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July 18, 1991

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Mr. John Hogg, P.Eng.
General Manager
Curragh Resources Ltd.
P.O. Box 1000
Faro, Y.T.
Y0B 1K0

Dear Mr. Hogg:

Re: Geotechnical Review of East Wall of Faro Pit

INTRODUCTION

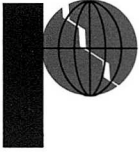
As requested, Piteau Associates Engineering Ltd. has completed an update assessment of the stability of the east wall of the Faro Pit. This review and letter report follows similar reviews summarized in letter reports dated May 2, 1990; November 22, 1990; February 1, 1991; March 25, 1991; May 3, 1991, and May 23, 1991.

Mr. A. Stewart visited the mine on two occasions, from June 25 to 28 and from July 8 to 10, 1991. During these visits, inspections of the east wall were made with mine personnel, and prism monitoring results were reviewed on a daily basis. A blast on the 3490 level on the east wall was observed on June 27, 1991. Discussions and meetings with mine personnel concerning the prism monitoring results and the overall stability of the east wall were held at various times during the site visits in June and July.

The following summarizes the results of the geotechnical review. A brief summary of the geology in this area of the pit, along with a general description of the past behaviour of this portion of the pit wall, is also included.

HISTORICAL BEHAVIOUR OF THE EAST WALL

Portions of the east wall of the Faro Pit have a history of instability that extends over many years. Specifically, the areas of wall excavated in the relatively weak and incompetent phyllite have experienced gradual weathering and degradation of individual benches, which typically began shortly after the benches were excavated. The adverse orientation of the main S2 foliation in the phyllite (i.e. the foliation typically dips directly into the pit) has also contributed significantly to the failure of the benches by allowing bench scale sliding to occur along foliation planes.



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The end result of the gradual degradation of the phyllite has been the creation of a pit wall at an overall angle of about 35° to 37°, with the slope essentially consisting of rubble with no well defined berms. While monitoring records for slope movements of this nature do not exist prior to September 1990, it would appear that the movements have been of a gradual creeping nature, with no sudden or large scale catastrophic slope failures. Examples of this type of slope degradation and movement can be seen in what are referred to as the "north slump" and "south slump" areas of the present east wall (see Fig. 1).

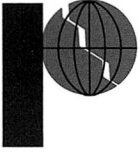
ENGINEERING GEOLOGY

The rock types exposed on and present behind the east wall are illustrated in Fig. 1, where it can be seen that the northern portion of the wall (i.e. what is referred to as the north slump area) is excavated in the weak and relatively incompetent phyllite discussed above. Similarly, the southern portion of the wall, east of the Big Indian Fault (referred to as the south slump area), is excavated in phyllite. Below the south slump area, calc-silicate breccia and a quartz diorite dyke are exposed in the slope. These rocks are expected to extend to the pit bottom in this area (i.e. about the 3450 ft elevation).

In the central portion of the east wall (i.e. referred to as the calc-silicate area), the phyllites are exposed primarily east of the Big Indian Fault (i.e. above about the 3960 ft elevation). West of the Big Indian Fault, most of the wall is excavated in calc-silicate breccia. However, an intrusive dyke is present on the hanging wall side of the Big Indian Fault, behind the calc-silicate breccia. This dyke also appears to daylight on the slope at about the 3500 to 3550 ft elevations, leaving the calc-silicate breccia on the slope as a somewhat isolated "pie or wedge shaped" mass. Based on geologic interpretation and on one small surface exposure, it would appear that a fault contact, subparallel to the pit wall below about the 3500 ft elevation, may exist. This fault contact, which is interpreted to be within about 20 ft of the pit wall, is bounded on the footwall side by phyllite and on the hanging wall side by sulphides and quartzite. The sulphides and quartzite could remain on the pit wall as a sliver of rock overlying the phyllite.

MOVEMENT MONITORING

Prism monitoring of the east wall of the Faro Pit was initiated in September 1990, when six prisms were installed in and behind the north slump area. These prisms were monitored on a semi-regular basis (where possible) throughout the fall and winter of 1990. In mid-January 1991, the first prisms were installed in the calc-silicate area. Since that time, other prisms have been installed in the north slump, south slump and calc-silicate areas, as necessary. A total of



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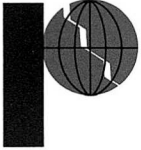
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22 prisms have been installed to date, with 19 being operational at the present time (see Fig. 1 for location of active prisms). Additional prisms are to be installed in the near future, as conditions warrant. Monitoring frequency has gradually increased as movement has been noted, with the present monitoring frequency (i.e. since June 24, 1991) being daily. During this period, mine personnel have made regular visual inspections of the east wall, with the frequency of visual inspections increasing this spring, becoming daily at the same time as the prism monitoring. As noted above, periodic site visits, inspections of the pit wall and reviews of the prism monitoring data have been made by the writer.

