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Geotechnical Evaluation
Grum Sulphide Cell Cover
Erosion Control Measures
Faro Mine Complex, Yukon - 2011

Prepared For: **Boreal Engineering Ltd.**

Date : **June 6, 2011**

File No: **100-002-11**

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1.0 INTRODUCTION

Chilkoot Geological Engineers Ltd. was retained by *Boreal Engineering Ltd.* to conduct a preliminary geotechnical evaluation of the *Grum Sulphide Cell Cover* located in the *Faro Mine Complex* in Faro, Yukon. The purpose of the evaluation was to assess the condition of the recently constructed cell cover given the degree of soil erosion that had been observed by *Yukon Government* (YG) and *Denison Environmental Services (*DES) site personnel.

Following our (May 10 & 11, 2011) evaluation, it appeared that the design intent to control slope drainage was not being met and that immediate corrective action would be required to minimize the detrimental effects of the spring frechette and uncontrolled surface water run-off. As such, our firm recommended to Mr.E.Nyland, P.Eng., President of *Boreal Engineering Ltd*. that the functionality of the existing ditches be improved. We subsequently met with *Yukon Energy, Mines and Resources* personnel (Mrs.D.Pitt, ASLA, Senior Project Manager and Ms.K.Furlong, E.I.T., Project Manager) on May 13 to further evaluate the situation. After conference call discussions with the Engineer of Record, Mr.K.Scott, P.Eng. of *SRK Consulting Engineers and Scientists* (and the above noted personnel), it was determined that the best course of action to minimize soil erosion was to employ hand laborers to access the cell and clear the existing ditches of snow and ice such that their functionality would increase relative to their existing state. As such, our firm was employed at the request of *Yukon Government* and *Boreal Engineering Ltd*. to direct erosion control measures and provide recommendations for remedial action.

Our preliminary field assessment was conducted on May 10 & 11, 2011 by the undersigned along with the assistance of Mr.Nyland (*Boreal*) and Ms.Furlong (YG). Authorization to proceed with our services was granted by Mr.Erik Nyland, P.Eng., president of *Boreal Engineering Ltd.* on May 10, 2011.

Erosion control measures were conducted between May 16-21 & 24, 2011. Our firm was onsite to formulate and direct the erosion control plan between May 15-21, 2011.

A design team representative, Ms.O.Kosarewicz, P.Eng., was onsite May 17-19, 2011 to verify that the erosion control measures did not adversely affect the design. Mr.D.Rainey, Ph.D. (*YG*) Project Manager was also on site on May 17 & 18, 2011.

The following report summarizes the findings of our geotechnical evaluation and the erosion control measures that were undertaken. While preliminary recommendations have been formulated for discussion purposes, further evaluation is required to fully address all facets of the project that may require remedial work.

1.1 Project Description - *Grum Sulphide Cell Cover Construction*

The *Grum Sulphide Cell Cover Construction* project was conducted in the fall of 2010 and involved;

- grading of waste tailings (sub-grade),
- placement of an impermeable plastic liner (approximately 400 m by 500 m),
- establishment of a 1 meter thick till cover above the liner,
- grading of surface water interception benches,
- construction of associated ditch-works, and
- hydroseeding of the cell cover (not yet conducted).

1.2 Weather

A general warming trend was noted between our two episodes onsite.

Generally fair weather was encountered on May 10 with temperatures in the order of 8 degrees Celsius, however, weather conditions deteriorated overnight and steady flurries were encountered on May 11, 2011.

The weather encountered during implementation of the erosion control measures was generally fair and ranged to 18 degrees Celsius with overnight temperatures generally above freezing. Overnight temperatures were noted to gradually increase during the course of the work.

The weather conditions for Faro, Yukon would have been recorded in more detail by Environment Canada if further information is required.

2.0 METHODOLOGY

Our geotechnical evaluation has been based upon our preliminary field assessment, brief review of the *SRK Consulting Engineers and Scientists* April 30, 2011 drawings (G-1 to G-14) and field conditions observed at the time erosion control measures were implemented.

Our observations and discussions with project personnel have been summarized in our Field Notes which have been attached as Appendix A.

A brief description of each facet of our evaluation and a summary of the work conducted during the erosion control measures has been provided below.

2.1 Preliminary Field Assessment (May 10 & 11, 2011)

A site reconnaissance was conducted the afternoon of May 10 and the morning of May 11, 2011. Mr.E.Nyland, P.Eng. of *Boreal Engineering Ltd.* and Ms.K.Furlong, E.I.T., (YG) Project Manager were both able to accompany us during our assessment.

In general, our reconnaissance was comprised of traversing portions of the site on foot, hand shoveling test pits along the toe berm bench and assessing the overall functionality of the cell cap relative to spring thaw conditions. During the work, photographs were taken to document the existing conditions. A digital copy of our photos has been attached.

At the time of our evaluation the majority of surficial cell cap materials were noted to be saturated or else covered in snow. Traversing the site on foot was difficult. Walking across saturated areas resulted in being inundated in approximately 0.2-0.3 meters of fine grained cap materials. The underlying cap materials were noted to be frozen below a depth of approximately 0.3 meters.

Several test-pits were hand excavated near the crest of the toe berm immediately above the as-built liner depth on May 10, 2011. While the liner was not encountered during the exploratory work, sand-bags (which were known to weigh down the liner during installation) were encountered along with buried snow and ice. The presence of deleterious (snow & ice) materials entrained within the backfilled materials was cause for concern. Thaw of the deleterious (snow/ice and frozen) material was likely the cause of zones of subsidence (which were observed as (approximately 1 by 4 meter) linear features oriented parallel to the crests of several benches) and general loss of local design continuity.

The bench ditches were essentially non-functional as they were noted to be filled with snow and ice. Water was noted to be flowing over the crests of the benches at a number of locations. The down-slope migration of surface water between the benches resulted in the formation of erosional rilling features in predominately areas were flow was identified in *Figure 1*. Similar erosion rills were noted on the eastern face of the toe berm near Station TB + 075.

Upon inspection of the 600 mm half culvert outflow flue, the noted conditions were considered poor. Specifically, undermining of the outflow flue was occurring. The undermining appeared to have been ongoing for some time and was in our opinion likely due to a combination of;

- a poor transition from the rip-rap lined outflow channel stemming from the final energy dissipation pond. Specifically, the half culvert outflow was oriented at an angle greater than 90º relative to the alignment of the discharge channel,
- its inability to handle the volume of flow discharging from the entire cell during the frechette,
- the impact of local surface drainage, some of which appeared to have originated from outside of the cell.

In addition to the undermining, an erosion gully was noted on the slope located directly east of the flue inlet area. The gully appeared to have formed as a result of overflow conditions at the location of the flue inlet.

Upon investigating the Grum Creek area (at the base of the erosion gully feature), granular outwash materials were noted to be lying on top of snow and the forest floor cover. It was apparent that this material originated from the erosion gully immediately upslope. Some incising through the forests organic floor mat and into the underlying sub-grade materials was noted. The presence of permafrost (which would be very susceptible to erosion) could not be ruled out in this region.

2.2 Erosion Control Measures (May 15-21 & 24, 2011)

2.2.1 Intent

Our firm employed a best practices approach to directing remedial measures with the intent to reduce the amount of surface water migrating down the face of the cell.

2.2.2 Establishment of Survey Control

For ease of reference, our firm established survey control on the benches and toe berm by marking survey lathe at approximately 25 meter intervals. Station 000 was established on the eastern edge of the benches with increasing chainage advancing to the west. In addition, the benches were simply numbered from 1 to 5 and TB (Toe Berm). Bench 1 equated to Bench elevation 1284 meters and subsequent benches were numbered sequentially relative to decreasing elevation (hence, Bench 5 is located immediately above the Toe Berm bench).

2.2.3 Initial Assessment (May 15, 2011)

Following our firms arrival onsite on May 15, 2011, it was apparent that the primary erosion features were comprised of incised rills on the cell cap culminating in prominent gullies located at the base of the toe-berm's east side. As such, a remedial strategy was formulated to assess the effectiveness of hand clearing of the bench drainage ditches, reduce the flow of surface waters over the east side of the toe-berm and re-establish bench ditch drainage.

The erosion gully located near the flue inlet appeared to have increased in size since May 11 and as such our firm recommended that heavy equipment be utilized to place rip-rap in an attempt to reinforce/armor the slope and minimize erosion.

2.2.4 Methodology

T.Moon Construction was retained by YG and DES to provide personnel & equipment to assist in the erosion control measures. Their work effort was observed and summarized by our firm in Daily Construction Summaries which have been attached as Appendix B.

Initial efforts on May 16, 2011 to concentrate hand excavation at zones where surface waters were cresting over the benches proved to be in-effective as snow and ice entrapped within the ditches prevented proper drainage of the bench ditches. As such, the methodology was modified to hand excavate from the confluence of the bench ditches and access road surface drains and progressively excavate to zones of concern. While this method resulted in improving the functionality of the bench ditches, there were areas (encountered on all benches) where sediment had completely filled the ditch (typically for a span of approximately 5-7 meters). This resulted in ditch blockage and bench overflow conditions. As the sediment within the ditch was saturated, hand-excavation of the material was not practical. As such, sand-bag dikes were constructed to intercept down-slope surface waters and redirect the flow back into more functional areas of the bench ditches. Local native cap materials were utilized to fill the (~175) sand-bags as it was not logistically possible to hand carry filled sand-bags to the regions of concern. Once the majority of the surface water flow had been re-directed into the east side of Bench 5, *T.Moon's* crew was dispatched to clear bench ditches on the east side of the cell from a predominately top-down approach. This allowed for water to be intercepted as soon as possible, to minimize cell degradation due to surface waters which were originating from outside the limits of the cell and the cell cap itself.

A tracked Bobcat mini-excavator was subsequently employed (through *T.Moon Construction*) on May 18, 2011 to clear sediment from the bench ditches. This work initially concentrated on clearing sediment from the east side of the Bench 5 ditch immediately above the Toe Berm gullies. The intent was to increase its functionality and minimize down-slope migration of surface water that was impacting the prominent Toe Berm erosion features. Once capacity to the east side of Bench 5 ditch was restored, the mini-excavator concentrated its immediate efforts on the west side of the cell. The mini-excavator began at the west side of Bench 2 and progressively advanced down-slope. Clearing of the Bench 1 ditch was considered, however the ground conditions were too poor to allow for traverse with the excavator. As such, the laborers were employed on May 19, 2011 to promote drainage in this area (to allow for subsequent clearing with the mini-excavator). The mini-excavator switched to clearing east side ditches on May 20, 2011. Again, top-down methodologies were employed, beginning at Bench 2. The Bench 1 ditch was mechanically excavated on May 24, 2011.

Following hand clearing operations, the laborers were utilized to hand place rip-rap at the confluence of the bench ditches and access road surface ditches May 18-20, 2011.

While an attempt to place rip-rap in the region of the flue inlet area was made by *DES* on May 17, 2011, rip-rap placement operations could not be conducted as the poor condition of the quarry access road prohibited access. By May 18, 2011, the erosion gully had become essentially self-armored with large cobbles and boulders (as the fine-grained component of the slope materials had washed down-slope by this time). Following discussions with Mr.D.Rainey, Ph.D., (*YG*) Project Manager on May 18, 2011, it was determined that the best course of action would be to monitor the conditions and await direction from the *SRK* design team.

2.3 MISCELLANEOUS OBSERVATIONS & DISCUSSIONS

2.3.1 Evaluation of Constructed Bench Grades

It is our understanding that the benches were to be graded towards the cell cover and bench ditch at a 2% grade in an effort to retain downward migration of cell cap surface water. However, based upon our level survey, the grades noted actually promoted down-slope migration.

During our evaluation, the bench grades were measured utilizing a level transit as follows;

BENCH	Design Grade	As-built Grade	~ Measured Grade
Bench 1	2 %	2 %	Minus 2.8 %
Bench 2	2 %	2 %	Minus 2.3 %
Bench 3	2 %	2 %	Minus 3.6 %
Bench 4	2 %	2 %	Minus 4.5 %
Bench 5	2 %	2 %	Minus (TBD) %
Toe Berm	NA	NA	Minus 0.1 %

The large variation between the design/as-built and the bench grades measured during our survey is of concern.

2.3.2 Evaluation of Toe Berm Bench Area

A level survey of the toe berm was conducted relative to a local benchmark established by our firm. In brief, the survey indicated that there was an approximately 3.3 meter drop in elevation located at approximately Station TB + 075 relative to the peak toe berm height in either direction. The presence of this low area essentially concentrated all the surface waters on the east side of the cell onto the face of the toe berm. This flow resulted in the formation of the erosion gully's. While onsite, the gully's were noted to incise approximately 2 meters in from the crest of the toe berm bench and create chasms which measured in the order of 2 meters deep.

From discussions with *SRK* personnel onsite, it was understood that the liner was temporarily established on the upslope side of the toe berm and then subsequently draped up and over the toe berm once it was established. Following this, additional bench material was utilized to create the bench. This would result in a region of liner where it's up-slope elevation is actually lower than the down-slope elevation. Further evaluation would be required to assess the impact of these potentially constructed conditions.

2.3.3 Failure of 600 mm half culvert outlet flue

Undermining of the outflow flue appeared to be ongoing since our initial investigation of May 10 & 11. The erosion gully (which formed on the eastern side of the adjacent slope descending to the Grum Creek area), was noted to have increased in size. While this increased the sediment load of the surface waters discharging from the cell cap, the oversized composition of the slope material resulted in (what appeared to be) essentially self-armoring slope conditions. The geotechnical durability and long-term environmental ramifications of the conditions should be assessed by qualified personnel.

The 600 mm half culvert was no longer operational after May 18, 2011. It's functionality prior to this time appeared to be limited.

2.3.4 Peripheral Drainage Regime

The surface drainage in peripheral regions outside the limits of the cell was undefined. At some locations, peripheral surface waters flowed onto the cell;

from areas of higher elevation that were outside of the cell limits,
laterally into the surface ditches from the adjacent access roads,
after exiting the confines of the lateral access road drainage ditches; and/or
by flowing directly into the energy dissipation ponds.

These flow regimes have been illustrated in Figure 1.

2.3.5 Cell Cap Material Composition

Given the presence of what appeared to be oversized materials (up to 500 mm diameter), the design assumptions should be re-evaluated to ensure that the design intent has not been compromised. The presence of oversize materials will generally increase the permeability of the cap materials

2.3.6 Cell Cap Thickness

Our firm attempted to assess the thickness and condition of the cell cover by means of test pitting by hand excavation immediately up-slope of Bench 3 (east side). However, frozen soil conditions were encountered at a depth of approximately 0.4 meters and as such excavation of the test-pit was terminated.

Given the magnitude of rilling (which was at some locations observed to be in the order of 0.3 meters deep), it is possible that there are locations where the cap thickness is less than the 1 meter required by the design. This would be a concern as the design life may be compromised if adequate cap thickness was not attained as soil cover will ultimately erode through eolian, surface water and other erosion processes. The compromised areas are likely concentrated in regions were surface drainage was identified as noted in Figure 1.

The affect of potentially reduced cap thickness at the locations of the bench ditches would have to be assessed in greater detail as this area may promote percolation to the region of cover materials immediately above the liner.

Insufficient data was available to determine whether the cap was overbuilt to allow for subsequent consolidation/settlement.

2.3.7 Surface Drains

The surface drains were noted to be approximately 0.2 meters higher than the adjacent cell cap materials. This condition is likely due to a combination of settlement of the adjacent cell cap materials and composition/construction methodology associated with the surface drain materials. Specifically, construction activities and the materials composition may have resulted in a more durable and competent region of material. It was evident that the higher local elevations of the surface drains channeled surface water flow along the upslope periphery of the drains and actually promoted soil cap erosion particularly at the flow locations noted on Figure 1.

2.3.8 Moose Pond – Preliminary Evaluation of Slope Conditions

Poor back-slope conditions at Moose Pond were observed during the frechette by site personnel and as such, an evaluation of the slope conditions was conducted by our firm on May18 & 20, 2011.

At the time of our analysis, the inflow into Moose Pond had been redirected (by YG and DES) and the water levels in the pond were noted to be decreasing. The diversion was required as water levels within Moose Pond had exceeded the ponds maximum capacity marker due to the influx of surface water run-off from the Grum Cell Cap and surrounding areas.

In brief, our (May 20) work was comprised of establishing survey control at the top of the ponds southern slope by marking 25 meter intervals utilizing survey lathe (to MP + 150). Subsequently, the existing slope conditions were logged and summarized as noted on Page 45 of our Field Notes attached in Appendix C. In addition to recording the physical condition of the slope, a total of six (6) soil samples were obtained to allow for subsequent geotechnical laboratory evaluation, if further assessment is required.

While some of the slope failure features appeared to be recent, others appeared to be historical in nature as re-vegetation of some failed areas was noted. As such, given the decreasing pond levels and observed conditions, our firmed deemed the risk of immediate slope failure to be relatively low. However, the slope conditions appeared to be progressively degrading and thus less stable conditions will likely prevail in the future unless remedial action is taken or a safe capacity for the pond is determined and strictly observed.

