NORTHERN AFFAIRS PROGRAM

ABANDONED CLINTON CREEK ASBESTOS MINE

REPORT
ON
JUNE AND JULY 2000 SITE INSPECTIONS

Prepared by:

geo-engineering (M.S.T.) LTD.

August 2000

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Prepared for
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Whitehorse, Y.T.

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Calgary, Alberta

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G1000

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1.0 INTRODUCTION

The abandoned Clinton Creek mine area was visited twice this year: on June 17 and 18 and then on July 14, 2000. The first visit was undertaken in the company of Mr. H.F. McAlpine. During the second visit, Messrs. B. Hartshorne, R. Seaman and H.F. McAlpine represented DIAND and Messrs. K. Skaftfeld, and T. Wingrove represented UMA Engineering Ltd. (UMA). The previous geotechnical inspection was undertaken on June 19, 1999, while the most recent geotechnical report was issued in May 1998.

Detailed documentation of the main geotechnical aspects of this area, and a brief review of the historical behaviour of the mine pits and dumps, is presented in our Review Report dated December 1986. More recently, the DIAND's Waste Management Department retained UMA to undertake a review and risk assessment of the mine infrastructure. However, the final report was not issued as yet.

Relics of past mining activities, such as underground conduits, crusher, storage tanks, foundations of a power plant and sewage treatment plant are still evident, despite an effort to partially cover some of them with random fill. Degradation of permafrost in the former village area has produced irregular ridges and kettle holes in former roads.

Ground surveys and monitoring of previously installed benchmarks on waste and tailings dumps was discontinued in 1986. UMA located some benchmarks along the Clinton Creek channel and the waste dump and surveyed them in 1999. This data indicate slower movements than in the 1980's. This information and deformations and movements observed during past and current site visits, confirm that the majority of the waste dumps did not reach equilibrium conditions and that the drainage courses in areas affected by dump movements are unstable. Major changes occurred in the Clinton Creek channel and at the Hudgeon Lake outlet.

2.0 CLINTON CREEK WASTE DUMP

The Clinton Creek waste dump is comprised of overburden rock from the Porcupine open pit. With the exception of occasional, more durable blocks, the prevailing material is weak overburden, shale, argillite and disintegrated sandstone. The overall configuration

of this dump has not significantly changed since the mid-1980's; however, fresh cracks exist at several locations.

The uppermost segments of the valley wall have gradients up to some 30 degrees. The mid and lowermost segments of the waste dump are comprised of several slightly inclined terraces and a bulge slowly advancing into Hudgeon Lake. Fresh deformations were identified during the recent site visit. Discharge from the lake passes through a "spillway" trough cut into the waste dump and runs over large rock blocks at its downstream end. Clinton Creek flows along the toe of the waste dump in a channel cut into the north side of the valley well above the original valley bottom. The channel has been significantly eroded since the 1997 flood.

2.1 WASTE DUMP

Fresh cracks, scarps and fissures were observed, similar to those noted during previous inspections, in the upper and middle segments of the waste dump. The waste dump toe, forming the valley plug, appears to occupy the same footprint since about 1990. While difficult to assess visually, it is obvious that the dump toe had to advance into the creek channel.

UMA acquired new aerial photographs in 1999. We plan to correlate recent photos (where made available) with the old ones.

Fresh cracks in the middle and uppermost waste dump areas indicate that the dump continues to be unstable. Since 1999 fresh cracks were also observed at the lakeside. The rate of movement is apparently slow, creep-like. Very little movement, if any, apparently occurs at the lake outlet area. However, a fissure paralleling the outlet was observed this year and the material in the outlet bottom was soft.

Water level marks indicate that the water level in the lake, at the time of our June visit, was down by approximately 450 mm from the maximum lake elevation. The water level during the July visit was at its typical summer elevation, about 600 to 750 mm below the maximum level.

2.2 CREEK CHANNEL

The 1997 flood triggered major changes in the gradient and configuration of the Clinton Creek channel. Main changes occurred between the Hudgeon Lake outlet and the Wolverine/Clinton Creek junction. The rock weir (constructed in its latest configuration in 1984) was destroyed, the channel between the weir and the lake outlet has been cut down and laterally eroded and significant erosion occurred within the remaining channel section. It was estimated that retrogressive erosion stopped some 20 m downstream from the lake outlet.

Relatively few changes of the Hudgeon Lake outlet area were observed during the 1998 and 1999 site visits. The exceptions were more severe undercutting of the banks formed by the waste material and increased seepage downstream from the lake outlet.

