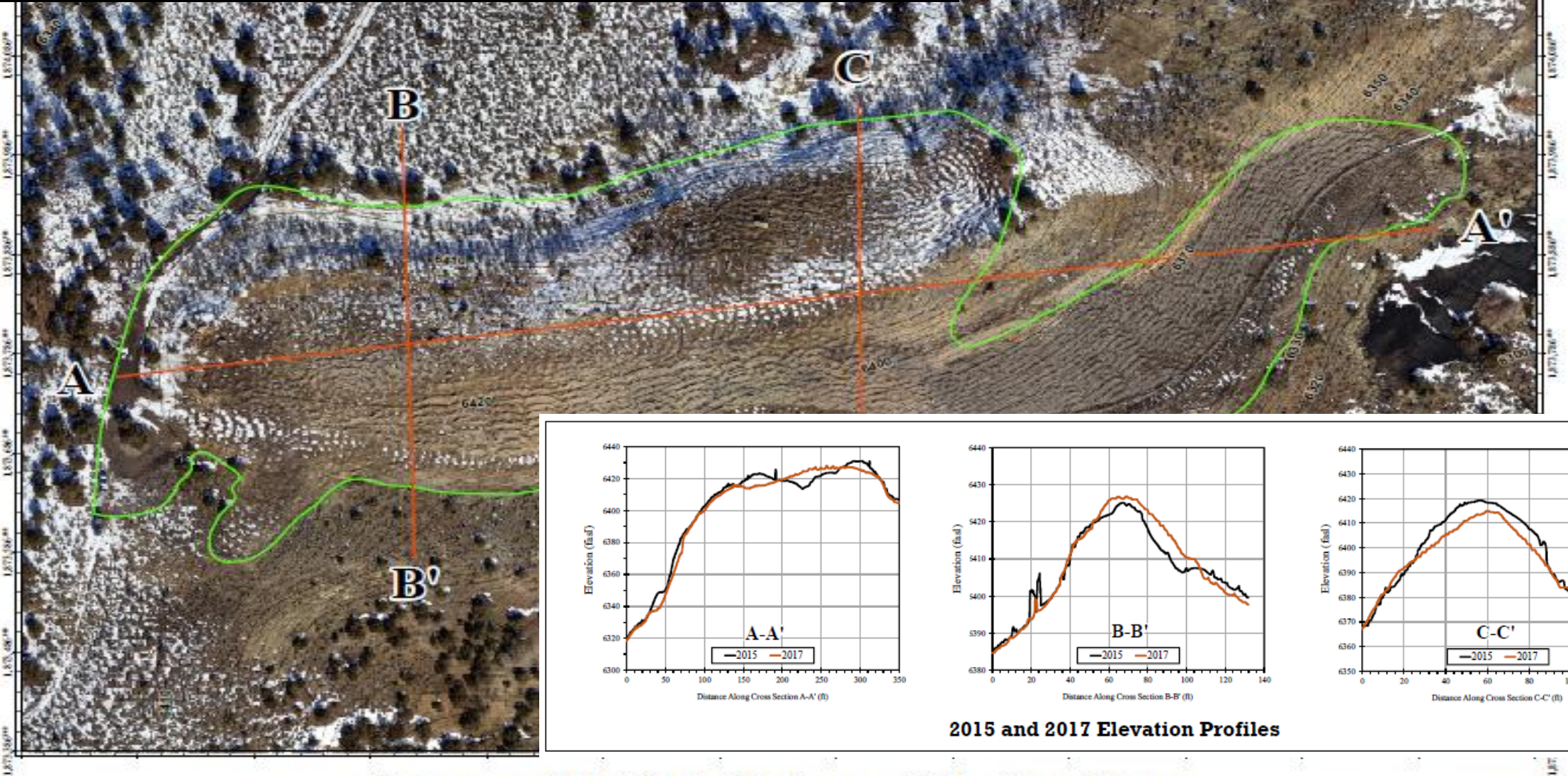
Skull Creek Coal Mine Fire – Construction Week of April 27, 2016



Skull Creek Coal Mine Fire - September 2016 Final Walkthrough



Skull Creek Coal Mine Fire Mitigation



February 2017 Post-Abatement Site Conditions

Skull Creek Coal Mine Fire Mitigation – 12/2023



Thank You for Having Us

Feel free to reach out:

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