As it appears that pre-existing conditions of the Moose Pond back-slope have not been documented, it is difficult to assess the impact that the out-flow from the Grum Sulphide Cell has had upon it.

While there was concern that the natural attenuation capacity of the pond had likely been compromised (given the presence of a seepage zone that was identified near Station MP + 090), a detailed environmental study would be required to ascertain whether the ponds use in that capacity has been compromised.

2.3.9 Storm Water Management Pond

Our firm was approached by *Boreal Engineering Ltd.* and *YTG* on May 20, 2011 to assess the feasibility of constructing emergency storm water management ponds adjacent to the final energy dissipation pond. As such, our firm surveyed neat line layout of a potential pond area and discussed construction options during a conference call on May 21, 2011 with *YTG, SRK* and *Boreal Engineering* personnel. It was determined that *DES* would construct the ponds to allow for storage capacity in the event of heavy precipitation and so excavation began immediately.

While our firm forwarded conceptual sketches on May 20 and 21, 2011, it was understood that *SRK* would facilitate their final design. As such, it should be noted that at the time of our departure from the site (on May 21, 2011), the side slopes of the storm water management pond excavated were not yet completed and so their final condition should be evaluated to ensure conformity with the design and side slope stability. A copy of our conceptual sketches has been attached in Appendix C.

2.3.10 Sample Retention

Our firm retained several grab samples to assist in characterizing the existing conditions at the time the erosion control measures were implemented. Specifically this included obtaining samples from areas of the surface drains, cell cap and Moose Pond slope failure.

2.4 As-built Drawing Review

While a detailed review of the As-Built Drawings was beyond our scope-of-work, based upon our observations and use of the drawings during remedial action, it appears that the intended as-built drawings do not accurately reflect the existing conditions. Specifically, the liner appears to be absent at the location of the toe berm bench gully's, however, this is difficult to evaluate as a detail illustrating the liners end-point at the location of the toe berm appears to be absent in this version of the drawings.

3.0 RECOMMENDATIONS & CONCLUSIONS

3.1 General

Our recommendations have been provided for discussion purposes only. They are not meant to be utilized directly as recommendations for remedial action.

For ease of reference, we have compiled *Figure 1 – May, 2011 Drainage Regime and Proposed Recommendations,* which denotes the approximate locations of potential geotechnical liabilities and provides point form recommendations for future evaluation/rehabilitation. In addition, the figure shows the approximate location and direction of the selection of photos that have been attached in Appendix E. We have elaborated upon a selection of these recommendations to provide insight as to the complexity of formulating remedial options. Additional measures may be required in order to effectively address the site and degrading conditions. Other geotechnical concerns will become more apparent over the course of time as erosion continues.

Erosion of the cell will be ongoing until remedial action is taken and a protective vegetative cover is fully established. As such, it is likely that soil erosion during precipitation events and next spring's thaw will be heavy (as a vegetative cover will not likely be fully established by the fall) and this should be taken into account from a project management perspective.

The remedial action envisioned will likely require the use of heavy equipment in order to import and/or re-grade and compact the cell and peripheral areas.

3.2 Formulate an Engineered Design

A detailed assessment of the behavior of the cap materials should be conducted to verify the overall stability of the soil mass, especially given the presence of the impermeable liner. This assessment should evaluate the local and regional thermal, groundwater and surface drainage regimes to evaluate the soils behavior during times of thaw. The assessment should also evaluate the avalanche hazard at times when the cell is covered in snow.

If imported material is required to re-establish the cap thickness, ‘bottom-up’ construction methodologies should be employed. Subsequent layers should be well bonded and keyed into underlying/adjacent materials. The construction of a reinforced (geo-grid/rip-rap) slope should be considered for steeper areas of the toe berm’s face. The gully areas should be excavated utilizing a tracked excavator equipped with a clean-up bucket to minimize the potential for unconsolidated fill from infilling the existing fissures/gullies.

The impact of terminating the liner near the top of the toe berm should be re-evaluated considering the long-term effect of sub-surface groundwater (above the liner) discharging at this location.

3.3 Re-grade & Compact the Cell Cover

Once the thickness of the cell cap has been confirmed and the prepared surface has been re-graded, the cell should be compacted utilizing a sheeps-foot drum roller. The use of this equipment should greatly assist in promoting laminar flow as well as reducing down-slope flow velocities. In addition, the prepared surface will be ideal to capture and harbor hydro-seed grasses, which will promote uniform establishment of a soil cap. The feasibility of utilizing compaction equipment on the cell slope will be heavily dependent upon the moisture condition of the cell cap materials and weather conditions.

3.4 Hydro-seed the Cell Area

Additional applications of hydro-seeding may be required depending upon how well it is established following the spring thaw.

3.5 Re-configure/Re-establish Surface Drains

The surface drains should be re-established such that they lie just below the cell cover surface in such a manner as to intercept and break-up fall line slope drainage.

3.6 Re-grade the Benches

The benches (including the toe berm bench) should be re-graded with a slope considerably greater than 2% drainage towards the bench ditches.

3.7 Re-habilitate the Ditches & Energy Dissipation Ponds

The bench and access road ditches should be lined with rip-rap armor to minimize erosion. The use of a near surface liner should be considered.

A toe berm ditch should be constructed on the toe berm bench. The use of baffles in this area should be considered given the existing gradients.

Sediment should be excavated from the energy dissipation ponds to restore their functionality.

3.8 Re-grade Peripheral Areas

The peripheral areas outside the limits of the cell should be regarded to promote drainage away from the cell limits. Interception ditches should be considered.

3.9 Survey the Cell Cap, Ancillary and Moose Pond Areas

A 0.5 meter contour interval survey plan (forwarded by *Boreal Engineering Ltd.* on May 20, 2011) verifies that the intended as-built conditions as noted on *SRK's* drawings (G-1 through G-14) were not likely fulfilled at the time the survey was conducted. As such, given the degree of erosion that was noted, we recommend that a detailed topographical survey be conducted in such a way that the generated surface can be compared to the above noted 0.5 m contour intervals. From this, an isopach thickness map can be generated to assess the change in (cell cover thickness) conditions relative to the initial fall, 2010 survey. Areas of concern should be explored in the field based upon areas identified during evaluation of the isopach map.

In addition to survey of the cell limits, the ancillary areas should also be surveyed such that remedial options can be better assessed. As a minimum, this should include surveying all areas up-slope of the cell, peripheral areas adjacent to the cell (up to and including the haul road), areas down-slope of the cell (including the base of the Grum Tailings directly east of the energy dissipation pond) the Grum Creek drainage area, and the Moose Pond and slope failure areas.

The 0.5 meter contour interval plan has been attached in Appendix D.

3.10 Complete Storm Water Management Pond(s)

The discharge from the energy dissipation pond outflow into the storm water management pond flow along a very low gradient and/or else heavily armored slope to prevent soil erosion from occurring. Additional consideration will be required to evaluate the ponds side-slope stability given the additional surcharge loads that may be carried by truck traffic/equipment utilizing the nearby quarry access road. We recommend that the access road be shifted such that it lies immediately adjacent to the access road surface ditch to allow for a greater factor of safety in this regard.

3.11 Assess Grum Creek Area

The presence of local and regional permafrost should be identified prior to formulation of remedial options in this area.

3.12 Assess Moose Pond & Slope

We recommend that a slope stability analysis be conducted to assess the structural integrity of the pond side slopes, particularly considering the number of personnel that work near this area and the apparently degrading slope conditions. The slope should be actively monitored by specifically designated and qualified geotechnical personnel to increase worker safety in this region.

3.13 Review Cell Cap Performance

While a review of the cell caps performance was beyond our scope-of-work, we suggest that the impact of up-slope water (which may percolate downwards and promote recharge of the groundwater regime of the waste tailings materials below the existing liner) be assessed. If required, materials up-slope of the cell should be re-graded to promote positive drainage away from the cell liner area.

3.14 As-built Drawing Revisions

We recommend that the As-Built drawings be revised to better reflect the actual field conditions such that remedial options can be better assessed (particularly in the region of the toe berm).

3.15 Construction Monitoring & Inspection

We recommend that any remedial work be monitored and inspected by qualified geotechnical personnel to verify that the remedial work is conducted in accordance with the design intent.

3.16 Time is of Essence

Time is of essence.

While further evaluation would be required to assess all facets of cell and peripheral area rehabilitation, it is critical that remedial construction work be conducted this summer to minimize the amount of soil erosion particularly during precipitation events and next year's frechette. This may require performing remedial work prior to receiving remedial recommendations from the design team. Construction based upon an interim design should be considered, considering that it was not possible to eliminate the soil erosion potential at the time of our operations due to the scale of work required.

4.0 REPORT LIMITATIONS

This report is intended for the sole use of *Boreal Engineering Ltd.*

No portion of this report may be used as a separate entity; it is intended to be read in its entirety. Any use of this report by a third party, or any reliance or decisions based upon it, are the responsibilities of such third parties.

The comments contained within this report reflect our best judgment in light of the information available to *Chilkoot Geological Engineers Ltd*. at the time of our field services. They are based upon a compilation of field observations, field conditions and generally accepted engineering practices.

The observations made in our Daily Construction Summary's reflect the general trend of work but are by no means an absolute measure of the work conducted.

Our evaluation is limited in that most of our observations were obtained while providing erosion control measure oversight and this should be taken into account. Our observations and recommendations should be assessed from a regional stand-point considering that conditions will change over time.

It should be reiterated that while the Erosion Control Measures were successful in minimizing down-slope migration of surface waters, deleterious conditions still exist and as such degradation of the cell cap is ongoing until corrective action is completed and final cell equilibrium has been reached.

As with all remedial work projects, adjustment to the remedial (assessment, design and construction) methodologies may be required to accommodate actual/potential field and soil conditions.

Should any newly found geotechnical concerns become apparent, our firm should be notified immediately in order to confirm the suitability of our recommendations and conclusions, which may be altered or modified in writing by the undersigned.

Thank you for allowing our firm to provide you with the above noted services. We trust the information we have provided will suit your purposes at this time, however, if you should have any questions regarding the information provided herein, please feel free to contact the undersigned at your convenience.

Respectfully Submitted,

CHILKOOT GEOLOGICAL ENGINEERS LTD.

PROFESSIONAL
#1277
YUKON
TARES DHARA
~~TERRITORY~~
ENGINEER

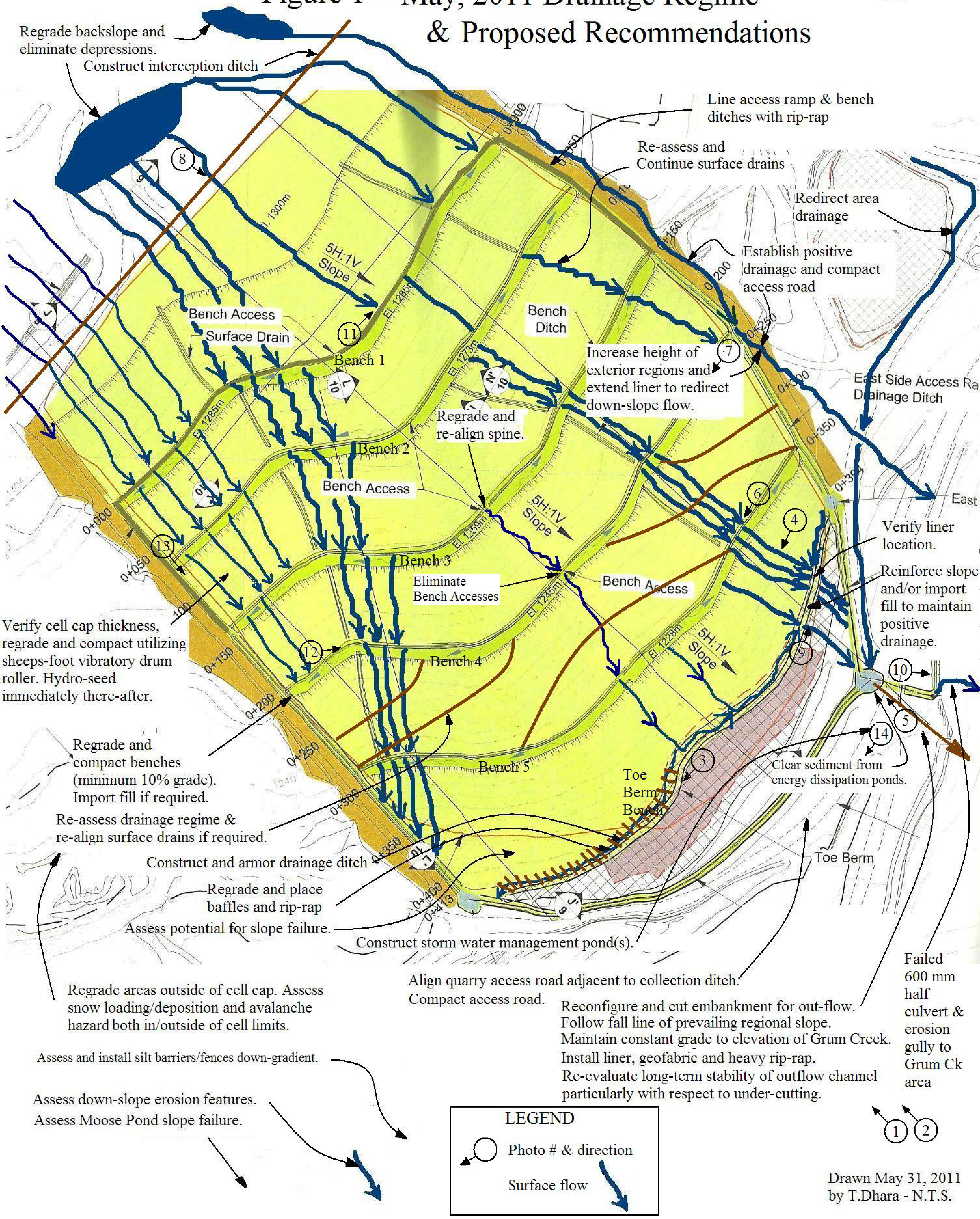
PERMIT TO PRACTICE
Signature
Date June 6, 2011
PERMIT NUMBER: PP025
Association of Professional Engineers of Yukon

Tares Dhara, P.Eng.
President

TD/td

CHILKOOT GEOLOGICAL ENGINEERS LTD.

Figure 1 - May, 2011 Drainage Regime & Proposed Recommendations



APPENDIX A

Field Notes

No. ....

Date. .... Page ....

No. FARO - EROSION CONTROL

Date. MAY 15, 2011 Page 1

TASK: SURVEY BENCH 1285 & 1273

CREW: 2 - (Gavin & Mc) WEATHER: GOOD - (-2 to +17 °C)

DAILY LOG

0830 - Mob to site

0920 - Gavin completed safety course. Issued 2 radios

0940 -

1010 - 1110 - Mark out stakes every 20 m. 1300 m Elev.
1+000 to 1+320

1110 - 1140 - Prep to mark out 2nd bench from the top.
2+000 placed on east side of bench.
Marking out 25 m intervals.

1140 - 1230 2+000 to 2+471 -

1230 - 1300 - Lunch at Truck

1300 - 1620 - Survey Bench 2 - 1273 then the to Bench 1 - 1285

1620 - 1700 - Walk down to bench 3 - Elev: 1259 m. -

1710 - Back at Security Gate house.

