Preliminary results of geological investigation in the Rail – Sewell Lake area, northwest Reed Lake (parts of NTS 63K10, 15)

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Introduction

Significant stratigraphic, geochemical and isotopic differences exisit between the arc rocks in the Flin Flon and Snow Lake areas (Stern et al., 1995a). These suggest that the two segments of the Flin Flon belt formed in distinct tectonic settings (Lucas et al., 1996). The Reed Lake region represents a critical area of the Flin Flon belt, as it lies at the boundary between the Amisk collage sensu stricto and the Snow Lake segment. The Reed Lake area also includes the Fourmile Island assemblage, an arc-type bimodal succession of volcanic and volcaniclastic rocks that hosts five significant volcanogenic massive sulphide (VMS) deposits, including the recently discovered Reed Lake Cu-Zn deposit. Previous geological work (Leclair et al., 1997; Leclair and Viljoen, 1997) and geophysical data show that arc-related volcanic rocks extend south of Reed Lake beneath the Phanerozoic cover for a distance of more than 50 km. Therefore, gaining a better understanding of the geology of arc-related volcanic rocks of the exposed basement in the Reed Lake area will provide insight for base-metal exploration in the Reed Lake area and in the sub-Phanerozoic basement immediately south of Reed Lake. The Reed Lake area was the focus of a four-week reconnaissance study in the summer of 1995 (Syme et al., 1995b, a). The study enabled significant improvement in our understanding of the geology of the Reed Lake area. However, the geological investigation was limited to shoreline exposure on Reed Lake and roadcuts along the abandoned Chisel railbed, with some inland 1:50 000 scale bedrock mapping on the west side of Reed Lake (Morrison et al., 1996).

Project objectives

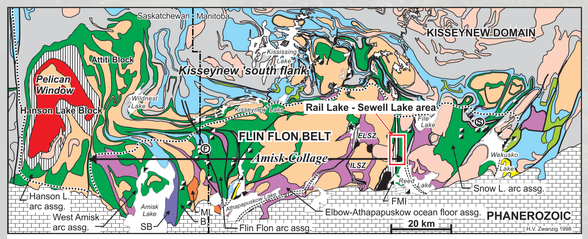
The geological investigation of the Reed Lake area aims to characterize the various packages of volcanic rocks, refine our understanding of their tectonic setting, and increase our knowledge of the various granitic and mafic-ultramafic intrusions of the area. The stratigraphy of the supracrustal rocks will be a focus of the study as this will help gain a better knowledge of the VMS potential of the area and help refine our understanding of the deformational history of the belt. In that purpose, geological mapping was initiated during the summer of 2013 in the Rail Lake - Sewell Lake area.

