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LORADO URANIUM MINE ENVIRONMENTAL REMEDIATION –NORTHERN SASKATCHEWAN

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LORADO URANIUM MINE ENVIRONMENTAL REMEDIATION –NORTHERN SASKATCHEWAN
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WILSON, Ian; ALLEN, Dianne E.; SCHRAMM, Laurier L.; and MULDOON, Joseph
Saskatchewan Research Council, Saskatoon, SK, Canada
E-mail address: ian.wilson@src.sk.ca

1. INTRODUCTION

The abandoned Lorado mine and mill sites are located in northwestern Canada, north of Lake Athabasca, on the western shore of Nero Lake, and 8 km south of Uranium City (Figure 1). During its operating lifetime the mill processed 305,000 to 550,000 t of low-grade ore to produce about 690 t of U3O8 product, and 190,000 to 344,000 m3 of tailings. The mill tailings and acidic waste were initially deposited in a nearby depression, but eventually extended beyond that to cover about 14 ha, and then overflow into nearby Nero Lake. Following closure in 1961 the mine and mill were dismantled over a period of years, and buried, but no remediation was undertaken of the exposed tailings or of Nero Lake. In 2007 the Saskatchewan government retained the Saskatchewan Research Council (SRC) to develop a remediation plan, undertake an environmental assessment of the proposed project, and manage remediation activities at the Lorado site. The resulting environmental impact statement describes a risk reduction plan designed to provide net benefit to human health, wildlife populations and aquatic life. The principal risks to humans, wildlife, and aquatic life were determined to arise from the exposed tailings and contaminant flows from Nero Lake to another nearby lake, Beaverlodge Lake. Accordingly, the principal reclamation activities were to: cover the surface tailings in-place and batch-treat Nero Lake in situ. The reclamation work has been conducted with approvals, permits and licenses from the Saskatchewan Ministry of Environment and the Canadian Nuclear Safety Commission.

2. SURFACE TAILINGS COVER

The objectives of the cover system are to protect against gamma radiation and radon exposure, prevent formation of efflorescent salts on the surface, reduce tailings acid generation in Nero Lake, and block uptake of tailings pore fluid into vegetation. It also had to cover soils and vegetation adjacent to the tailings that may have been contaminated. For exposed tailings an engineered soil cover system was designed that incorporates a “capillary break,”comprising a 1 m thick layer of specifically-sized sand under a 0.25 m layer of finer soil (“till”). The sand layer is to prevent the upward movement of water, and the till layer is to protect the sand cover and allow revegetation. On the submerged tailings within Nero Lake, only a sand cover was required. Overall, the covers used about 250,500 m3 of sand and about 93,400 m3 of till. The cover system was also designed to ensure that it is free draining and contoured to shed water towards one of two engineered drainage ditches, or directly to Nero Lake. The cover system will ultimately be stabilized and revegetated.

3. IN SITU NERO LAKE TREATMENT

Nero Lake is about 2.2 km long by about 1 km wide, with a total water volume of about 11 million m3. It is estimated that as much as 167,000 m3 of tailings and acidic waste overflowed into Nero Lake, and that as much as 40% of the bottom of Nero Lake was covered with tailings. Since abandonment, additional contaminants have flowed into Nero Lake. The cumulative effects of this contamination included the lake pH dropping to 4.0, reductions in alkalinity and bicarbonate concentration, and elevated concentrations of dissolved heavy metals such that the lake was no longer able to sustain a fish habitat. A treatment process for the lake was developed, pilot tested, and implemented in 2013-2014. This involved mildly overdosing the lake with about 400 tonnes of lime (CaO). The treatment was successful, and brought the pH of the lake to about 7.5.

4. CONCLUSIONS

Concerns that the Lorado mill site has been affecting human health and the environment have been dealt with by completing a remediation project to reduce such impacts from this site in future. An effective remediation plan was developed and implemented, which is based on proven scientific methods, risk assessment, and health, safety and environmental best practices. Monitoring will continue to confirm predictions made during the environmental assessment, and to assist with on-going planning and controls put in place to manage the

site.

Country or International Organization

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Author: Mr WILSON, Ian (Saskatchewan Research Council)

Co-authors: Ms ALLEN, Dianne (Saskatchewan Research Council); Dr MULDOON, Joseph (Saskatchewan Research Council); Dr SCHRAMM, Laurier (Saskatchewan Research Council)

Presenter: Mr WILSON, Ian (Saskatchewan Research Council)

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