

AREA A HIGHWALL FINAL RECLAMATION PROJECT¹

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Abstract: Western Energy, a subsidiary of Westmoreland Mining LLC owns and operates the Rosebud Mine. In over thirty years of production more than 300 million tons have been produced.

Westmoreland Mining purchased Western Energy in 2001 in addition to other mining operations owned by The Montana Power Company and the Knife River Corporation. Westmoreland Mining and its affiliate Westmoreland Resources, Inc together own five surface and coal or lignite mines in the United States. These mines make their parent company Westmoreland Coal Company one of the top ten coal producers in the U.S.

Colstrip was founded in 1923, mining started in 1924. The coal was used to fuel steam locomotive boilers on the Northern Pacific Railway. Forty four million tons of coal was mined during the 34 years of operation. Mining by the Northern Pacific ceased in 1958 when diesel replaced the coal-fired steam locomotives.

Area A Permitting, Mining and Reclamation History

- State Program Permit issued September 2, 1986
- Coal shipped to out of state utilities through 1995
- Postmining topography revisions for final reclamation approved in 1999
- Spoil side regrading conducted from 1999-2002
- Final highwall regrading scheduled for 2003

Final Reclamation Opportunity

During reclamation activities on the spoil side during 2001 an opportunity to preserve various topographic features such as steep slopes, sandstone cliffs rock outcrops and unique habitat features was identified. In addition, by reducing the area needed for final highwall reduction, approximately 5000 ponderosa pines would be saved.

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Final Reclamation Problems

To take advantage of this unique reclamation opportunity three significant problems were identified:

- Provide stable drainages from the reclaimed area to tie with the undisturbed areas both upstream and downstream.
- Balance the cut and fill volume required with a smaller highwall reduction area.
- Provide for topographic diversity and vegetation diversity on the spoil side recognizing that more cut material would be required from the spoil side.

Final Reclamation Solutions

Design of Stable Drainages

The drainages were designed to drain from the undisturbed highwall zone to the undisturbed, downstream zone in a concave, longitudinal manner. The drainage slopes vary with the elevation difference between both tie points, and are designed to ensure stable hydrologic performance (i.e. through slope design and side-channel design).

Balancing Cut and Fill Volumes

In order to reduce the final highwall reduction zone to preserve the native features the following three areas were identified to achieve a material balance:

- Cut more on the spoil side
- Create oversteepened slopes on the highwall side
- Create bluff extensions on the highwall side

Spoil balance is an integral part of the PMT design. The PMT must be designed to be both cost effective and operationally manageable. The spoil was balanced to ensure that the material be moved the shortest distance to obtain the most diverse and hydrologically functional topography. The area was divided into logical blocks that signify which type of equipment will be moving the material, and signifying where that material must be moved. The logical blocks will be input into a GPS dozer guidance system that will let the operators know the optimum directional push, and let the operators know when an area is complete. Overall, the PMT design is a very iterative process. Approximately 15 topographies were designed until an optimum design was obtained.

Providing for topographic diversity on the spoil side

To enhance the spoil side of the PMT design, several minor tributaries to the main drainages were developed. The tributaries were developed for three reasons. The first reason is to attempt to best approximate tributaries that existed pre-mine. The second reason is to add to the hydrologic, wildlife, and vegetative functionality of the area. The third reason is to add to the aesthetic value of the reclamation. Without the tributaries (and associated ridges between them), the area would have much less topographic diversity.

Variable topsoil replacement depths also play an important role in spoil side vegetative diversity. By directly laying down highwall treesoil, and by laying down stockpiled topsoil, the vegetation can be varied according to the appropriate slope aspect. This process will ensure that a mix of Ponderosa pine and native grasses succeed and enhance the area.