

Restoring the Hydrology – Key to Successful Reclamation at the Riley Pass Uranium Mine Site¹

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Abstract: The Riley Pass Uranium Mine Site (Site) is located on the Custer Gallatin National Forest in the North Cave Hills of Harding County, South Dakota, approximately 25 miles north of Buffalo South Dakota and 25 miles south of Bowman, North Dakota. During the late 1950s and early 1960s, extensive, unrestricted strip mining occurred on lands in the Riley Pass portion of the North Cave Hills. Mining consisted of removing overburden from the bluffs to access uranium-bearing lignite coal beds, which in places were 80 feet below the original ground surface. The mines cover approximately 316 acres encompassing high walls, pit floors, and spoils. Due to the erosive nature of the surrounding soils and the harsh climate, contaminants of concern (arsenic, molybdenum, uranium, thorium, and radium 226) have been exposed and mobilized, resulting in a risk to human health and the environment. USDA Forest Service is lead agency for the Site under its Comprehensive Environmental, Response, Compensation and Liability Act of 1980 (CERCLA) authority. An Engineering Evaluation/Cost Analysis was completed for the Site in November 2006. The primary objective of the removal actions is to isolate the contaminated mine waste onsite and leave the final reclaimed surface in a physically stable condition. The Site consists of 12 bluffs; response actions have been completed at eight bluffs. Through both bankruptcy and fraudulent transfer court settlements, the Forest Service received funding to complete Site reclamation. Traditional reclamation approaches, such as uniform slopes, rock lined ditches and terrace for drainage were included in past designs and reclamation work. Given the area's climate and the highly erosive nature of the Site's soils, natural landform reclamation techniques were selected to stabilize the Site, both physically and chemically. The intent of this reclamation technique is to restore the pre-mining hydrology, both surface and sub-surface. Natural landform reclamation includes the design of naturally functioning slopes, stream channels, and subsurface flow, to the extent possible. Native vegetation and rocks were also employed to mimic the surrounding undisturbed bluffs. Two natural landform restoration projects have been completed at the Site. The techniques used, and the engineering design and construction of these projects will be presented. Challenges encountered during the design implementation will be discussed, including material balance, surveying for quantities and steep slope construction work. Three years after project completion, this natural landform reclamation approach successfully stabilized (physically) the mine waste and spoils on site and created a fully functioning landscape that can support the pre-mining uses at the site, such as wildlife habitat, ranching, recreation and traditional cultural uses.

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