The results of the prism surveying have been calculated, plotted and assessed on an ongoing basis as the data becomes available. As well as tabulated results of incremental and net movements, velocities, etc., graphical plots of movement in plan and of time/distance plots have been generated and assessed.

With regard to the north slump area, which has been monitored since September 1990, Prisms 1 and 2, located in the vicinity of the pit crest, have not experienced any movement. The other prisms in this area experienced movement last fall in direct response to mining activity at the toe of the slope. However, during the winter, when mining of the phyllite at the toe of the slope was no longer occurring, movements of these prisms slowed to about 15 to 30mm/day, with at least two prisms indicating deceleration and the remainder moving at approximately a constant rate. It is noteworthy that the presence of snow made it impossible to monitor all of the prisms at some times. During April and May, when the early portion of the spring thaw was occurring, these prisms (with the exception of Prisms 1 and 2) experienced an expected increase in movement rate to about 30 to 50mm/day. Since the end of May, these movements have been gradually increasing to a present rate that ranges from about 30 to 65mm/day. The movement is directly downslope at a plunge angle that ranges from about 25° to 55°. Given the past and present nature of the north slump area, and the fact that the effects of spring thaw are still being felt, the recent very gradual increases in movement are not unexpected.

Prism monitoring of the south slump area began on June 3, 1991. During that time, movement rates have accelerated from about 50mm/day to as much as about 300mm/day for Prisms 14 and 15, located essentially in the middle of the slump area (see Fig. 1). The movement is directly downslope at a plunge of about 20 to 30°. A recently installed prism at the top of the south slump area (i.e. Prism 22) has not experienced any movement to date. However, the presence of cracks and settlement just south of this prism indicate that movement is likely to occur.



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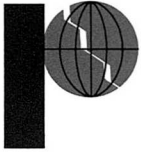
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As discussed above, prism monitoring of the calc-silicate area was initiated with two prisms (i.e. Prisms 8 and 9, both since destroyed but replaced by Prisms 8A and 12, respectively) in mid-January. Since that time, a number of prisms have been installed on most accessible benches to provide broad monitoring coverage of this area of the east wall. To date, movement in the calc-silicate area appears to be restricted to the middle portion of the slope. That is, Prisms 8A and 12 (i.e. and Prisms 8 and 9 before them) in the lower portions of the slope, and Prisms 7 and 18 in the upper portion of the slope (i.e. located on either side of the Big Indian Fault) have not experienced any movement. However, Prisms 16, 17, 19, 20 and 21, which were installed at various times between June 3 and the present, are all experiencing accelerating movements. At the present time, Prisms 16, 20 and 22 have increased to about 100 to 125mm/day, whereas Prisms 17 and 19 have increased movement rates of about 200 to 250mm/day. Prism 16, the first of these prisms to be installed (i.e. on June 3) had an initial velocity in early to mid-June of about 35 to 40mm/day. All but one of these five prisms are moving downslope at an angle of about 15°. It is noteworthy that the June 27 blast at the toe of the slope did not appear to have any effect on the prism movement rates.

VISUAL MONITORING AND ASSESSMENT OF FAILURE MECHANISM

Visual monitoring of the east wall indicates that the north slump and south slump areas are moving in a similar manner. That is, the broken rubble appears to be creeping downslope, with the movement rate no doubt being exacerbated by the presence of water in the slope. This is particularly evident in the south slump area, where occasional local bulging and sloughing of the broken material, were observed. The presence of discrete seepage points on the wall has resulted in semi-continuous streams of material being washed from the slope in a few locations, creating alluvial fan-like deposits on the berms below. This material is gradually filling the berms and, in one local area in the south slump area, is starting to spill to the pit bottom.

Detailed inspection of the calc-silicate area (i.e. by walking the individual benches) was not possible during the winter and until all snow had melted from the slopes. While a lack of movement during this time cannot be stated with any certainty, general observation of the slope from a distance did not indicate significant slope movements were occurring in the area. The first visual indications that the portion of the slope between about the 3700 and 4100 ft elevations was moving were obtained in early June, at about the same time as Prism 16 was installed on the 3910 berm. Since this time, and up to the present, the rock mass in this area has become highly fractured, with the degree of fracturing appearing to increase in relation to the accelerating movement of the prisms. At the time of the most recent site visit, the high degree of



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fracturing appeared to be reducing the slope to a loosened mass of blocks of ever decreasing size. Fracture openings ranged from hairline cracks to at least 3 ft wide. While some of these fractures appeared to be along relatively planar joint or shear sets with consistent orientations, many others appear to be curved or discontinuous and of relatively random orientation.