1730 - Back at YTG - Guest House

No. FARO GRUM - EROSION CONTROL
Date MAY 15, 2011 Page 2

PHOTOS

1 - 1030 - FW - Layout of control stakes - Elev. 1300 ~ 1+100
2 - 133? - FE - 2+075 Note drainage over crest of bench
3 - 133? - FW - 2+045 - Note surface drainage
4-5 1335 - FE - Top of Ditch / Top of 'Crest' Survey
6 - 1425 - FS 2+135 - Note flow going under ground
7 - 1610 - FW - 1+030 - Note slump / seepage.
8 - 1617 - FE - 2+080 - Water cresting at 2+050 & 2+075
9 - 1630 - FW - 3 ~ 350? Water crossing crest

GENERAL OBSERVATIONS

The top 2 benches have a considerable

No. FARO GRUM - EROSION CONTROL
Date MAY 15, 2011 Page 3

1.87 TBM - 2 - WEST

CREST		TOP OF DITCH
1.96	2+471	1.60
1.46	2+450	1.36
1.35	2+425	1.35
1.33	2+400	1.33
1.25	2+375	1.09
1.15	2+350	0.80
BS 2.25 / 2.35	2+325	1.86
2.12	2+300	1.70
1.85	2+275	1.51
1.48	2+250	1.41
1.64	2+225	1.41
1.68	2+200	1.78
2.05	2+175	1.81
2.16 / BS 1.15	2+150	2.18
1.16	2+125	1.29
1.29	2+100	1.19 ← ?
1.63	2+075	1.59
1.77	2+050	1.56
1.69	2+025	1.68
2.36	2+000	2.16

5 m

435

375

290

puddles

puddle

1.91

1+165 Seep 1h

1+135 WATER 1.24 2+135

030 ~7 m

4.95 BS ← → 0.09

~~BENCH 2 = ELEV. 1273~~

No. FARO GRUM - EROSION CONTROL
Date MAY 15, 2011 Page 4

→ 0,09
4,76 ← → 6,23
4,30 0,68 - TOP OF ROCK

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Date MAY 15, 2011 Page 5

	CREST	1+445	
	1,88	1+440	1,76
	1,74	1+420	1,46
	1,39	1+400	1,08
	1,28	1+380	1,02
360 ← W	1,18	1+360	1,04
	1,01	1+340	0,80
330 ← W	BS 1,06 / 2,55	1+320	2,38
	2,47	1+300	2,21
	2,37	1+280	2,20
260 ← W	2,24	1+260	2,00
	1,94	1+240	1,74
	1,57	1+220	1,51
210	1,75	1+200	1,69
	2,15	1+180	1,87
150 ← W	2,30	1+160	1,97
140 ← W	2,32	1+140	2,15
	2,42	1+120	2,21
	BS 2,50 / 0,76	1+100	0,52
	0,85	1+080	0,70
	0,88	1+060	0,67
050 ← S	0,95	1+040	0,80
	1,10	1+020	1,00
	1,31	1+010	1,16

puddles

puddles

BENCH 1 = ELEV. 1285

0,68 TOP OF ROCK

No. FARO - EROSION CONTROL
Date MAY 16, 2011 Page 6

TASKS: ASSESS LOWER BENCH
WEATHER: Good -6°
CREW: Chilloot (Tares & Gavin) Tim Moon (6 + Tim)

DAILY LOG

0745 - Waiting for General Store to open to p/u string to tie sandbags.
08?? - Gone up - No one is around - mob to site
0830 - At security gatehouse... no one is around. ... waiting to get radios.
0845 - Met - Doug Sweeney - New Mine Manager
John : DES

Bob - Regular Foreman for Tim Moon's crew
6 laborers & Tim Moon.
0900 - It would be better to wear hard hats but after discussion w/ Doug & John they indicated it's a policy that must be enforced.

0910 - Sitting in on meeting with Tim Moon's crew. I indicated they'll be best off to get rubber boots and sunglasses

No. FARO - EROSION CONTROL
Date MAY 16, 2011 Page 7

0925 - Job Task Hazard Assessment.
- W/ Tim Chester - DES Safety.

Wildlife - Bear Spray & Foot Work
Slips, Trips & Falls
Proper Technique
Repetitive Motion

Tim Moon's Crew
Bob - Foreman Travis
Tiernan Tyrel
Shane
Joe Smith & Two More

DAILY LOG

1020 - At base of Cell - Tim to get rubber boots
1040 - At Bench 1 & 2
1150 - Shovelling Bench 5. Immediately above the berm.

1050 - 1150 2+085 to 2+105 = 20 m
2+130 to 2+145 = 15 m
1+119 to 1+138 = 19 m
1 hr ≈ 54 m
1150 - 1230 5+000 to ~ 5+040 = 40 m

No. FARO GRUM - EROSION CONTROL
Date MAY 16, 2011 Page 8

PHOTOS

1 - 1050 - FSW Bench 2 - 2 crews
2 - 1050 - FW - Bench 1 - 1 crew
3-4 - 1110 - FNW - Shovelling ditch edge - Bench 2
5-6 - 1115 - FW -
7 - 1116 - FN -
8 - 1120 - FS - Heavy Erosion Toe
9 - 1120 FE
10 - 1124 FW - Sand bags blown out?
11 - 1126 - SW Corner
12 - 1132 - FN - 5 Bench filled ditch
13 - 1159 FW - 5 Bench - Hand shovelling ditch.

No. FARO GRUM - EROSION CONTROL
Date MAY 16, 2011 Page 9

GENERAL OBSERVATIONS

- Surface drain is filling bench 1 ditch w/ sediment at 1+075 to 1+086
- Hand shovelling at ~ 40 m/hr so we can maybe excavate 1 ditch per day, - or else ~ 400 m/day?
- The isolated zones on bench 1 & 2 are not working where the guys shovelled, so no point attacking the bad spots.

DAILY LOG

1230 - Guys & Gavin going for lunch til 1300
I went to check out Bench 1 & 2 work done.
All 6 & Gavin shovelling bench 5, to silted portion of ditch ~ 5+086.

1430 - 4 guys on Bench 4 +000 to 040.
1500 - All 6 guys + Gavin + 1 sandbagging silted portion of ditch. Trying to eliminate flow down to toe berm.
1730 - Bob back at truck.
1805 - Tim Moon Construction offsite. 1810 - Gavin & 1 offsite
1840 - offsite -

No. FARO GRUM-EROSION CONTROL
Date MAY 16, 2011 Page 10

DISCUSSIONS

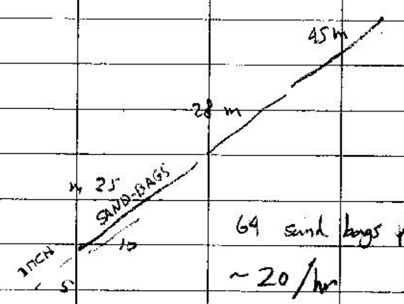
1700 - w/ Karen - Re: Equipment Supply

I'm supposed to talk to Jon DES re: supply of equipment -

1 D-9, 395c and rock truck will be available to get back into the rip-rap pit.

I indicated there's not much in the way of a procedure but bail rock over the embankment near the half culvert.

Will take a lot of rip-rap and no guarantees on anything. Water is flowing down the east access road and part is flowing into the energy dissipation pond, along with gravel from the berm where massive erosion is occuring



64 sand bags placed
~ 20/hr

No. FARO GRUM - EROSION CONTROL
Date MAY 16, 2011 Page 11

DISCUSSIONS

1830 - w/ Jon

I indicated that our efforts helped stem flow in the eastern gully but the western gully is getting worse as most of water is coming from the area west of the 'break point' on the bench .. and then flowing to the east. Jon indicated that he's got Tim Moon contracted for a week .. gate to gate. He'll get the 9 to go open the road into the rip-rap pit, 395 to load Tim Moon's rock truck and stockpile 5-6 loads, then leap frog the hoe to the site to place. I indicated that the work we did today was helpful in stopping flow to the east the berm gully but that our efforts may be futile. Moose pond should be looked at.

1900 w/ Karen - I called her

She will try and get a mini-kubota excavator thru Jon → Moon.

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Date MAY 17, 2011 Page 12

WEATHER: CLEAR → P.C. → light Sprinkle of rain.

TASKS: TIMMON - Shovelled ~ 125 m of bench 3 & 4
30 m of bench 2
- Sand bagged ~ 30 bags west of existing bags on B5
- Surveyed Toe Berm; Assess Top of Cap

Olga Kasarewicz

0745
T - I indicated we're filling sand bags w/ cap.
O - Isn't that taking away from the cap thickness
T - I indicated that it doesn't compare to the impact of the other processes out there

0805 - Head to site from guard house

0830 - onsite w/ T. Moon & Crow & Olga
Tim walked to see bench 5 bags - ~~with~~ excavator to be here ~ 10 am
0850 - 345 heading to pit to get rip-rap
0915 - Someone on radio (hoe operator)
1045 - Excavator diverting east side road to the energy dissipation pond at the culvert.
0900 - 0945 - I completed staking of toe berm.

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Date MAY 17, 2011 Page 13

DISCUSSIONS

0850 w/ Olga - she confirmed that the liner is draped over the top of the top berm.
- She also indicated that she thought there was a ditch on the toe berm but that it has likely filled w/ sediment.
- I indicated I saw no remnants of an infilled ditch.

MEETING @ OUT-FLOW

1015 - Re: Rip-Rap Placement (Bill, Jon & Ray) DES - Olga floating around
Strategy we agreed on is to divert east access road run-off into pond. Pad over culvert to run the rock truck. Stockpile of rip-rap on east side.
- Olga concurred that the 600 mm pipe was undersized
- I indicated we will decommission what's left of the pipe and rip-rapped trench

1040 - W/ Olga - She asked if she could get the survey of the toe berm.
I indicated I'd pass my info up the line.

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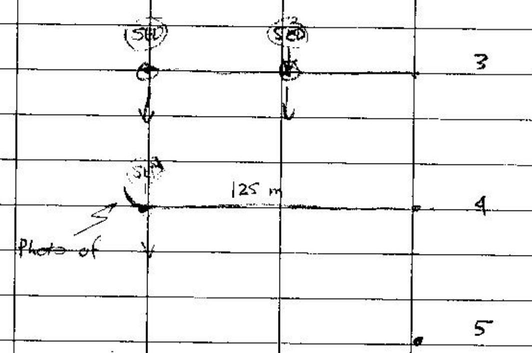
Date MAY 17, 2011 Page 14

1100-1140 - Surveyed the berm w/ Gavin
1215 - Off site - Guys going for lunch, I'm looking
1230 at upper bench conditions - Lots of overflow
125 m this morning bench 4

The Moon (867) 332-1530 call



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Date MAY 17, 2011 Page 15

			CREST OF BERM 0,02	2 cm TBM TOE EAST
-0,20	T+000	0,08		
0,85	T+025	0,16		
2,22	T+050	2,45	- 2,95 Top of east fissure	
3,08	T+075	3,15	- 3,31 Top of west fissure	
3,04	T+100	3,28		
1,95	T+125	3,00	1,95 85	
1047 Photo → 1,73	T+150	1,66		
1,55	T+175	1,48		
1,38	T+200	1,42		
1,30	T+225	1,28		
← 8 m →				
2,05	T+250	1,97	← Photo 1054 hrs	
0,39	T+275	3,02	0,28	8 m wide shots
1,35	T+300	1,19		
2,88	T+325	2,76		
4,21	T+350	4,15		
1,45	T+375	1,37	0,36	
2,17	T+400	2,37		
4,19	T+414	4,44	1,70	
		3,59	Ditch ℄	
		2,76	Top of Rip-Rap outside ditch edge.	
		3,52	Access Road	

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Date MAY 17, 2011 Page 16

1325 Dustin at Guard house

1325 · Olga back onsite after.

Ray, Bil, Jon were instructed by Jon Bronson to try and see what they can do with the excavator. However they are only using [illegible] and do not have any rip-rap as they can't get a rock truck into the pit.

DISCUSSIONS

1325 ▸ Olga asked if we were going to clean out the ponds. I indicated that I suppose that's something we all have to look at.

▸ She asked how much longer we are here.

▸ I indicated probably a week. She said she heard 3-4 days.

▸ She asked me what's the plan for the toe berms wash out areas, I indicated there's no plan, that's what she's here for. For the time being we are simply trying to minimize erosion.

▸ She indicated she was going to head up and look at the top part of the cell.

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1325 · w/ Ray, - We concurred that it's unusual that there was no grading plan.

1325 ▸ Olga asked me if the erosion gullies on the toe berm were present during my initial visit.

▸ I indicated they were but were no where near as prominent.

▸ Olga seemed to think that they were a result of the steeper slope aspect on the east side.

1500 - w/ Dustin. We tour bench 5, toe berm failures, moose pond.

In general I express my concern re: cell cap thickness given the amount of erosion.

I indicated that Olga clarified that the liner ends at the top of the toe berm but then why can't we see it at the erosion failures on the toe berm. - I explained they had 3 options for the half culvert - Like the trench (not that feasible), like the fissure from the toe slope up - or long term cut out from pond to Grum Ck (200,000 m^3?!) -

2330 - w/ Dustin - He wants me to look at the seeps at Moose Pond and potentially assist in design

DAILY LOG

1430 - Dustin onsite -

1640 - Dustin offsite - I called Erik. - see discussion

1710 - T. Moon crew preparing to head back to Faro

 off road.

1715 - Gavin & I offsite.

May 16 ? 0730 - 1830 = 10,0

May 17 ? 0730 - 1730 = 9,5

May 18 - 0730 - 1830 = 10,5

17

DISCUSS

1746 - w/ Olga at Good Hope.

- She indicated that she just went to the half culvert and only 1/3 of the water is getting into it.
- I said it's like that every day since we've been here
- She said it's going to need a bigger culvert
1708 - w/ Olga
She asked if there was still going to be a conference call. I indicated that we're aiming for tmr. around 11 as Moose Pond is going to overflow.

2300 - Cont. - of the slope at-flow - I indicated sure but we have not yet evaluated the ramifications of the erosion and the distribution of the soil types. There may be permafrost which now due to loss of organic cover will cause erosion.

1600 - w/ Dustin - Moose Pond overflow is likely - water rising at 15-20 cm/hr. - Dustin was looking at constructing a dam to have a second pond area.

GENERAL OBSERVATIONS (MAY 18)

There is a lot of snow & ice beyond the top of the slope that is flowing onto the cap. Cut off today by Tim Moon's Crew. - Really gained the upper hand yesterday by establishing drainage on bench 5 east side which directed the vast majority of the flow away from the toe berm. This finally allowed us to go to the headwaters and turn off the tap by re-establishing flow in the upper (bench 1) ditch. Neilson on the mini-excavator was employed today to excavate sediment

No.

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No. FARO GRUM EROSION CONTROL

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LINER SHOTS

0.83 BM TOE EAST

T+000	2.33
T+025	4.18 1.73
T+050	3.55
T+075	3.48
T+100	4.12 4.57 ← In west crevasse
T+125	2.60
T+150	2.49
T+175	2.28
T+200	1.93
T+225	1.85
T+250	2.60

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WEATHER: CLEAR +1° to +20°

BOBCAT - EAST SIDE OF BENCH 5
WEST SIDE OF BENCH 2

0700 - Depart Faro - p/u radios / bear spray.
0750 - on cap - T, Moon past or going back to the guard house.
Crew jump starting Argo - (delivered last night)
Rock truck (Volvo) delivered last night - w/ lowboy.
Moon crew informed not to operate Argo on cap.
0815 - Dustin at cap - I jumped in w/ him to assess moose pond.
Gavin heading up to shovel w/ Moon crew.
Dustin indicated he just passed the mini kubota.
0830 - Assess Moose Pond w/ Dustin
Crew cutting bench 1 ditch.

0900 Assess out-flow w/ Dustin - Olga present
There is no water flowing in the half pipe.
All water is flowing thru the erosion gully / chasm
The material is phyllite and is essentially
self armouring. - The slope where the water

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DISCUSSION

0935 - Assess backslope
We decide to 'simply' re-establish the
top ditch. with the laborers hand shovelling
Concerned about punching out the cap w/ a cat.
The amount of snow on the backslope is negligable
compared to what has melted already.
They can cut a ditch around the top end
of cap once the material stabilizes.
0900 - Conduit is running is comprised of over sized
rock boulders 300 - 500 mm

DAILY LOG

1015 - Bobcat tracked mini-excavator onsite at cap.
1015 - Bobcat jump started the argo and then the crew
went upslope to the 1st bench to intercept backslope water
1030 Bobcat is going to bench 5 to excavate out
ditch sediment. - Essentially taking out 1 bucket
scoop progressively from east to west.
1400 Bobcat reach bench access - East side of bench 5 exc.

Ian (604) 990-9866

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1205 - w/ Dustin & Olga -
Dustin is concerned that there is not much [illegible]
in the eastern ditch at bench 5 to bench 4
We discussed that the water is either within
the rip-rap on top of the liner or there
are holes in it because according to Olga
it was one of the last things done.
(I thought the toe berm was the last thing ??)
? - w/ Dustin - Do Even if we compromise the liner at
the toe berm it's impact will be negligable.

