

Integrating Geochemical Characterization and Field Procedures in Construction to Mitigate Potentially Acid-Generating Materials in Northern Minnesota, USA¹

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Abstract: Highway 169 in northern Minnesota, USA, recently underwent rerouting after years of serious vehicular accidents. The new highway alignment cuts through significant exposures of the Soudan Iron Formation, which contains potentially acid-generating (PAG) rock. PAG rock was identified as a potential environmental issue during planning, and subsequent investigation and consideration led to the development of a thorough mitigation plan. Both the plan and its execution in the field during construction drew heavily on geochemical and geological characterization methods originating from mining environmental studies. The goal of the plan was to minimize fragmentation, exposure and oxidation, and leaching of PAG rock, while still using the material as the primary fill making up the road core, and developing the road cuts necessary to improve the visibility for highway drivers. The requirements of the mitigation plan needed to be tailored to site restrictions including work within a narrow road corridor, very rapid blasting and rock placement schedules, and heavy equipment capabilities. Local sources of neutralizing amendment materials were identified, and site-specific lime amendment and mixing and blending techniques were developed and used to achieve the mitigation design criteria and to overcome the limitations of the construction equipment. In addition, because of the recognition of PAG unconsolidated soils in the area, field-specific techniques were used to screen the potential for these materials to generate acid. Placement of final geomembrane cover materials took place sequentially during construction, and long-term groundwater monitoring is ongoing. Lessons from this project are currently helping inform the development of a guidance document on acid rock drainage for transportation projects in Minnesota.

Keywords: acid rock drainage, water quality, transportation.

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