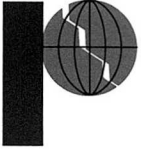
No large scale (i.e. larger than bench scale) relatively sudden failures have been observed in the calc-silicate area to date. In this regard, the rock mass primarily appears to be generating ongoing rockfalls and ravelling of material. For the most part, block sizes range from sand and gravel sized material to blocks up to about 10 to 20 yds³ in volume. It is noteworthy that it would appear that virtually all rockfalls and ravelling material have been retained on the berms and have not reached the present bottom working level of the pit. A few bench scale and smaller wedge failures were also observed.

Near the south end of the pit, in the vicinity of Prism 10, two areas of instability were observed. One, immediately above Prism 10 on about the 3790 level, appears to be a slow moving localized toppling failure. The second is located on the 3630 bench about 250 ft south of Prism 10, and consists of a large block (estimated to be at least 100 yds³) that will likely fail as a planar failure. In both cases, there is potential for a portion of the failure to reach the pit bottom.

The actual failure mechanism for the main calc-silicate area is not completely understood. However, based on the geologic interpretation, the prism monitoring and the visual inspections, it would appear that the portion of the slope between about the 3700 and 4100 ft elevations is experiencing toppling failure, possibly combined with bench scale wedge failures that may be formed by discontinuities subparallel to the North Bound and Faro Faults. These failures are probably being pushed or driven to some extent by water pressure in the upper portion of the slope in the area of the Big Indian Fault and the intrusive dyke. Potential for planar sliding along the underlying fault contact with the phyllite or due to degradation of the phyllite, should a significant amount of the phyllite become exposed at depth, remains a possibility.

MINING STATUS

Following the blast on the 3490 level on June 27, 1991, and due to the accelerating movements that were occurring and the uncertainty with regard to fully understanding not only the mechanism of movement, but also the rate of movement in all areas of the east wall (specifically in the calc-silicate area), a decision was made by mine personnel to cease operations under the east wall. At that time, guidelines were prepared by the writer and mine personnel



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General Manager
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regarding east wall mining and slope monitoring procedures. A copy of the memo summarizing these guidelines is enclosed in Appendix A.

Since ceasing operations, five additional prisms have been installed in the calc-silicate area (i.e. Prisms 18 to 22) and additional prism monitoring data has been obtained and inspections made, as discussed above. Further prisms are planned to be installed. Construction is now underway to abandon the open Faro Creek Diversion channel in the area immediately behind the east wall and pump all surface water in Faro Creek past the east wall in sealed pipes. This pumping bypass, which will eliminate seepage from the open diversion channel and reduce water inflow into the rock mass, will be completed on or about July 20, 1991. It is anticipated that this may have a beneficial effect on stability.

Due to the continued acceleration of most of the prisms on the east wall, no decision has been made to restart mining in the pit. Slope conditions and guidelines are being reviewed daily, and this practice is to be continued.

I trust the above is sufficient for your needs at this time. Should you have any questions concerning the above, please do not hesitate to contact me.

Yours very truly,

PITEAU ASSOCIATES ENGINEERING LTD.

Alan F. Stewart, P.Eng.



AFS/ef

Enc.