1420 - Staking bench 3 w/ Gavin
1530 - Surveying bench 4 w/ Gavin - Olga shoveling bench 4
1615 - Olga off bench 4 - Gave up shovelling
1600 - Guys moved down to bench 3
1700 - Guys rip-rapping bench 1/3 ditchs east side
1815 - Moss Crew driving back to guard house
1835 Leaving site
1910 Back in Faro

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1.94 , 8M EAST

DITCH		CREST	
1.43	4+000	1.54	
1.15	4+025	1.61	
1.02	4+050	1.47	
0.93	4+075	1.27	
1.73	4+100	1.15 / 2.08	
1.56	4+125	1.98	
1.56	4+150	1.79	
1.23	4+175	1.45	4+185
1.07	4+200	Photo 1.55	
1.32	4+225	1.57	
1.30	4+250	1.59	Gavin
1.10	4+275	1.52 / 1.29	
1.02	4+300	1.10	
1.10	4+325	1.98	
1.10	4+350	1.34	
1.30	4+375	1.62	
1.09	4+400	1.88 / 1.29	
1.17	4+425	1.47	
1.47	4+450	1.64	
1.68	4+475	1.93	
1.98	4+485	2.26	

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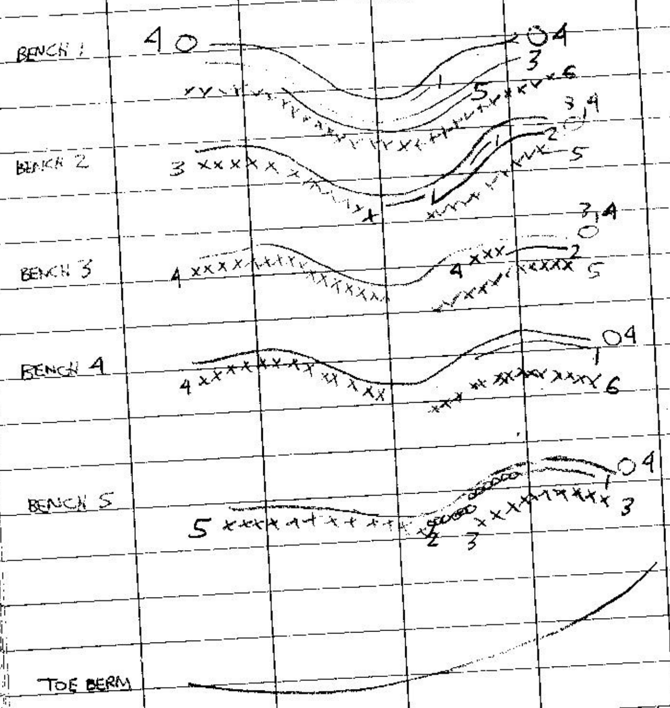

1 - May 16 2 = May 17 3 = May 18 4 = May 19

0 - Rip-Rap - hand placement at ditch confluences

xxx - Ditch Excavation w/ mini-excavator

⌐ - Hand clearing

oooo - Sand Bagging

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CREST 4.69 / 0.15 TBM 4.71 / 0.26

4.42 / 0.40

3.55 BM 4 EAST

1.62	3+000	1.94	
1.38	3+025	1.55 / 1.71	
1.49	3+050	1.90	2.07
1.59	3+075	1.78	2.09
1.46	3+100	1.56	1.76
	4.5m	3m	
1.20	3+125	1.35	1.56
1.14	3+150	1.31	
1.05	3+175	0.98 / 1.86	
1.69	3+200	2.08	
1.63	3+225	2.06	
1.35	3+250	1.80	
1.38	3+275	1.57	
1.63	3+300	1.79	
1.86	3+325	2.22	
2.00	3+350	2.25 / 1.28	
0.85	3+375	1.23	
0.96	3+400	1.30	
1.31	3+425	1.52	
1.54	3+450	1.77	
1.75	3+475	2.02	
1.83	3+487	2.26	

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~1500 W/ Olga - on Bench while she's shoveling -
"If I need to get a copy of your survey
data who do I ask... Guess I should
go thru proper channels and ask Dustin.
I indicated I will be submitting my data to
Bernal so yes, please go thru Dustin/YTG
She asked how much longer we'll need the
bobcat and suggested friday??
I indicated we'll need it until we're done with
cleaning out sediment from the ditches
W/ Olga: ~1 hr before above conversation
She asked what the mini-excavator
was doing. (???)
I indicated cleaning sediment from the
ditches so that they have some capacity.

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No. FARO GRUM - EROSION CONTROL
Date MAY 19, 2011 Page 30

WEATHER: OVERCAST, VERY WINDY, ~~FOG~~ Showers.

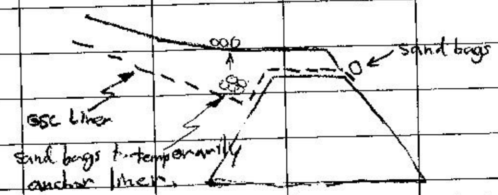
Excavate, 2 bench west side

3 bench " "

T, Moss - riprap ditch transitions

DISCUSSION

1010 - W/Olga : Re: Liner at toe berm & outflow pipe



Olga indicated that they first wedged the liner against the toe berm which was already constructed to allow for the run-off collection ditch

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Date MAY 19, 2011 Page 31

DISCUSSIONS

1010 - continued -

O - east side of liner might be deep as Polly built this area up.

O - drainage outside the cap area impacted the 600 mm pipe?

O - The original design had the run-off collection ditch at the top of the toe berm.

- I suggested that there is the possibility that a 0.5% (or shallow gradient) be cut and carry toe berm drainage all the way to the west ... alternately if the liner is deep on the east side (although it appears shallow based upon where it can be seen daylighting around station T+035 ~) there is a possibility that drainage can be carried to east from the low spots of the erosion features.

- I gave her a heads up that I will be advising my OE and Boreal (and ultimately YTG) the 600 mm culvert is no longer functional and that the design team should provide direction as aspect of the design no longer exists ... understanding that we are all aware that the pipe was undersized.

- Olga agreed indicating that it was the size of the one in the Van Gorda pit 1500 mm that it cont... probably would have been all right, although asking the water to do a 90° turn was probably too much. She indicated they were taking advantage of the existing access road for ease of construction.

DAILY LOG

0700 - Depart FARO
0720 - @ gate T Moon 2 Crew just ahead of us
0750 @ site cap
0805 - Crew hand placing rip rap - East side ditches at confluence with the lateral ditches
Nelson cutting bench 3 west
0900 T. Moon offsite
0930 Gavin and I finished the survey of the potential liner.
0830 - Gavin & I surveyed liner daylight on toe berm
0930 - 1020 - Gavin staked bench 5 1010 - Olga at road
1130 - Nelson done emptying ditch on west side of bench 3
1030 - Olga off to see Moose Pond.
1140 - Olga stopped to talk - Heading to town to p/u a change
1315 Environmental Gal onsite - heading to outflow

DISCUSSION

cont... Olga asked when I would be submitting my data to YTG - I indicated it would likely be around the 30th if all goes well.

- She indicated that as the toe berm was already constructed it was difficult to do anything to change its grade (in for some reason)... as they were running out of time due to winter... (...huh??)
- She asked what the plan was today.

I indicated guys placing rip-rap at ditch transitions. Excavator cutting out ditches on west side today, east side tomorrow... and perhaps a day or two next week. Guys probably done tomorrow.

- We both noted that today is the first day where you can see the difference in material types between the benches and the till cover as the cell is drying out.
- Olga commented that we did a good job in getting the ditches to work.

1140 - W/ Olga - Re: construction Oversight and weather.

As we were talking about the weather she indicated that they were lucky with the weather as the project was on the go until Nov. 3~

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DISCUSSIONS

1140 - cont... I asked if she knew anything about the upper two benches as there is considerable slumping of the crests ~ 300 mm resulting in a bench close to 7m across... not 10m

- She indicated that she was only present for the 1300 m cap area and then allowed and someone else was here.
- I indicated Kam said that snow / ice was buried in these crest areas.
- Olga indicated that construction traffic was concentrated on the lower two benches, so likely less compaction on the upper benches.

1415 - Survey Bench 5 - Neilson bench 4 West since after Guys closed ... with the fifth (Bench 1 East) lunch rip-rap.

1500 - Run level to the ... east side Benchmarks

1600 - Bench 1 assessment - 1640 - Talked to Jay & Olga.

1700 - Bench 5 assessment - 1730

1530 No sign of the crew ... ?? → 1730

1800 - offsite -

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3.37 | 0.26 ← → 4.07 | 0.09 ← → 4.54 BM TOE EAST

DITCH		CREST	
	ROCK	2.28	4.37 ROCK
1.57	5+000 (3 m)	1.66	
1.41	5+025	1.58	
1.34	5+050	1.55	0.56 / 4.72
1.08	5+075	1.32	
1.79	5+100	1.49 (2.15)	
1.75	5+125	1.98	0.61 / 4.41
1.40	5+150	1.50	
1.25	5+175	1.45	
← 7m →			0.80 / 4.53
1.17	5+200	1.37	
1.23	5+225	1.44	
0.89	5+250	1.37	
1.02	5+275	1.16 (1.06)	0.38 / 4.24
1.17	5+300	1.22	0.31 ?
1.47	5+325	1.61	3.11 BM 4 EAST
1.44	5+350	1.48	0.66
1.42	5+375	1.54	4.22
1.10	5+400	1.30 (1.32)	0.24
1.32	5+425	1.46	
1.47	5+450	1.68	4.50
1.41	5+475	1.90	

No. FARO GRUM - EROSION CONTROL
Date MAY 19, 2011 Page 36

0.R
4.10
0.43 3+070 STK
5.00 3+000 STK
0.26
4.82
0.19
4.33
0.46
4.67
0.13
4.51
0.26
4.15
0.36
2.08
1.04 ROCK BY BENCH 1

No. FARO GRUM - EROSION CONTROL
Date MAY 19, 2011 Page 37

DRY OF SL 1+380 (S)
OF SL 1+360
OF SL 1+340
HEAVY OF SL 1+330
OF SL 1+320 (S)
SB OF SL 1+300
OF SL 1+300 (S)
WET OF SL 1+280 (S) WET
WET OF SL 1+260
OF SL 1+240
WET SL 1+230 WET
1+225 BENCH ACROSS EA DRY
DRY 1+200
WET OF SL 1+170 (S)
1+150 (S)
OF SL 1+140
OF SL 1+120
OF SL 1+110
OF SL 1+100
WET SL 1+080 (S) OF SL 1+430 (S)
SB SL 1+060 OF SL 1+420 (S)
DRY SL 1+040 OF SL 1+410 (S)
SL 1+025 OF SL 1+400 (S)
SL
SL 1+010
SL 1+000 OF SL 1+380

No. FARO GRUM - EROSION CONTROL
Date MAY 19, 2011 Page 38

HEAVY RILL	LIGHT RILL	SLUMP	OVERFLOW	SUBSIDENCE	STATION	SEDIMENT	LIGHT RILL	HEAVY RILL	SURF DRAIN	BENCH ACCESS
✓					5+475					
✓								✓		
✓								✓		
✓										
✓					5+425			✓		
✓			✓		5+410		✓			
	✓		✓		5+40.		✓			
					5+380		✓			
					5+375		DRY			
			R EXT		5+360	✓	✓			
					5+350	✓	✓			
	✓		✓		5+340					
	✓			✓	5+325	✓	✓			
	✓				5+310		✓ DRY			
	DRY				5+275		DRY			
	✓				5+270	✓	✓			
DRY					5+255		✓			
			R EXT		5+240		DRY			✓
	✓		✓		5+215	✓		✓		
					5+200	✓	✓			
					5+190	✓	✓			
	✓		✓		5+175		DRY			
DRY					5+150		DRY			
✓			✓		5+135		|			
✓					5+125					
✓			✓		5+110		DRY			
✓			✓		5+100	✓		✓		
✓			✓		5+075	✓		✓		
	✓		✓		5+065	✓				
	✓		✓		5+040	✓		✓		
		✓	✓		5+030		✓			
					5+010			✓		
					5+000		✓			

No. FARO GRUM - EROSION CONTROL
Date MAY 19, 2011 Page 39

1730 ~ Crew off day -

1820 - At Gate w/ Gavin. - Neil left just before us.

1800 - Jay & Olga driving down to look at Moose Pond.

DISCUSSIONS

1715 w/ Olga & Jay - Re: Ditch Drainage.

- Olga and Jay were walking by on bench 5.
- Olga indicated that the ditch is not draining.
- I indicated that none of the benches have been draining.
- She asked when the excavator was going to go to it and what has be done.
- I indicated it's finished the east side of bench 5 and west side of bench 2, 3 & 4. - We are working from the top down such that the ditches don't refill with sediment.

1640 - w/ Olga & Jay & Gavin - Re: Ditch Armor.

We were discussing sediment loads as Jay is doing some monitoring and I asked Olga to clarify the ditch armoring. Olga indicated that the ditches

No. FARO GRUM - EROSION CONTROL
Date MAY 19, 2011 Page 40

were simply cut from the waste rock tailings.
So I indicated that sooner or later they will self armor once the fines wash out.

No. FARO GRUM - EROSION CONTROL
Date May 20, 2011 Page 41

WEATHER: WINDY AS USUAL, SUNNY 20°

DAILY LOG

0700 - Leave Faro
0730 - @ Grum. Tilmoon onsite with crew of 6. Neil on site.
0820 - T. Moon leaving site [illegible] for grid here.
Neilson to cut out bench 5 - west side then bench 2 - east side.
Tilmoon crew of 6 hand clearing the top bench as the drainage is marginal.

Conference call number 1-866-792-1316 ID 8412797
Karen texted me last night and wanted me to sit in.
There was a number of people - DES & YTG involved.
In general Karen asked what my assessment of waste pond slope was. I indicated I didn't have sufficient data to make such an assessment but from looking at it, it appears that much of the movement has occurred over a number of years as some areas have revegetated. As someone from DES pointed out the water level is lower that the peak flow which occurred the other day.

DISCUSSIONS

contu and is at a level where the slope aspect is not that steep.

I indicated that I concurred however the flow noted is difficult to compare with preexisting conditions as the area has not be characterized to our knowledge.

- Someone commented on that the Hill cap was tested prior to use so it should be safe w.r.t. run-off / contaminants.
- Someone else corrected this person, by indicating that the existing cap was in fact never tested as the material source was changed at the last moment.
- They had a discussion regarding where the source of all the sediment, I suggested that some of it may be originating from outside the cell.

1040 - W/ Christian & Matt C - Water Resource

Dan at Moore Pond - We discussed the sediment load that came down at a one in flood event however a heavy rain event

may result in similar discharge. Future compaction with a sheeps foot (which I will recommend) will aid in reducing the discharge.

- I indicated that I'm setting up local control w/ survey stakes at 25 m intervals to better assess the failure conditions.

1000 - 1100 - Van Gonda to assess erosion of cap - Grum

1110 - 1220 - Moore Pond to set control - 1120 ~ Neil on bench 2 east.

1315 - Completed control - logging slope failure

Finished S W

1430 ~ Moon crew offsite.

1500 - Neil initiating B3 east ~ Complete B2 E and B5 W portion

East side of bench 2 ditch was excavated thru the center of the bench!

1810 - Breakdown survey equipment - drive back to Faro

~1930 - Arrive Faro.

No. FARO GRUM - EROSION CONTROL
Date MAY 20, 2011 Page 44

1810 -
1830 -

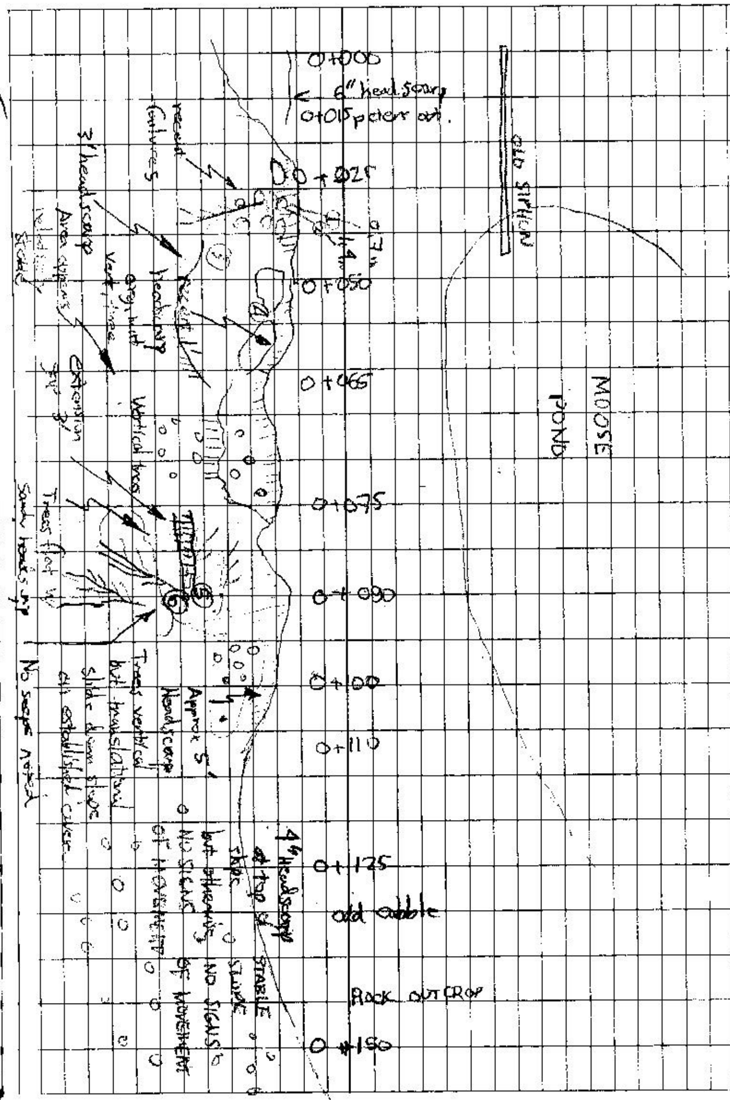
MOOSE POND SLOPE

SAMPLES

1	0+035	0.7 m	
2	0+035	1.4 m	
3	0+035		
4	0+065		
5	0+085		Sandy Gravel
6	0+085		Gravelly Sand - Seep area