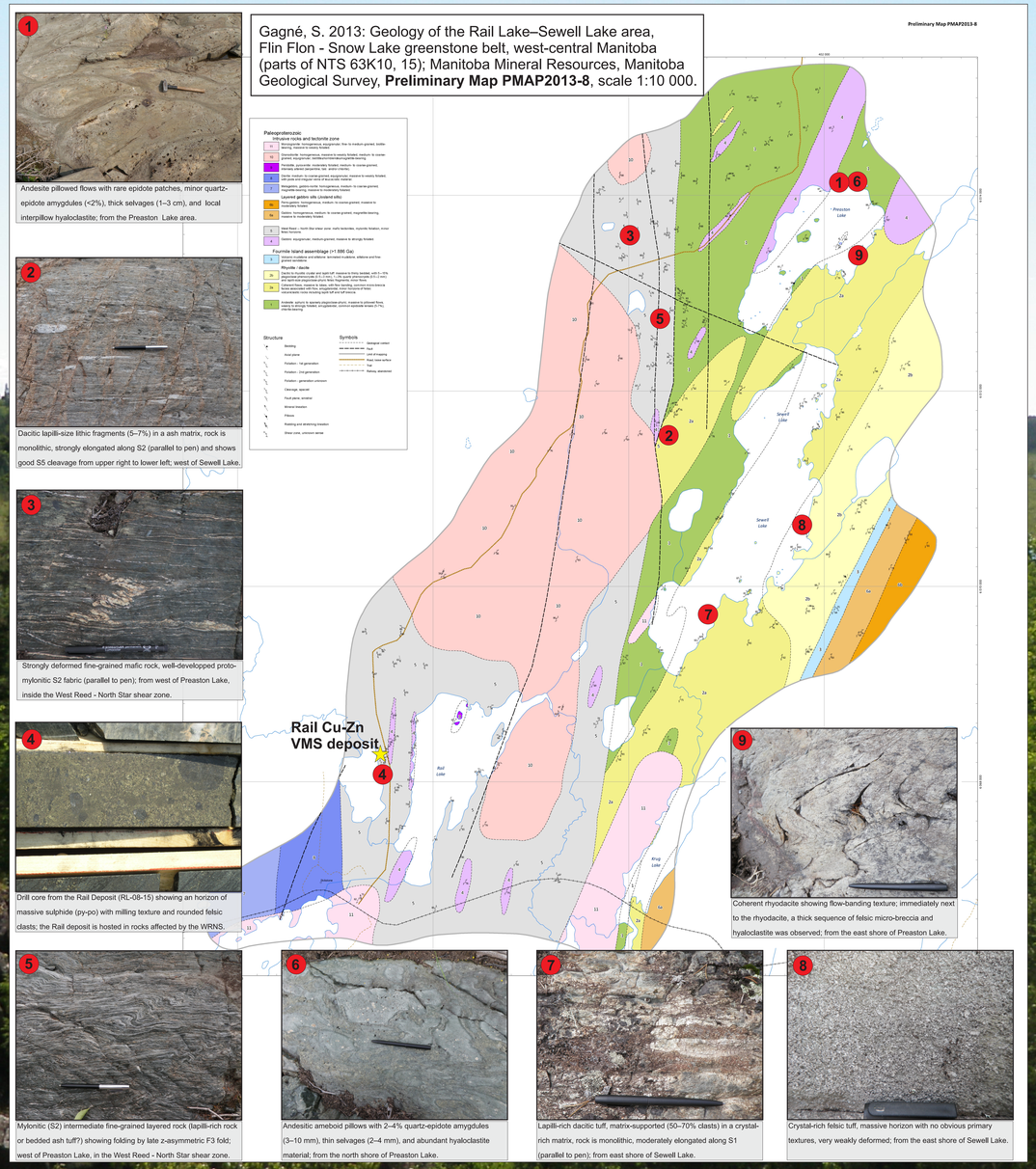
Further fieldwork will be conducted in the summer of 2014-2015. The focus will be to conduct inland mapping with an emphasis given to supracrustal rocks (volcanic and sedimentary sequences) in order to increase our knowledge of the Reed Lake geology. Key known mineral showing and occurences will be re-visited. Examination of selected drill cores from the Reed Lake area will also be undertaken in order to characterise local stratigraphy and the geological setting of mineralized zones.

Concurrently to geological mapping, geochemical characterization of the different rock types is being done, over 50 whole-rock geochemical analyses have now been obtained from the western Reed Lake area, Sm/Nd analysis will also be obtained and samples were taken for U-Pb age determinations.

Ultimately, results from this study will add to our understanding of the tectonic evolution of the central Flin Flon Belt and its economic potential.

Project Location





Gagné, S. 2013: Geology of the Rail Lake–Sewell Lake area, Flin Flon - Snow Lake greenstone belt, west-central Manitoba (parts of NTS 63K10, 15); Manitoba Mineral Resources, Manitoba Geological Survey, **Preliminary Map PMAP2013-8**, scale 1:10 000.

1 Andesite pillowed flows with rare epidote patches, minor quartz-epidote amygdules (<2%), thick selvages (1–3 cm), and local interpillow hyaloclastite; from the Preaston Lake area.

2 Dacitic lapilli-size lithic fragments (5–7%) in a ash matrix, rock is monolithic, strongly elongated along S2 (parallel to pen) and shows good S5 cleavage from upper right to lower left; west of Sewell Lake.

3 Strongly deformed fine-grained mafic rock, well-developped proto-mylonitic S2 fabric (parallel to pen); from west of Preaston Lake, inside the West Reed - North Star shear zone.

4 Drill core from the Rail Deposit (RL-08-15) showing an horizon of massive sulphide (py-po) with milling texture and rounded felsic clasts; the Rail deposit is hosted in rocks affected by the WRNS.

