Coal Outcrop Fire Suppression in the North Dakota Badlands

The Abandoned Mine Lands Division of the North Dakota Public Service Commission conducted its first coal outcrop fire suppression project this past fall. The objective was to extinguish coal seam outcrop fires burning on U.S. Forest Service lands in the North Dakota Badlands. Coal outcrop fire suppression normally falls outside of AML jurisdiction. Authority to conduct this project was obtained as a result of a cooperative agreement between the U.S. Forest Service and the U.S. Department of the Interior, Office of Surface Mining. Funding for the project was provided by a $37,000 grant from the Office of Surface Mining, Casper Field Office.

An estimated 30 coal seam outcrop fires were ignited as a result of a 1999 grass fire that burned about 70,000 acres of grasslands in North Dakota and Montana. One family lost their ranch and home to the fire. Most of the resultant coal seam fires were located on the Little Missouri National Grasslands in North Dakota, near the Montana border.

An initial site investigation of some of the 30 coal outcrop fire sites in September 2003 indicated the individual burning coal seam areas to vary in size from about 1/10 acre up to 1 acre or more in size. The U.S. Forest Service has been monitoring these sites for several years. A primary concern was and continues to be the possibility of additional grass fires igniting as a result of the burning coal seams. At least four subsequent grass fires have already been attributed to the burning coal seams

The project began November 14 and was completed by December 10, 2003. Suppression activities were conducted on eight of the highest priority sites. One of the sites was considered too big for complete excavation, based on available funding. Intercept trenches were excavated through the coal seam and around all burning portions of this site and backfilled with inert, noncombustible material. In time, the burning coal will come into contact with the intercept trenches and extinguish due to removal of the fuel supply. The remaining seven sites were reclaimed by complete excavation of all burning materials, mixed with clay and enclosed in a burial trench. Required equipment for the project work included an excavator and front end loader.

Overburden thickness varied from 4-12 feet and the burning coal seams averaged about 7 feet thick. The typical fracturing and slumping process of overburden associated with burning coal seams allows combustion gasses to escape and a new supply of oxygen to feed the burning underground coal-allowing the fire to progressively grow. Fumaroles venting steam and smoke were common at all of the sites.

A large percentage of work time at all of the sites was dedicated to chasing down and eliminating “runners”. These “runners”, or small burn areas, were typically 3-6 feet in diameter and shot out in front of the burn face, often 50-75 feet, following fractures in the coal seam

Topsoil was stripped, stockpiled and respread at all of the sites. Project areas were backfilled and graded to their approximate original contour, then finish graded, back-dragged, harrowed and seeded with native plant species.

Several new coal outcrop fire sites have been discovered recently and it is expected that additional new sites will be discovered over the next couple of years. North Dakota hopes to receive additional grant money to continue coal fire suppression work at the remaining sites in 2004.

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