Seep @ 09
Organic mat establish

No. FARO GRUM - EROSION CONTROL
Date MAY 20, 2011 Page 45



No. FARO GRUM-EROSION CONTROL
Date MAY 20, 2011 Page 46

DISCUSSIONS

1600 - I met Christian at the base of the cell and we discussed the feasibility of establishing storm water

No. FARO GRUM- EROSION CONTROL
Date MAY 20, 2011 Page 47

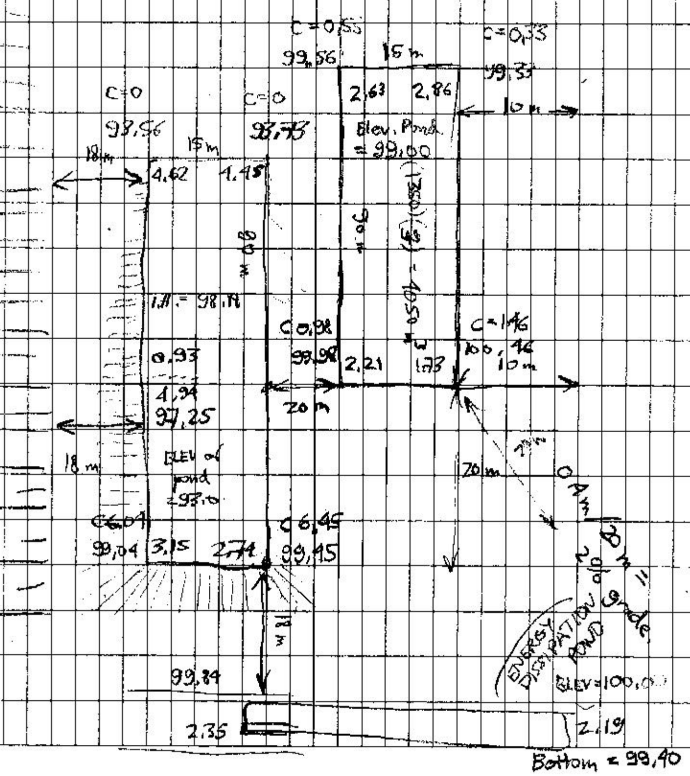
STORM WATER MANAGEMENT DESIGN

1600-1810 hrs

VOLUME of EACH POND (4050) - (945) = 3105

Capacity - Berm = 3000 m volume

210 linear meters
= 945 m³ in sideslope volume



No. FARO GRVM - EROSION CONTROL
Date MAY 21, 2011 Page 49

WEATHER: PARTLY CLOUDY

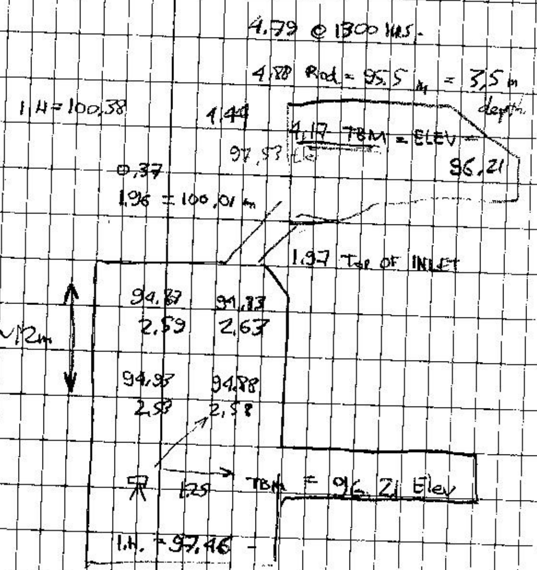
DAILY LOG

0730 - Depart Faro
0750 At Gate - p/u radios / bear spray
0820 At cell - Chris, Christian, B.J., Jon
L Told them the approximate game plan -
I indicated that caution should be exercised around
0920 Back at guard house for conf. call - Karen, Deb -
SRK
Cam, They were thinking 21 side slopes
1020 - Back at cap constructing ponds.
Doug, Christian onsite (See discussions)
1105 - Laying out Pond 1 collars and survey
... base -
1300 - Survey excavation base ~ 12m excavated
1500 - Called Erik (see Discussions)
1530 - Left message for Karen - We're demobbing.
~1700 D9 & 345 completed operations
1800 - In Faro -

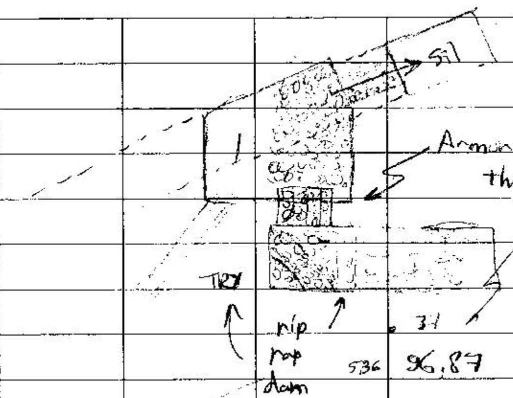
No. FARO GRVM - EROSION CONTROL
Date MAY 21, 2011 Page 49

Aim for 3.5 m - base elevation of 95.5 but got 94.9 ~

SURVEY OF POND 1



No. FARO GRUM - EROSIONAL CONTROL
Date MAY 21, 2011 Page 50



Armor the whole thing w/ fabric so hold 96.2 pond elevation

.37
536 96.87

26 3.07 - 99.16

Potentially Poor Ground Conditions at current elevation - Saturated at the curve of the existing berm

6 2.04 - 100.19 3.21 99.02
6
20 20
2.55

I.H. = 102.23 (Instrument Height)

2.23 Top of Culvert

No. FARO GRUM EROSION CONTROL
Date MAY 21, 2011 Page 51

0830 - cont. in the west end of the pond so as not to disturb the downslope edge/retaining barrier

GENERAL OBSERVATIONS

The D-9 stripped the top layer ~ 6"-1' of saturated surficial material immediately north of the pond in order to prepare the area for the excavation spoils which were spread in order to raise the road as there was a low spot immediately northwest of the pond. - See photos from rip-rap haul... that didn't occur

No. FARO GRUM - EROSION CONTROL
Date MAY 21, 2011 Page 52

DISCUSSIONS

1801 - W/ Karen - I called Karen to let her know
we are demobbing as there are no DES
personnel available to operate the
equipment (long weekend and both operators
Jon & Bill had to be called in to do
the pond excavation). - Karen had thought
that they were going to work through
the weekend and was concerned about
potential storm events. - I indicated
that the forecast was calling for fair
weather, and that the snow pack on the
cell had melted a few days ago. -
A bit of snow remains above the cell
(however I feel this will be gone in ~2 days)
She will let me know if we are still req'd
onsite within the next hour otherwise
we are free to demob. I indicated
that there are seeps on the north
face of the pond excavation however
I feel that they will subside and that
the water will likely percolate.

No. FARO GRUM - EROSION CONTROL
Date MAY 21, 2011 Page 53

DISCUSSIONS

0920 - W/ Christian, Jay & Doug & Gavin & Me
The conference call started ~ 0900 from the
schedule but Gavin and I were late as
DES was moving material with the D9 & 345
and excavating Pond 1. I indicated that
I was concerned with the pace of work
as there really is no design on the pond
layout. The stakes I layed out are heat line
and don't account for the difference in elevation
between the points - The east side is ~1.5m
higher than the west side so there will be
some additional side slope expansion req'd
in order to maintain 1:1 side slopes. -
Erik had indicated that they were envisioning
2:1 side slopes (rise/run). I indicated that
it is a fairly large undertaking given the estimated
volume of 12-15 k m³ of material envisioned for exc.
Estimation is ~10-14 days of work. - Concerned
with bulldozer usage - would like to see excavator
with 2 rock trucks and then a D-5 and
packer on receiving end - I suggest that

DISCUSSIONS

1020 - w/ Doug & Christian

Christian was bringing Doug up to speed on what transpired at the project. We discussed that there may be a material issue as they have picked up high readings in zinc by Moose Pond but its source is unknown. While the outflow is now running thru Mine Tailings where once the 600 mm half culvert carried the flow there remains the possibility that the material utilized as the cap may be the source. Further testing is ongoing to verify the cap suitability. I suggested that although further study would be req'd, a possible solution (if the cap is ~~too~~ high in contaminants) is to cap the cap with ~ 1' of approved material. Once vegetation is established the majority of the water will be runoff. The water percolating thru will of course be of concern however it may be a possible solution - although less than

DISCUSSIONS

ideal considering the whole purpose was to cap the tailings ... not the cap.

- I explained to Doug that in the area of the non-functional outflow (600 mm half culvert) the water that is propagating down the slope will ultimately progress/erode to the west until equilibrium is establish down the slope fall line.
- I explained to Doug that none of the benches are graded in accordance with the design intent to prevent down slope migration of surface water but instead promote it.
- I explained to Doug that the Toe Berm bench was originally intended to carry the peripheral ditch but the ditch location was changed to its current location. There is a ~3 m 'depression' which caused the water to flow over the front of the toe berm. Oddly the low point of the toe berm bench does not line up with the riprap which is seen to progress up the slope at its current location east of the eastern erosion feature.

spoils could be utilized for creating a secondary containment 'dam' if properly compacted just in case additional capacity is req'd.

W/ BNK 1800 Res Capacity - They figure 30 mm peak event equates to 8000 m^3 so holding 4000 m^3 would be good and deal with the rest. They may consider a second pond.

2300-0830 = 9.5 Conceptual Design.

No. FARO MINE CLOSURE - GRUM
Date MAY 22, 2011 Page 58

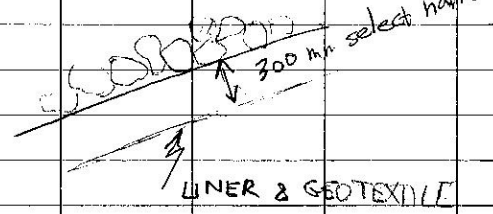
CONCEPTUAL STORM POND

APPROXIMATE
ESTIMATED CAPACITY (@ 1:1 SLOPE)

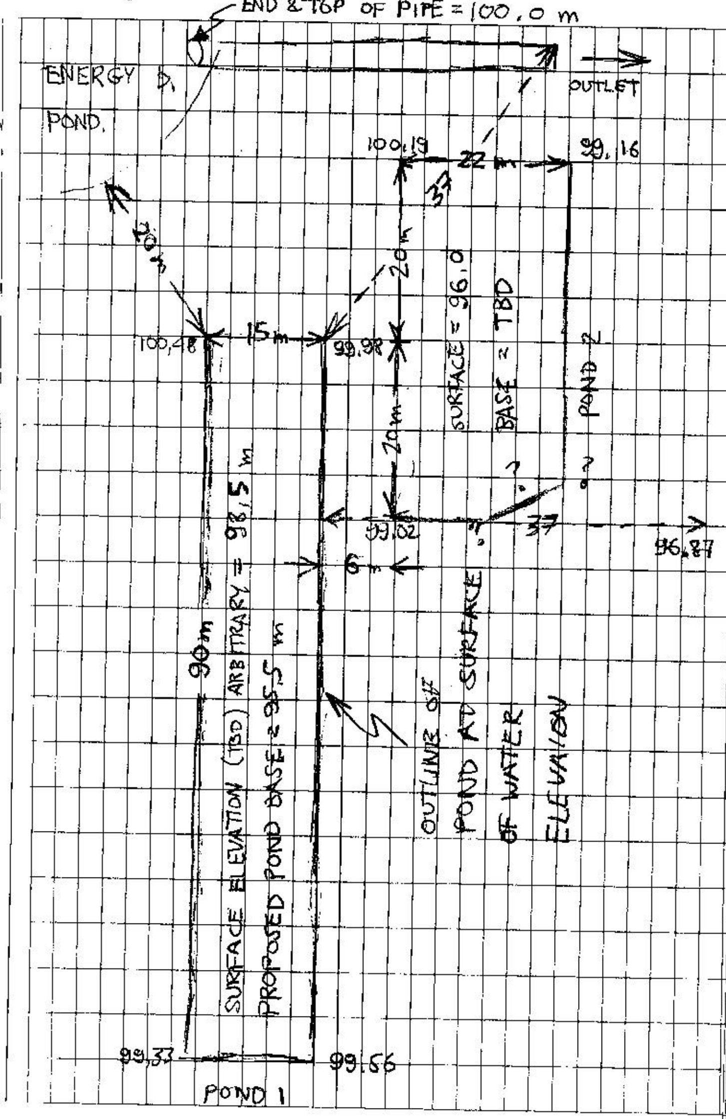
$$POND\ 1 = (15)(90)(3) = 4050$$
$$\text{minus} \left(\frac{3 \times 3}{2}\right)(210) = 945$$
$$\underline{\underline{3105}}$$

$$POND\ 2 = (22)(40)(3) = 2640$$
$$\text{minus} \left(\frac{3 \times 3}{2}\right)(124) = 558$$
$$= 2640 + 558$$
$$\underline{\underline{2085}}$$

ASSUME 1:2 SIDESLOPES TYPICAL



No. FARO MINE CLOSURE - GRUM
Date MAY 22.2011 Page 59



APPENDIX B

Daily Construction Summary

CHILKOOT GEOLOGICAL ENGINEERS LTD.

Mile 929.4 Old Alaska Highway, Whitehorse, Yukon
(867) 667-6671 ph. chilkoot@northwestel.net (867) 667-6673 fax

DAILY CONSTRUCTION SUMMARY

Client : Boreal Engineering Ltd.
Project : Faro Mine Complex Closure
Task : Implement Erosion Control Measures

Date : May 15, 2011
Location : Grum Sulphide Cell Cover
Work Areas : Please See Below

Equipment		0430	0700	0730	0800	0830	0900	0930	1000	1030	1100	1130	1200	1230	1300	1330	1400	1430	1500	1530	1600	1630	1700	1730	1800	1830	1900	Work Hours	Miscellaneous	Travel	Downtime	Total Hours
CHILKOOT	Tares Dhara, P.Eng.					t	n	t	aTB	s1/2	a3/4	a5	aTB	lunch	s1/2	s1/2	s1/2	s1/2	s1/2	s1/2	s1/2	a	t					7.0	0.0	1.5	0.0	8.5
BOREAL	G.Nyland					t	n	t	aTB	s1/2	s1/2	s1/2	s1/2	lunch	s1/2	s1/2	s1/2	s1/2	s1/2	s1/2	s1/2	a	t					7.0	0.0	1.5	0.0	8.5
T.Moon Construction	T.Moon																															
	Robert (Foreman)																															
	Laborer 1 & 2																															
	Laborers 3,4 & 5																															
	Argo (6 wheel drive)																															
	Bobcat Tracked Excavator																															
SRK																																
DES	Christian																															
	Chris																															
	Jay																															
	Cat 345 Excavator																															
	D9 Cat Bulldozer																															
Weather																																

a - assess benches & slope
b -
c - cut/fill roadway
d -
e - excavate ditches
f - filling sandbags
g - grade existing
h - hand shovel snow from ditches
i -

k -
m - miscellaneous
n - safety meeting
p - parked
o -
r - rip-rap placement
s - survey
t - travel to/from site
w -

- Downtime
- Work
- Miscellaneous
- Travel

Load Counts		
Material	**Daily**	**Total**

Miscellaneous	
Crew Size	2

Work Areas			
1	Bench 1		
2	Bench 2		
3	Bench 3		
4	Bench 4		
5	Bench 5		
TB	Toe Berm		
EP	Energy Pond		
MP	Moose Pond		

COMMENTS: Assessed the condition of the benches, sloped cover, toe berm and outflow flue. Considerable erosion is occurring throughout the cell due to migration of surface and melt waters which are flowing down the face of the cell. A considerable amount of the flow is cresting over the eastern portion of the toe berm resulting in the formation of gullies. Prepared for May 16 arrival of T.Moon crew.

Hours and work effort reflect time onsite based upon our observations and are approximate.

CHILKOOT GEOLOGICAL ENGINEERS LTD.