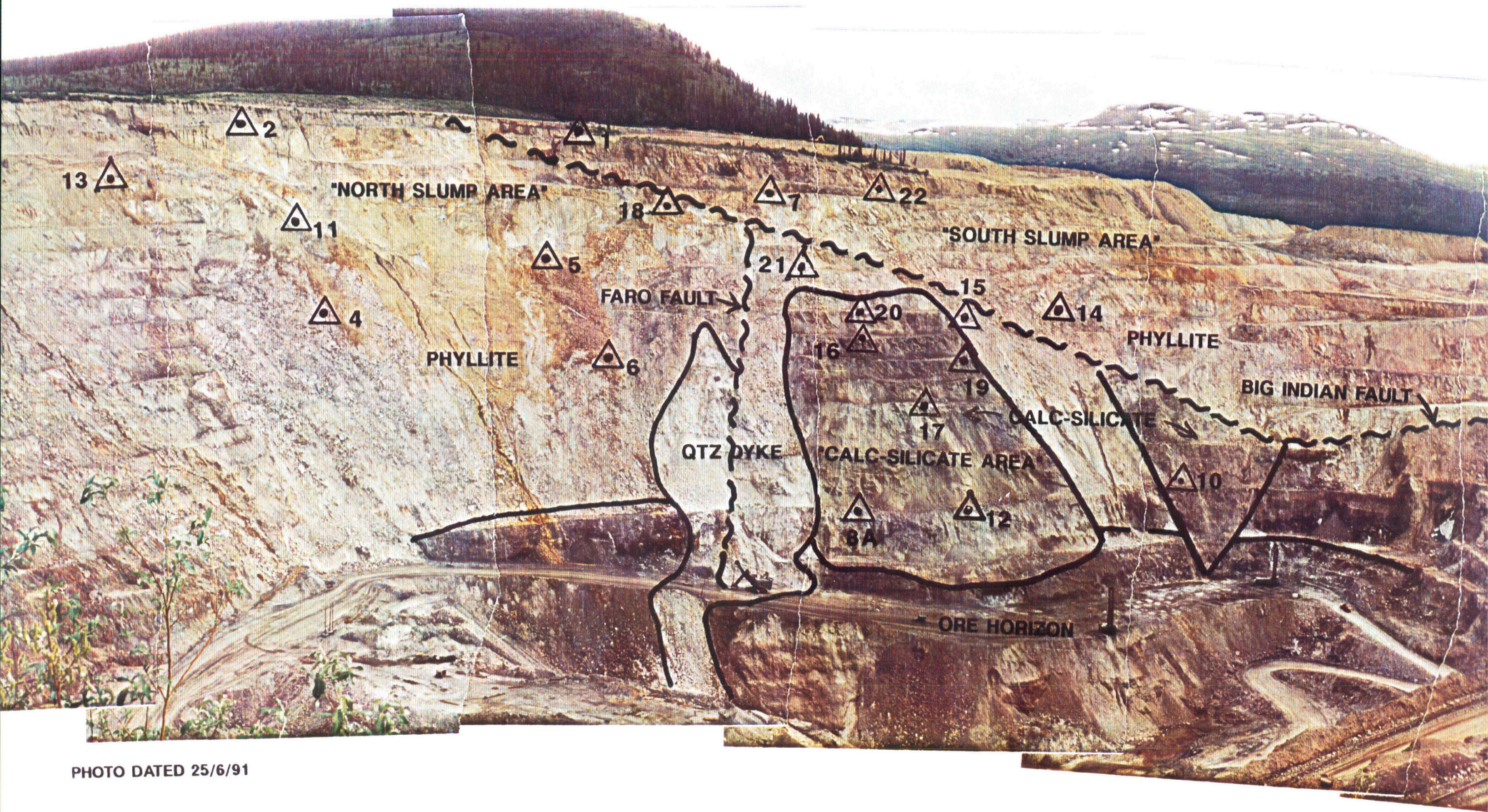


PHOTO DATED 25/6/91

FIG. 1

APPENDIX A

**MEMORANDUM CONCERNING EAST WALL MINING
AND SLOPE MONITORING PROCEDURES**

CURRAGH RESOURCES INC.**INTER-OFFICE MEMORANDUM
FARO OFFICE**

DATE: June 28, 1991

TO: See Distribution

FROM: Ray Mason
Superintendent, Mine Ops.

SUBJECT: EAST WALL SLOPE MONITORING AND PROCEDURES

=====

1. MINING PLAN

Mine from north to south as narrow as possible at the west side of the E Phase. Place a catch berm dumped in tightly with 170 ton truck at a height of 2.5 to 3 metres. Start catch berm north of the white granodiorite dike until south of the south slump.

2. Dispatch to monitor area 24 hr./day with binoculars, if rockfall increases or raveling starts, he must notify equipment operators to evacuate the area of the E Phase and notify the responsible shifter. Shifter on duty will then contact Mine Superintendent/Mine G.F. This person will inspect the area and make a decision on when work may resume.

3. The prism's will be surveyed at least daily and critical graph plotted and assessed a.s.a.p.

Surveying to be done as much as possible by same instrument and surveyor.

Visual monitoring daily from dispatch and south side and at least weekly (if possible) from closeby by one person and good backup during weekend duty, and continue with daily record keeping.

4. PULL OUT CRITERIA

At the present time, Prism #16 is considered the key signal of rock movement in the calc silicate section. Movement of this prism at 50 mm/day is the cutoff limit for any activity in this area. This factor will be reviewed on a continuing basis and changed as required. Rapid acceleration of any other prisms will be given consideration for work stoppage.

Cont'd.../2

RE: East Wall Slope Monitoring and Procedures (cont'd)

June 28, 1991

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Work will not resume in this area until at least two consecutive readings have been taken which show that movement has either slowed or stabilized. When this has happened, the Senior Pit Operations person (Superintendent or G.F.) will, in conjunction with a senior person from Mine Engineering, make a recommendation to the General Manager that work can resume.

5. At the south side of E Phase, two critical blocks of rock will be visually monitored daily by the Engineering Department and area underneath it should be abandoned by personnel a.s.a.p. as any movement appears.

6. In emergency call:

- | | | |
|----|--------------------------------|----------|
| 1) | Ray Mason - Pit Superintendent | 994-2142 |
| 2) | Alex Goold - G.F. Mine Ops. | 994-3357 |
| 3) | Bill Dunn - Chief Engineer | 994-3288 |
| 4) | Gerrit Vos - Sr. Engineer | 994-3047 |



Ray Mason
Superintendent, Mine Ops.

GV/RM/rg

Distribution:

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