RESEARCH PROGRAM FOR THE NATIONAL MINED LAND RECLAMATION CENTER--WESTERN REGION[1]

by

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Abstract. Successful reclamation requires a fundamental understanding of pre- and post-mining geologic and hydrogeologic settings, and the water movement through these settings. Studying and understanding the factors that affect water quality in the mined landscape has been a long-term research focus of the North Dakota Mining and Mineral Research Institute (NDMMRRI) at the University of North Dakota Energy and Environmental Research Center (EERC). Field studies conducted since 1974 in the lignite strip mines of western North Dakota have indicated that the quantity and quality of water in different parts of an abandoned or reclaimed landscape depend on overburden and spoil chemistry and mineralogy (i.e. trace elements, soluble salts), texture (grain size), permeability, frequency and intensity of precipitation, and topographic position. This type of data is needed to optimize reclamation designs with respect to revegetation, subsidence and erosion control, and reestablishment of high-quality groundwater.

Data from previous studies were used to design the initial research program for the Western Region of the National Mine Land Reclamation Center (NMLRC), for which the EERC/MMRRI is the lead institution. The research program for the NMLRC emphasizes long-term monitoring and follow-up study of factors controlling subsurface water quality, based on detailed instrumentation, monitoring, and analytical efforts. Data are available from previous studies and current projects to help answer questions on location and significance of infiltration, the type and quantity of soluble salts generated and transported, and location of recharge.

For example, some abandoned surface mine landscapes in North Dakota provide abundant depressions where, over the years, runoff and seepage have collected and interacted with the spoil materials to yield groundwater recharge in greater quantity and of better quality than background groundwater. In practice, providing for depressions and ponds in reclaimed landscapes has been locally effective in increasing spoils flushing (and recharge) and ultimately reducing salt loading in the subsoil. High-relief areas such as spoil ridges inhibit infiltration and flushing, and remain highly reactive and capable of yielding large amounts of salts for decades. These are examples of the types of long-term changes that an abandoned or reclaimed landscape will experience, and the reason why these types of research data are invaluable for making intelligent decisions on how landscape reconstruction and reclamation can be most meaningfully accomplished.

Additional Key Words: Reclamation, surface mining, water quality, soil water, groundwater.

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