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(867) 667-6671 ph. chilkoot@northwestel.net (867) 667-6673 fax

DAILY CONSTRUCTION SUMMARY

Client : Boreal Engineering Ltd.
Project : Faro Mine Complex Closure
Task : Implement Erosion Control Measures

Date : May 16, 2011
Location : Grum Sulphide Cell Cover
Work Areas : Please See Below

	Equipment	0430	0700	0730	0800	0830	0900	0930	1000	1030	1100	1130	1200	1230	1300	1330	1400	1430	1500	1530	1600	1630	1700	1730	1800	1830	1900	Work Hours	Miscellaneous	Travel	Downtime	Total Hours
CHILKOOT	Tares Dhara, P.Eng.			t	t	m0	n0	n0	t	aTB	h1	a2	h5	a1/2	h5	h5	h5	h5	f5	f5	f5	f5	f5	f5	m0	t		9.5	0.0	2.0	0.0	12.0
BOREAL	G.Nyland			t	t	m0	n0	n0	t	h1	h2	h1	h5	a1/2	h5	h5	h5	h5	f5	f5	f5	f5	f5	f5	m0	t		9.5	0.0	2.0	0.0	12.0
T.Moon Construction	T.Moon			t	n0	n0	n0	n0	t	mH	t	offsite																2.5	0.0	2.0	0.0	4.5
	Robert (Foreman)			t	n0	n0	n0	n0	t	h1	h1	h1	h5	lunch	h5	h5	h5	h4	f5	f5	f5	f5	mH	mH	t			9.0	0.0	1.5	0.0	10.5
	Laborer 1 & 2			t	n0	n0	n0	n0	t	h1	h1	h1	h5	lunch	h5	h5	h5	h4	f5	f5	f5	f5	f5	f5	t			18.0	0.0	3.0	0.0	21.0
	Laborers 3,4 & 5			t	n0	n0	n0	n0	t	h2	h2	h2	h5	lunch	h5	h5	h5	h4	f5	f5	f5	f5	f5	f5	t			27.0	0.0	4.5	0.0	31.5
	Argo (6 wheel drive)																															
	Bobcat Tracked Excavator																															
SRK																																
DES	Christian																															
	Chris																															
	Jay																															
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Weather																																

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- Downtime
- Work
- Miscellaneous
- Travel

Load Counts		
Material	**Daily**	**Total**

Miscellaneous	
Crew Size	8-9

Work Areas			
1	Bench 1 - Elev 1285	0	Security Gate
2	Bench 2 - Elev 1273	F	Faro
3	Bench 3 - Elev 1259	H	Haul Road
4	Bench 4 - Elev 1245		
5	Bench 5 - Elev 1228		
TB	Toe Berm		
EP	Energy Pond		
MP	Moose Pond		

COMMENTS: Initiated erosion control measures by hand shoveling snow and ice from the existing bench ditches. Initially concentrated on stopping flow at the top of the cell however these efforts did not appear to be directly effective in minimizing erosion of the prominent toe berm gullies and as such efforts were redirected to bench 5, immediately above the toe berm.
Initiated sandbag placement on Bench 5 in a region where the ditch had infilled with sediment in an effort to redirect down-slope flow into the bench ditch. Reduced the amount of surface water cresting over the toe berm considerably through todays work efforts.
Hours and work effort reflect time onsite based upon our observations and are approximate.

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DAILY CONSTRUCTION SUMMARY

Client : Boreal Engineering Ltd.
Project : Faro Mine Complex Closure
Task : Implement Erosion Control Measures

Date : May 17, 2011
Location : Grum Sulphide Cell Cover
Work Areas : Please See Below

Equipment		0430	0700	0730	0800	0830	0900	0930	1000	1030	1100	1130	1200	1230	1300	1330	1400	1430	1500	1530	1600	1630	1700	1730	1800	1830	1900	Work Hours	Miscellaneous	Travel	Downtime	Total Hours
CHILKOOT	Tares Dhara, P.Eng.			t	m0	sTB	sTB	sTB	sTB	sTB	sTB	sTB	a4	m	m	m0	m	m	m	m	m	m	t	m0	t			9.0	0.5	2.0	0.0	12.0
BOREAL	G.Nyland			t	m0	f5	f5	f5	f5	f5	sTB	sTB	h4	h4	h4	h4	h4	h4	h4	h4	h3	h3	t	m0	t			9.0	0.5	2.0	0.0	12.0
T.Moon Construction	T.Moon			t	n0	m5	t	offsite																				1.0	0.0	1.0	0.0	2.0
	Robert (Foreman)			t	f5	f5	f5	f5	f5	f5	f5	f5	lunch	h4	h4	h4	h4	h4	h4	h4	h3	h3	t					8.5	0.0	1.0	0.0	10.5
	Laborer 1 & 2			t	f5	f5	f5	f5	f5	f5	f5	f5	lunch	h4	h4	h4	h4	h4	h4	h4	h3	h3	t					17.0	0.0	2.0	0.0	21.0
	Laborers 3,4 & 5			t	f5	f5	f5	f5	f5	f5	f5	f5	lunch	h4	h4	h4	h4	h4	h4	h4	h3	h3	t					25.5	0.0	3.0	0.0	31.5
	Argo (6 wheel drive)																															
	Bobcat Tracked Excavator																															
SRK	Olga Kosarewicz, P.Eng.			t	m0	m5	m	m	m	mTB	m	m	t	lunch	t	m	m	m	m	m	m	m	t	m0	t			7.5	0.5	2.5	0.0	10.5
DES	Christian							mP						mF									mMP					1.5	0.0	0.0	0.0	1.5
	Chris																															
	Jay																															
	Cat 345 Excavator						mP	mP	oEP	oEP	oEP	pEP	mF	mF	pEP	pEP	pEP	pEP	pEP	pEP	pEP	pEP	oMP	oMP	oMP	oMP	?	5.5	0.0	0.0	0.0	5.5
	D9 Cat Bulldozer										pEP	pEP	pEP	pEP	pEP	pEP	pEP	pEP	pEP	pEP	pEP	pEP						0.0	0.0	0.0	0.0	0.0
YTG	D.Rainey, Ph.D.							t	t	t	t	t	t	t	t	m0	t	m	m	m	m	m	t					3.0	0.0	5.0	0.0	8.0

Weather	

a - assess benches & slope
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- Miscellaneous
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Load Counts		
Material	Daily	Total

Miscellaneous	
Crew Size	11-13

Work Areas			
1	Bench 1 - Elev 1285	0	Security Gate
2	Bench 2 - Elev 1273	F	Outflow Flue
3	Bench 3 - Elev 1259	H	Haul Road
4	Bench 4 - Elev 1245	P	Rip-Rap Pit
5	Bench 5 - Elev 1228		
TB	Toe Berm		
EP	Energy Pond		
MP	Moose Pond		

COMMENTS: Continued to concentrate efforts to sandbag bench 5 surface flow and redirect flow into bench 5 ditch. Efforts to stem the flow appeared effective and as such hand clearing operations were shifted to intercept upper bench flow on the east side of Bench 4 and Bench 3. SRK representative onsite along with YTG Project Manager.
While DES was able to access the rip-rap pit on the west side of the cell with the excavator, it was determined that the poor ground (fill) conditions on the access road would not allow for use of a rock truck being supplied by T.Moon. The flow to Moose Pond was redirect by YG/DES in the evening given an impending overflow situation.
Hours and work effort reflect time onsite based upon our observations and are approximate.

CHILKOOT GEOLOGICAL ENGINEERS LTD.

Mile 929.4 Old Alaska Highway, Whitehorse, Yukon
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DAILY CONSTRUCTION SUMMARY

Client : Boreal Engineering Ltd.
Project : Faro Mine Complex Closure
Task : Implement Erosion Control Measures

Date : May 18, 2011
Location : Grum Sulphide Cell Cover
Work Areas : Please See Below

Equipment		0430	0700	0730	0800	0830	0900	0930	1000	1030	1100	1130	1200	1230	1300	1330	1400	1430	1500	1530	1600	1630	1700	1730	1800	1830	1900	Work Hours	Miscellaneous	Travel	Downtime	Total Hours
CHILKOOT	Tares Dhara, P.Eng.		t	m0	mMP	mMP	mF	mB	sTB	sTB	sTB	sTB	a4	m	m	m0	m	s3	s3	s4	s4	m	m1-3	m1-3	m0	t		10.5	0.5	1.0	0.0	12.0
BOREAL	G.Nyland		t	m0	m0	f5	f5	f5	f5	f5	f5	f5	h4	h4	h4	h4	h4	s3	s3	s4	s4	m	m1-3	m1-3	m0	t		10.5	0.5	1.0	0.0	12.0
T.Moon Construction	T.Moon		t	mH	t	offsite																						0.5	0.0	1.0	0.0	1.5
	Robert (Foreman)		t	h1	h1	h1	h1	h1	h1	h1	h1	h1	lunch	h1	h1	h1	h1	h2	h2	h2	h3	h3	r1-3	r1-3	t			10.0	0.0	1.0	0.0	11.0
	Laborer 1 & 2		t	h1	h1	h1	h1	h1	h1	h1	h1	h1	lunch	h1	h1	h1	h1	h2	h2	h2	h3	h3	r1-3	r1-3	t			20.0	0.0	2.0	0.0	22.0
	Laborers 3,4 & 5		t	h1	h1	h1	h1	h1	h1	h1	h1	h1	lunch	h1	h1	h1	h1	h2	h2	h2	h3	h3	r1-3	r1-3	t			30.0	0.0	3.0	0.0	33.0
	Argo (6 wheel drive)		t	mC	mC	mC	mC	mC	battery	mC	mC	mC		mC	mC	mC	mC	mC	mC	mC	mC	mC	mC	mC	t							
	Tracked Excavator (Neil)		t	t	t	n0	n0	n0	t	e5	e5	e5	e5	lunch	e5	e5	t	e2	e2	e2	e2	e2	e2	e2	t			8.5	0.0	2.5	0.0	11.0
	Volvo - Rock Truck			mH	mH	mH	mH	mH	mH	mH	mH	mH	mH	mH	mH	mH	mH	mH	mH	mH	mH	mH	mH	mH								
SRK	Olga Kasarewicz			t	m0	mC	mF	mB	mC	mC	mC	mC	t	lunch	t	m	m	m	m	m4	m4	m	m	t				8.0	0.0	2.0	0.0	10.0
DES	Christian																															
	Chris																															
	Jay																															
	Cat 345 Excavator																															
	D9 Cat Bulldozer																															
YTG	D.Rainey, Ph.D.		t	m0	mMP	mMP	mF	mB	m	m	m	m	m	m	m	m	m	m	m	m	m	m	t					9.5	0.0	1.0	0.0	8.0

Weather																														

a - assess benches & slope
b -
c - cut/fill roadway
d -
e - excavate ditches
f - filling sandbags
g - grade existing
h - hand shovel snow from ditches
i -

k -
m - miscellaneous
n - safety meeting
p - parked
o - redirect flow
r - rip-rap placement
s - survey
t - travel to/from site
w -

- Downtime
- Work
- Miscellaneous
- Travel

Load Counts		
Material	Daily	Total

Miscellaneous	
Crew Size	11-13

Work Areas			
1	Bench 1 - Elev 1285	0	Security Gate
2	Bench 2 - Elev 1273	F	Outflow Flue
3	Bench 3 - Elev 1259	H	Haul Road
4	Bench 4 - Elev 1245	P	Rip-Rap Pit
5	Bench 5 - Elev 1228	C	Cell Cap
TB	Toe Berm	B	Backslope Area
EP	Energy Pond		
MP	Moose Pond		

COMMENTS: Shifted hand clearing efforts to all of Bench 1. A mini-excavator arrived onsite to clear sediment from the bench ditches. Soft Bench 1 conditions restricted mini-excavator use to the west side of Bench 2 to iniate erosion control measures on the west half of the cell. The laborers also cleared the eastern sides of Bench 2 & 3 in the afternoon and initiated rip-rap placement at the confluence of the ditch benches to the lateral surface drains (Benches 1-3 east side).

Hours and work effort reflect time onsite based upon our observations and are approximate.

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DAILY CONSTRUCTION SUMMARY

Client : Boreal Engineering Ltd.
Project : Faro Mine Complex Closure
Task : Implement Erosion Control Measures

Date : May 19, 2011
Location : Grum Sulphide Cell Cover
Work Areas : Please See Below

Equipment		0430	0700	0730	0800	0830	0900	0930	1000	1030	1100	1130	1200	1230	1300	1330	1400	1430	1500	1530	1600	1630	1700	1730	1800	1830	1900	Work Hours	Miscellaneous	Travel	Downtime	Total Hours
CHILKOOT	Tares Dhara, P.Eng.		t	m0	sTB	sTB	sTB	m	m	m	m	m	m	m	m	m	s5	s5	s5	s5	a1	a1	a5	a5	m0	t		10.5	0.5	1.0	0.0	12.0
BOREAL	G.Nyland		t	m0	sTB	sTB	sTB	s5	s5	m	m	m	m	m	m	m	s5	s5	s5	s5	m	m	m	m	m0	t		10.5	0.5	1.0	0.0	12.0
T.Moon Construction	T.Moon		t	mC	m1-3	mC	t	offsite																				1.5	0.0	1.0	0.0	2.5
	Robert (Foreman)		t	mC	r1-5	r1-5	r1-5	r1-5	r1-5	r1-5	r1-5	r1-5	lunch	r1-5	r1-5	r1-5	r1-5	r1-5	r1-5	m	m	m	m	t				9.5	0.0	1.0	0.0	10.5
	Laborer 1 & 2		t	mC	r1-5	r1-5	r1-5	r1-5	r1-5	r1-5	r1-5	r1-5	lunch	r1-5	r1-5	r1-5	r1-5	r1-5	r1-5	m	m	m	m	t				19.0	0.0	2.0	0.0	21.0
	Laborers 3,4 & 5		t	mC	r1-5	r1-5	r1-5	r1-5	r1-5	r1-5	r1-5	r1-5	lunch	r1-5	r1-5	r1-5	r1-5	r1-5	r1-5	m	m	m	m	t				28.5	0.0	3.0	0.0	31.5
	Argo (6 wheel drive)		t	mC	mC	mC	mC	mC	mC	mC	mC	mC		mC	mC	mC	mC	mC	mC	mC	mC	mC	mC	t				9.5	0.0	1.0	0.0	10.5
	Tracked Excavator (Neil)		t	mC	e3	e3	e3	e3	e3	e3	e3	t	lunch	e4	e4	e4	e4	e4	e4	e4	e4	e4	e4	e4	t			10.0	0.0	1.0	0.0	11.0
	Volvo Rock Truck		pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH							
SRK	Olga Kosarewicz, P.Eng.			t	m0	m0	m0	t	mC	mMP	mC	mC	t	lunch	t	m	t	m	m	m4	m4	m	m5	m	mMP	?		7.5	0.0	2.5	0.0	10.0
DES	Christian																															
	Chris																															
	Jay														mF	mF	mF	mF	mC	mC	mC	mC	m5	mC	mMP	?		5.5	0.0	0.0	0.0	5.5
	Cat 345 Excavator																															
	D9 Cat Bulldozer																															
YTG																																

Weather																										

a - assess benches & slope
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f - filling sandbags
g - grade existing
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m - miscellaneous
n - safety meeting
p - parked
o - redirect flow
r - rip-rap placement
s - survey
t - travel to/from site
w -

- Downtime
- Work
- Miscellaneous
- Travel

Load Counts		
Material	**Daily**	**Total**

Miscellaneous	
Crew Size	11-13

Work Areas			
1	Bench 1 - Elev 1285	0	Security Gate
2	Bench 2 - Elev 1273	F	Outflow Flue
3	Bench 3 - Elev 1259	H	Haul Road
4	Bench 4 - Elev 1245	P	Rip-Rap Pit
5	Bench 5 - Elev 1228	C	Cell Cap
TB	Toe Berm	B	Backslope Area
EP	Energy Pond		
MP	Moose Pond		

COMMENTS: The mini-excavator conitnued to progressively clear sediment from the bench ditches on the west side of the cell. Cleared the west side of Bench 3 and then the west side of Bench 4.
T.Moon's crew continued to place rip-rap at the confluence of the ditch benches to the lateral surface drains (predominately east side).
Surveyed the potential liner daylight within the toe berm.

Hours and work effort reflect time onsite based upon our observations and are approximate.