5 Mylonitic (S2) intermediate fine-grained layered rock (lapilli-rich rock or bedded ash tuff?) showing folding by late z-asymmetric F3 fold; west of Preaston Lake, in the West Reed - North Star shear zone.

6 Andesitic ameboid pillows with 2–4% quartz-epidote amygdules (3–10 mm), thin selvages (2–4 mm), and abundant hyaloclastite material; from the north shore of Preaston Lake.

7 Lapilli-rich dacitic tuff, matrix-supported (50–70% clasts) in a crystal-rich matrix, rock is monolithic, moderately elongated along S1 (parallel to pen); from east shore of Sewell Lake.

8 Crystal-rich felsic tuff, massive horizon with no obvious primary textures, very weakly deformed; from the east shore of Sewell Lake.

9 Coherent rhyodacite showing flow-banding texture; immediately next to the rhyodacite, a thick sequence of felsic micro-breccia and hyaloclastite was observed; from the east shore of Preaston Lake.

Structural Geology

The Rail Lake–Sewell Lake area is a polydeformed, low-grade part of the Flin Flon belt. The sequence of deformation presented here is based largely on crosscutting relations observed on outcrops.

Graded beds and pillow asymmetry consistently indicate an overall easterly upright facing direction for the rocks of the FIA, in agreement with Bailes (1980) for the Dickstone mine sequence. The FIA represents an east-facing homoclinal sequence.

The oldest deformation structure (D1) is a weak to moderately developed mineral foliation (S1). The S1 foliation is recognized outside the West Reed North Star shear zone (WRNS) in the eastern portion of the map area, where it typically trends north-northeast with a steep dip (70–85°). This early fabric is axial planar to a large syncline that folds the FIA rocks along the east side of Morton Lake. The maximum age for the D1 event is provided by the 1886 Ma age of the Josland sill, which intruded along the axial plane of the Morton Lake syncline but was unaffected by folding (Zwanzig et al., 2001).

The second episode of deformation led to the formation of the WRNS and is characterized by a protomylonitic to mylonitic fabric (S2) that consistently strikes north with subvertical dip. Inside the WRNS, the mineral and stretching lineations are shallower (50–70°) and typically plunge to the south. Shear-sense indicators reveal mainly dextral movement along the shear zone, although there are many indications of later sinistral slip.

The WRNS was reactivated during D3 deformation, resulting in local Z-folds that vary from tight chevron to isoclinal and do not have an axial-planar penetrative fabric. The D3 deformation appears to record sinistral transpression along the north-northeast-trending WRNS.

A series of late, narrow brittle faults (D4) developed parallel to the WRNS in the map area. These brittle faults are interpreted to be D4 brittle features. Chloritic alteration is locally observed along the walls of the larger brittle faults.

Northwest-trending, subvertical spaced cleavage represents the last episode of deformation (D5). This spaced cleavage is observed throughout the area both within and outside the WRNS, and offsets D1 to D4 deformation structures with a dextral offset.

VMS mineralizations

The Fourmile Island assemblage hosts five significant VMS deposits within the Reed Lake area. The Rail deposit occurs near the south end of the map area and the Dickstone deposit is found 5 km north of the area. The precise geological setting of the Rail deposit is unclear because it sits in the middle of the WRNS; however, the Dickstone deposit is known to occur near the contact between the Preaston and Dickstone formations (units 1 and 2 in PMAP2013-8). The presence of the Rail deposit and the fact that the host horizon of the Dickstone deposit can be traced uninterrupted from the Dickstone mine through most of the map area suggest that the Rail Lake–Sewell Lake region has significant potential for discovery of further VMS deposits. Weak to moderate sericite-chlorite alteration was observed within felsic volcanic rocks along the shoreline of Sewell Lake and on some small islands, with alteration being strongest in the island exposures.

Although no gold occurrences have been reported from the Rail Lake–Sewell Lake area, the WRNS hosts several significant gold showings in the North Star Lake area, 3 km north of the map area. Because the same structures that host gold mineralization in the North Star Lake area straddle the Rail Lake–Sewell Lake region, it likely also has significant potential for shear-hosted (i.e., orogenic) gold mineralization.

References

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