Further degradation (downcutting, as well as lateral erosion) of the channel was observed during the July 2000 site visit. These changes were not as apparent in June when a relatively high flow was taking place. Visual observations may be summarized as follows:

- erosion steps (only about 100 mm high) have developed in the lake outlet channel,
- the outlet channel bottom, covered with small to medium-sized shale/sandstone fragments is soft,
- the armoured section, immediately downstream from the lake outlet, sagged and some of the boulders were possibly dislodged (Photos 1 and 2),
- the channel bottom downstream from the rip-rap section was further downcut (by about 500 mm and slumps developed on the banks (Photos 3 and 4),
- total grade difference between the lake level and the channel downstream from the lake outlet is now estimated to be in the order of 3 m, and
- further downstream, lateral erosion triggers on-going instabilities of both channel banks (Photos 5 and 6).

3.0 PORCUPINE CREEK WASTE DUMP

The overall configuration of this dump has not changed significantly over the period of the last five to ten years. The sloughing is most evident on the southern dump segment. Water ponded on the upstream side of the dump filtrates through the dump and is discharged at the north side of the dump, about 8 m above the dump toe. Heavy seepage, from different discharge points, was observed in June 2000. The discharge was clear, without suspended solids.

4.0 WOLVERINE CREEK TAILINGS PILES

The general appearance of both south and north pile lobes is similar to that observed during previous site visits. However, the piles remain unstable and movements of these segments are irregular, reflecting the displacement of main dump blocks. For example, when a lower block moves, the adjacent slope segment accelerates and the failure gradually progresses to the top of the pile (Photo 7).

In 1997, the southern lobe (Photo 8) temporarily blocked the creek channel and the blockage has now been eroded away during larger flow events. It appears that the blockage may be a yearly event, reoccurring during the fall and winter low flow seasons. It appears that continuing movements discouraged or destroyed the local beaver colony. Their dam was pushed up and a new channel cut (Photo 9).

The north lobe reached the valley bottom in 1985 and temporarily blocked the creek flow in 1987. The original valley bottom was "bulldozed" up and against the east valley wall. This created another small lake. However, beavers now control its level. The flow from this lake overtopped easily erodible tailings and cut a new channel through the toe of the north lobe (Photo 10). The rate of the north lobe advance appears to be slower than the rate of the south lobe since the channel blockage did not reoccur at the north lobe. However, fresh cracks in the lower and middle segments of this lobe are indicative of the ongoing movement.

The Wolverine Creek spillway weir continues to perform well except for the lowermost weir which was dislodged and the channel undercut by about 300 mm (Photo 11).

5.0 CONCLUSIONS

Based on observations made during the June and July 2000 site visits, the following conclusions are made:

- All waste dumps and tailings piles continue to be unstable.
- A somewhat greater spring runoff than usual occurred this year which further modified the Clinton Creek channel, downcut the channel downstream from the lake outlet and dislodged some of the channel rip-rap at the lake outlet.
- The Wolverine Creek channel does not show significant changes due to this year's spring runoff.

The writer believes that the potential hazard of releasing a large flow from the Hudgeon Lake has further increased.

Respectfully submitted:

GEO-ENGINEERING (M.S.T.) LTD.

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Principal Consultant

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G1000/2000Clinton Creek

APPENDIX A

PHOTOGRAPHS

Photo 1: Looking upstream at the rip-rap segment of the Hudgeon Lake outlet. The left side appears to sag relative to the right side.

Photo 2: Hudgeon Lake outlet, looking downstream at the armoured section.

Photo 3: Downcutting of the channel (which occurred during this year's spring break-up) triggered slumping of creek banks downstream from the lake outlet.

Photo 4: Downcutting dislodged large boulders on the channel banks.

Photo 5: View of former rock weir and increased lateral erosion of both channel banks.

Photo 6: View of the downstream segment of the Clinton Creek channel. Note ongoing erosion of both channel banks.

Photo 7: Wolverine Creek tailings pile. View of one of several active headscarps.

Photo 8: View of the south tailings pile lobe and the Wolverine Creek spillway weir.

Photo 9: View of the beaver dam located at the upstream edge of the south tailings pile, uplifted by ongoing ground movements.

Photo 10: View of the toe of the north tailings pile lobe.

Photo 11: View of the Wolverine Creek lowermost rock weir, currently dislodged. Note the channel erosion.