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DAILY CONSTRUCTION SUMMARY

Client : Boreal Engineering Ltd.
Project : Faro Mine Complex Closure
Task : Implement Erosion Control Measures

Date : May 20, 2011
Location : Grum Sulphide Cell Cover
Work Areas : Please See Below

Equipment		0430	0700	0730	0800	0830	0900	0930	1000	1030	1100	1130	1200	1230	1300	1330	1400	1430	1500	1530	1600	1630	1700	1730	1800	1830	1900	Work Hours	Miscellaneous	Travel	Downtime	Total Hours
CHILKOOT	Tares Dhara, P.Eng.		t	m0	m	m	m	m	mG	mG	mMP	mMP	mMP	mMP	m	m	m	m	m	m	mEP	sEP	sEP	sEP	sEP	t		11.0	0.0	1.0	0.0	12.0
BOREAL	G.Nyland		t	m0	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	mEP	sEP	sEP	sEP	sEP	t		11.0	0.0	1.0	0.0	12.0
T.Moon Construction	T.Moon		t	mC	mC	t	offsite																					1.5	0.0	1.0	0.0	2.5
	Robert (Foreman)		t	mC	r1-5	r1-5	r1-5	r1-5	r1-5	r1-5	r1-5	r1-5	lunch	r1-5	r1-5	r1-5	t											6.0	0.0	1.0	0.0	7.0
	Laborer 1 & 2		t	mC	r1-5	r1-5	r1-5	r1-5	r1-5	r1-5	r1-5	r1-5	lunch	r1-5	r1-5	r1-5	t											12.0	0.0	2.0	0.0	14.0
	Laborers 3,4 & 5		t	mC	r1-5	r1-5	r1-5	r1-5	r1-5	r1-5	r1-5	r1-5	lunch	r1-5	r1-5	r1-5	t											18.0	0.0	3.0	0.0	21.0
	Argo (6 wheel drive)		t	mC	mC	mC	mC	mC	mC	mC	mC	mC		mC	mC	mC	pH	pH	pH	pH	pH	pH	pH	pH	pH			6.0	0.0	0.5	0.0	6.5
	Tracked Excavator (Neil)		t	m0	m0	e5	e5	e5	e5	e5	t	e2	lunch	e2	e2	e2	e2	t	e3	e3	e3	e3	e3	e3	t			10.0	0.0	1.0	0.0	11.0
	Volvo Rock Truck		pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH							
SRK	Olga Kosarewicz, P.Eng.																															
DES	Christian										mMP																					
	Chris																															
	Jay																															
	Cat 345 Excavator																															
	D9 Cat Bulldozer																															
YTG	Matt (Yukon Environment)										mMP																					
Weather																																

a - assess benches & slope
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n - safety meeting
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r - rip-rap placement
s - survey
t - travel to/from site
w -

- Downtime
- Work
- Miscellaneous
- Travel

Load Counts		
Material	Daily	Total

Miscellaneous	
Crew Size	9-10

Work Areas			
1	Bench 1 - Elev 1285	0	Security Gate
2	Bench 2 - Elev 1273	F	Outflow Flue
3	Bench 3 - Elev 1259	H	Haul Road
4	Bench 4 - Elev 1245	P	Rip-Rap Pit
5	Bench 5 - Elev 1228	C	Cell Cap
TB	Toe Berm	B	Backslope Area
EP	Energy Pond	G	Van Gorda Tailings
MP	Moose Pond	SP	Storm Water Mgmt. Pond

COMMENTS: The mini-excavator cleared sediment from Bench 5 west side, then progressed to Bench 2 east side and Bench 3 east side.
T.Moon crew completed placement of bench ditch rip-rap at the confluence with the western lateral ditch.

Hours and work effort reflect time onsite based upon our observations and are approximate.

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DAILY CONSTRUCTION SUMMARY

Client : Boreal Engineering Ltd.
Project : Faro Mine Complex Closure
Task : Implement Erosion Control Measures

Date : May 21, 2011
Location : Grum Sulphide Cell Cover
Work Areas : Please See Below

Equipment		0430	0700	0730	0800	0830	0900	0930	1000	1030	1100	1130	1200	1230	1300	1330	1400	1430	1500	1530	1600	1630	1700	1730	1800	1830	1900	Work Hours	Miscellaneous	Travel	Downtime	Total Hours
CHILKOOT	Tares Dhara, P.Eng.			t	m0	mEP	mEP	m0	m0	mEP	sEP	sEP	mEP	mEP	sEP	sEP	mEP	mEP	mG	mG	mEP	mEP	mC	t				9.5	0.0	1.0	0.0	12.0
BOREAL	G.Nyland			t	m0	mEP	mEP	m0	m0	mEP	sEP	sEP	mEP	mEP	sEP	sEP	mEP	mEP	mG	mG	mEP	mEP	mC	t				9.5	0.0	1.0	0.0	12.0
T.Moon Construction	T.Moon																															
	Robert (Foreman)																															
	Laborer 1 & 2																															
	Laborers 3,4 & 5																															
	Argo (6 wheel drive)		pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH							
	Tracked Excavator (Neil)		pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH							
	Volvo Rock Truck		pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH							
SRK	Olga Kosarewicz, P.Eng.																															
DES	Christian																															
	Chris																															
	Jay																															
	Cat 345 Excavator		t	mEP	mEP	mEP	mEP	mEP	mEP	mEP	mEP	mEP	lunch	mEP	mEP	mEP	mEP	mEP	mEP	mEP	mEP	mEP	t	pH				9.0	0.0	1.0	0.0	10.0
	D9 Cat Bulldozer		t	mEP	mEP	mEP	mEP	mEP	mEP	mEP	mEP	mEP	lunch	mEP	mEP	mEP	mEP	mEP	mEP	mEP	mEP	mEP	t	pH				9.0	0.0	1.0	0.0	10.0
YTG	Matt (Yukon Environment)																															
Weather																																

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o - redirect flow
r - rip-rap placement
s - survey
t - travel to/from site
w -

- Downtime
- Work
- Miscellaneous
- Travel

Load Counts		
Material	**Daily**	**Total**

Miscellaneous	
Crew Size	4

Work Areas			
1	Bench 1 - Elev 1285	0	Security Gate
2	Bench 2 - Elev 1273	F	Outflow Flue
3	Bench 3 - Elev 1259	H	Haul Road
4	Bench 4 - Elev 1245	P	Rip-Rap Pit
5	Bench 5 - Elev 1228	C	Cell Cap
TB	Toe Berm	B	Backslope Area
EP	Energy Pond	G	Van Gorda Tailings
MP	Moose Pond	SP	Storm Water Mgmt. Pond

COMMENTS: DES initiated excavation of a storm water management pond down-gradient of the final energy dissipation pond.

Hours and work effort reflect time onsite based upon our observations and are approximate.

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DAILY CONSTRUCTION SUMMARY

Client : Boreal Engineering Ltd.
Project : Faro Mine Complex Closure
Task : Implement Erosion Control Measures

Date : May 24, 2011
Location : Grum Sulphide Cell Cover
Work Areas : Please See Below

Equipment		0430	0700	0730	0800	0830	0900	0930	1000	1030	1100	1130	1200	1230	1300	1330	1400	1430	1500	1530	1600	1630	1700	1730	1800	1830	1900	Work Hours	Miscellaneous	Travel	Downtime	Total Hours
CHILKOOT	Tares Dhara, P.Eng.																															
BOREAL	G.Nyland																															
T.Moon Construction	T.Moon																															
	Robert (Foreman)																															
	Laborer 1 & 2																															
	Laborers 3,4 & 5																															
	Argo (6 wheel drive)																															
	Tracked Excavator (Neil)		t	mC	e4	e4	e4	e4	e4	t	e1	e1	lunch	e1	e1	e1	e1	e1	e1	e1	e1	e1	e1	e1	t			10.0	0.0	1.0	0.0	11.0
	Volvo Rock Truck																															
SRK	Olga Kosarewicz, P.Eng.																															
DES	Christian																															
	Chris																															
	Jay																															
	Cat 345 Excavator																															
	D9 Cat Bulldozer																															
YTG																																

Weather																														

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m - miscellaneous
n - safety meeting
p - parked
o - redirect flow
r - rip-rap placement
s - survey
t - travel to/from site
w -

- Downtime
- Work
- Miscellaneous
- Travel

Load Counts		
Material	**Daily**	**Total**

Miscellaneous	
Crew Size	1

Work Areas			
1	Bench 1 - Elev 1285	0	Security Gate
2	Bench 2 - Elev 1273	F	Outflow Flue
3	Bench 3 - Elev 1259	H	Haul Road
4	Bench 4 - Elev 1245	P	Rip-Rap Pit
5	Bench 5 - Elev 1228	C	Cell Cap
TB	Toe Berm	B	Backslope Area
EP	Energy Pond		
MP	Moose Pond		

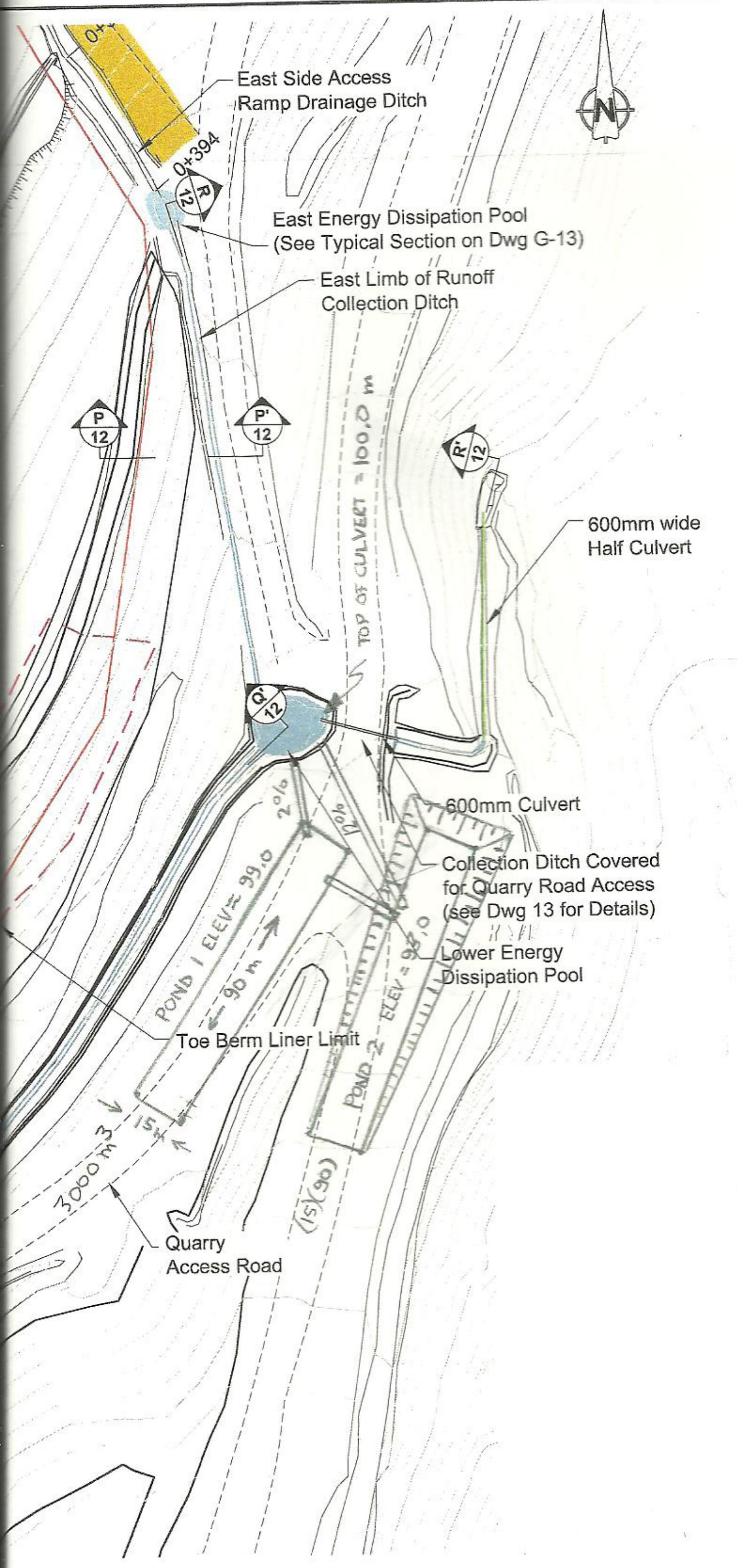
COMMENTS: The mini-excavator completed clearing sediment from the bench ditches. Clearing of the east side of Bench 4 and all of Bench 1 was conducted.

Hours and work effort reflect time onsite based upon our observations and are approximate.

APPENDIX C

Conceptual Sketches

Storm Water Management Ponds



LEGEND

- Defined Extent of Sulphide Cell
- Access Ramp (uncovered)
- Resloped Crest
- Drainage Flow Direction
- Flume (600mm wide half culvert)
- Drainage Channel
- Energy Dissipation Pools
- Toe Berm Liner Limit

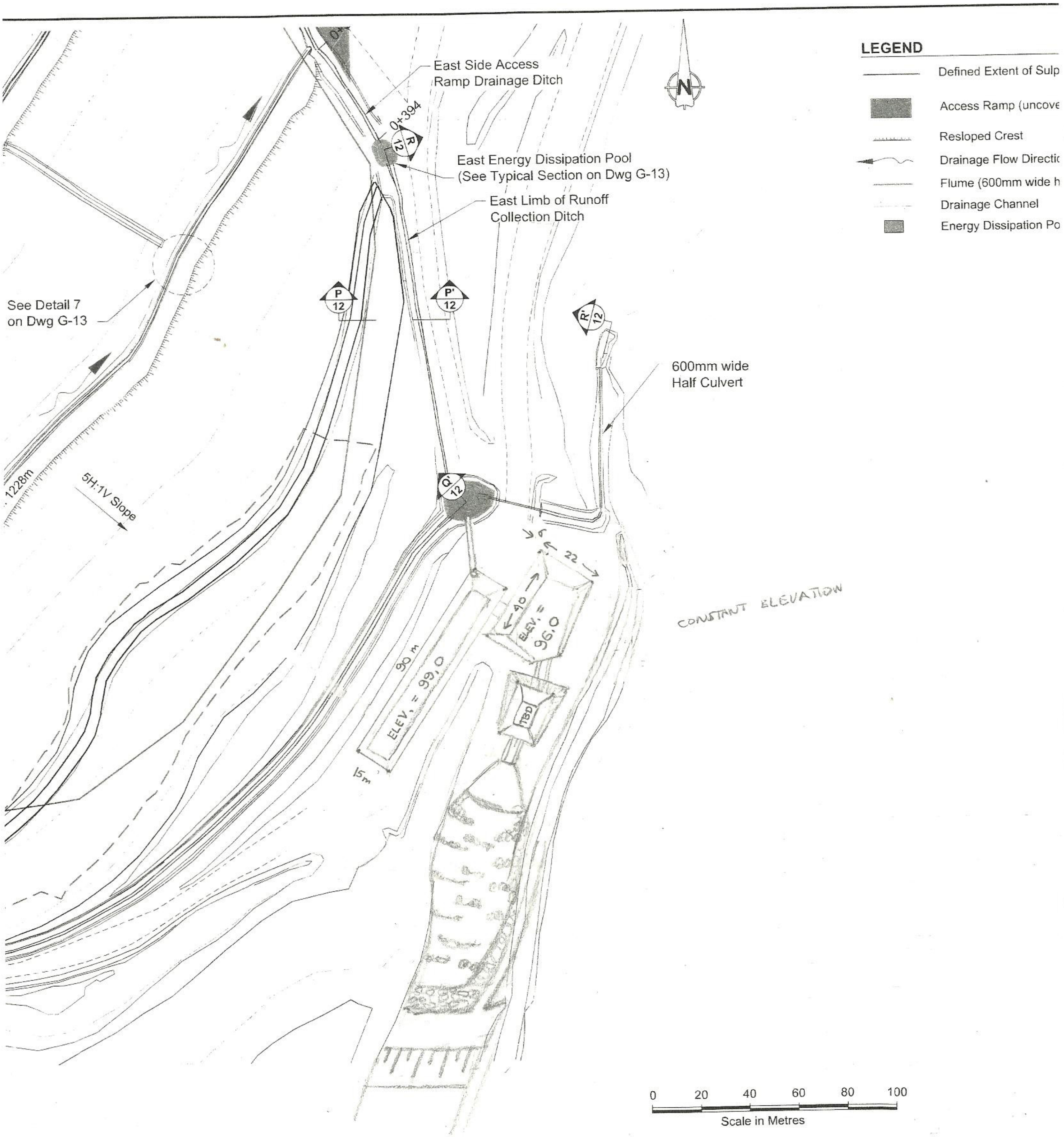
NOTES

1. Surface drains tie into bench ditches, which are connected to ramp drainage ditches.
2. Energy dissipation pools lined with geomembrane and covered by geotextile and rip rap.

REFERENCES

1. Original ground compiled by the ORTHOSHOP, Calgary, September 2003. Date of photography: July 25, 2003, Projection: NAD83 - Zone 8 (corrected to survey control points using Jun.9, 2010 survey by Yukon Engineering Services).
2. As-built toe berm survey completed by Pelly Construction on August 26, 2010.
3. As-built toe berm limit survey completed by Pelly Construction on September 9, 2010.
4. As-built survey completed by YES (Yukon Engineering Services) on November 26, 2010.

SRK Consulting Engineers and Scientists Vancouver			Faro Mine Closure / Fermeture de la mine Faro	Grum Sulphide Cell Cover Construction		
DESIGN: PM	DRAWN: NV / DC	REVIEWED: PM	FARO MINE COMPLEX FINAL CLOSURE AND REMEDIATION PLAN	DRAWING TITLE: Runoff Collection Ditch - Plan View		
CHECKED: CCS	APPROVED: CCS	DATE: Apr. 30, 2011		DRAWING NO. G-11	SHEET 11 OF 14	REVISION NO. 4
STAMP	FILE NAME: 1CY001_029-G-6_NAD83.dwg		SRK JOB NO.: 1CY001.029			



PM		22Feb11
PM	CCS	28July10
AT	CCS	18Jun10
CHK'D	APP'D	DATE

PROFESSIONAL ENGINEER'S STAMP

CHILKOOT GEOLOGICAL ENGINEERS LTD

DESIGN:	DRAWN: TD	REVIEWED:
CHECKED:	APPROVED:	DATE:

FILE NAME: 1CY001_029-G-6_NAD83.dwg

Faro Mine Closure
Fermeture de la mine Faro

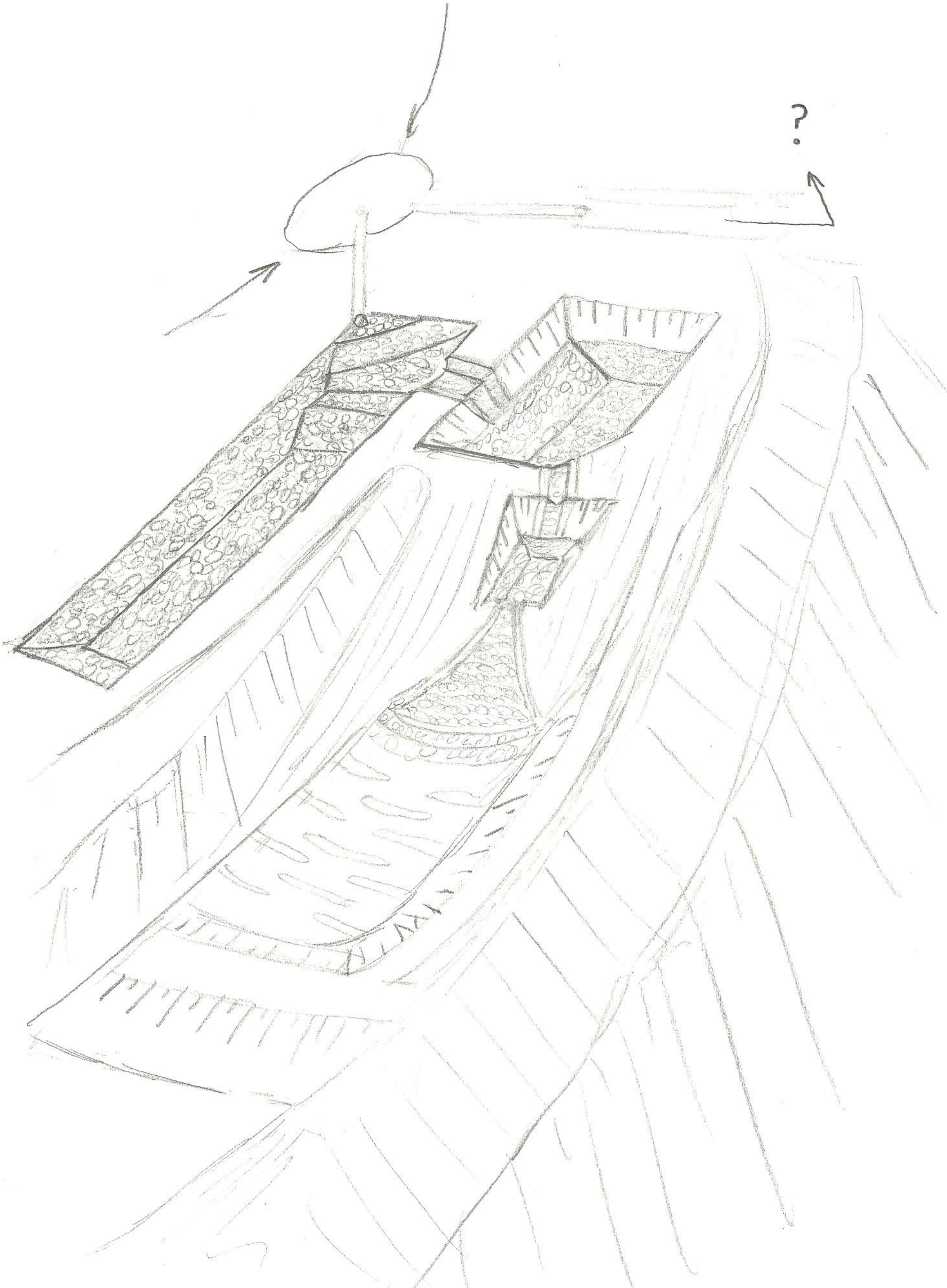
STORM WATER MANAGEMENT PONDS

SRK JOB NO.: 1CY001.029

Grum Sulphide C

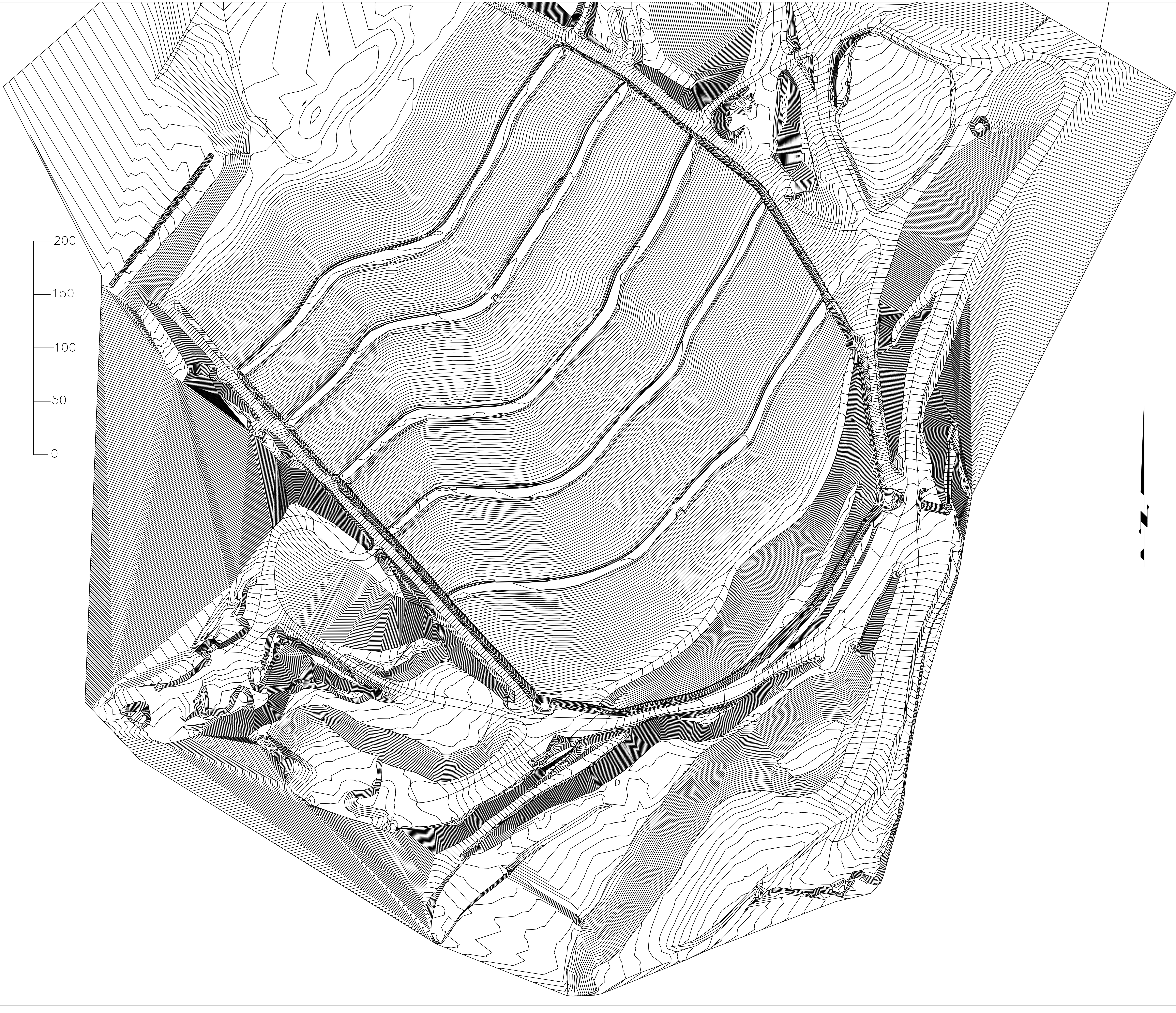
DRAWING TITLE:

DRAWING NO.



APPENDIX D

0.5 m contour intervals of Fall 2010 As-builts


200
150
100
50
0

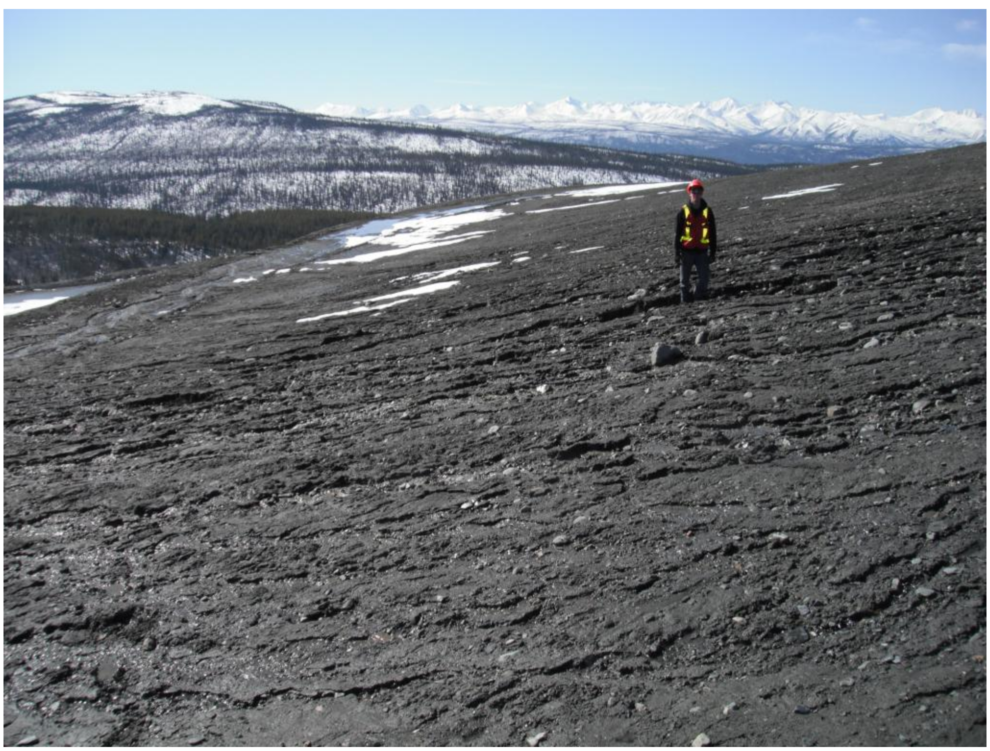
APPENDIX E

Selection of Photos

1 - May 10, 2011 – Site Conditions as viewed from the Van Gorda Tailings piles

2 - May 20, 2011 – Cell conditions.

3 - May10, 2011 – Toe Berm conditions near liner elevation. Note buried snow.



4 - May 16, 2011 – Erosion rills on cell cover below east side of bench 5.

5 - May 16, 2011 – Toe Berm conditions. Note sediment and erosion gullyies.

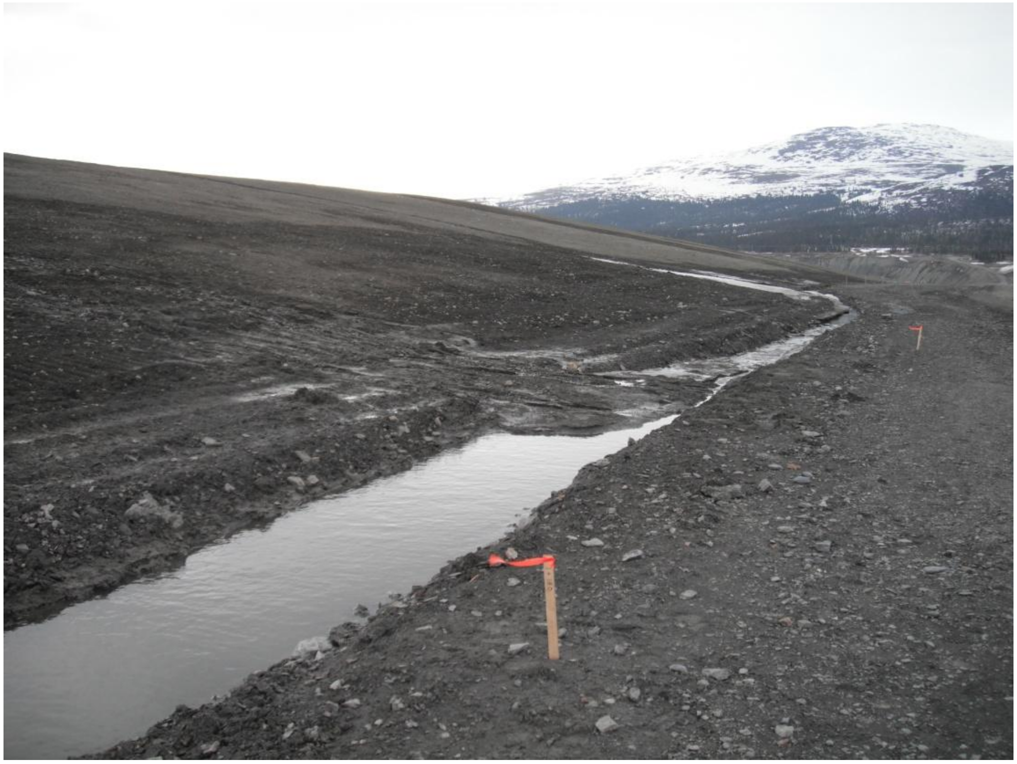
6 - May 16, 2011 – Bench 5 ~ Station 0 + 080 Sand-bagging to redirect overflow.

7 May 17, 2011 – Hand excavation of east side of Bench 4 ditch.

8 - May 17, 2011 – Up-slope (beyond elev. 1300) conditions.

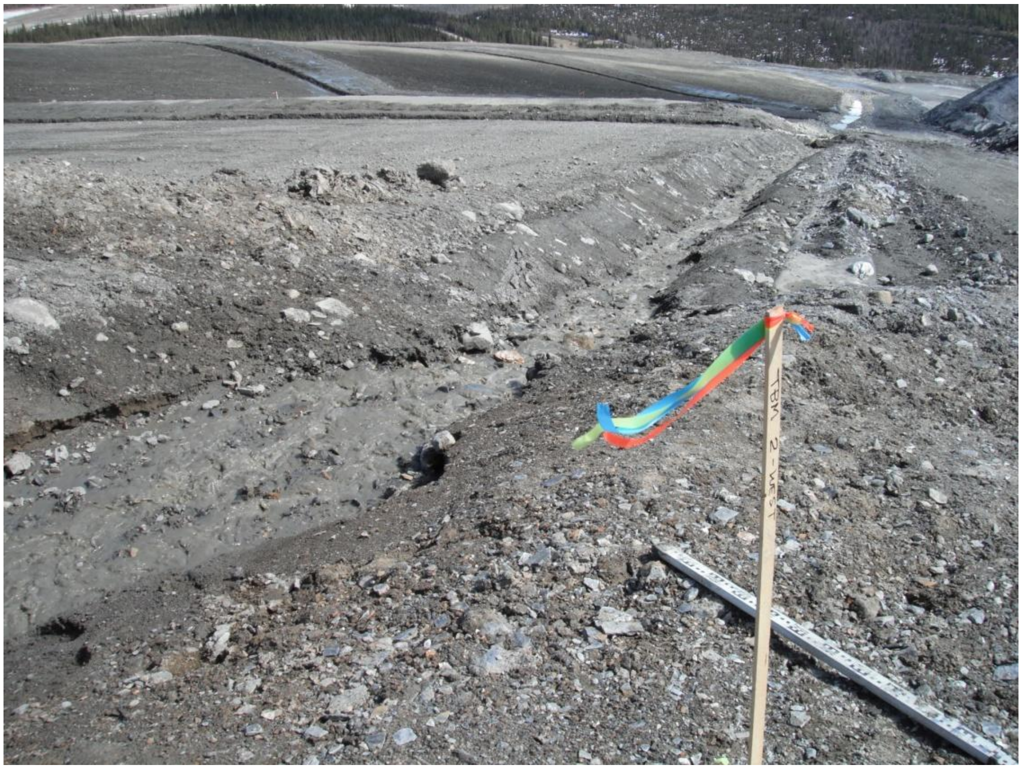
9 - May 17, 2011 – Erosion gully at Toe Berm Crest ~ Station 0 + 080.

10 - May 18, 2011 – Outflow flue conditions.



11 - May 19, 2011 – Sedimentation of bench ditch. Bench 1 + 180 facing east.

12 - May 19, 2011 – Excavating ditch sediment from Bench 4 ditch.



13 - May 21, 2011 – Bench 2 west side facing down slope. Note incising of ditch.

14 - May 21, 2011 – Excavation of emergency storm water management pond.