Our File: 2012-600

26 November 2012

Aurchem Exploration
1 Lindeman Road
Whitehorse, YT
Y1A 5Z7

Attention: Ms. Jillian Chown, Vice President

Re: Aurchem Exploration Waste Rock & Overburden Management Plan

1. Introduction

Aurchem Exploration Ltd. is planning to operate a small open pit Gold Mine in the Mt. Nansen area of the Yukon. Current mining plans are based on a production rate of 100 tonnes per day of which 50 tonnes per day are expected to be waste rock. Operations will be limited to 120 days per year for a total estimated waste rock production of 6000 tonnes per year.

Aurchem has identified a need for the design of a waste rock dump for this operation.

2. Objectives

This document identifies waste rock dump design criteria for the Aurchem Exploration open pit mine. The waste rock dump performance objectives are as follows:

- Physical stability;
- Reduce potential for erosion and associated potential impacts on surface waters
- Operationally efficient and cost effective.

3.0 Site Characteristics

Aurchem owns 389 quartz mineral claims and 7 mineral leases covering approximately 7,543 hectares (18,640 acres) in the Mt. Nansen area of the Yukon. The site is located approximately 65km west of the Village of Carmacks.

Drawing 12-900-1 provides a site plan of the mine site location, local drainage and the proposed dump site.

3.1 Topography, Geology and Vegetation

The project site is located above tree line at approximately 1,530m ASL. The project area is comprised primarily of exposed rock with sparse willows and brush. Adjacent water bodies include Iron Creek and Klaza Creek.

The gentle, rolling topography of the corridor is largely underlain by granodiorite with less abundant metamorphic rocks, and lies between steep and rugged relief comprising Mount Nansen Group volcanic rocks.

The site is located in an area of discontinuous permafrost.

3.2 Climate

The climate is classified as a subarctic (severe winter, no dry season with a sub polar moist tundra bio zone).

Based on data from Environment Canada, July is warmest with an average temperature of 16.3 °C at noon. January is coldest with an average temperature of -30.5 °C at night.

Winter has prolonged freezing periods, with the coldest month most often being October. Rainfall and other precipitation has no distinct peak month.

Limited data is available on rainfall in this area. Based on climate normals for the closest monitoring station at Carmacks, YT, the total average precipitation is 287mm of which 93mm (water equivalent) is snow fall.

3.3 Groundwater

The site is located at the top of a drainage divide with a general classification of a ground water recharge area. A detailed hydrogeological investigation has not been completed but Aurchem personnel have reported (reference 3) that no groundwater has been encountered in trenches excavated on site to a depth of 7m.

Site personnel also report that melt and rainwater tends to accumulate in the trenches which indicates a relatively low subsurface permeability.

Plate 1: Site Location

3.4 Surface Water

Surface waters in this area are limited to two seasonal streams, Iron Creek and Klaza Creek.

3.5 Seismic Conditions

The NRCan Seismic Hazard Calculator was used for this location to provide a peak ground acceleration (PGA) of 0.110 g at a probability of exceedance of 2% every fifty years or 0.004 per annum.

The USGS instrumental intensity scale provides a indication the relative impacts of this PGA.

Instrumental Intensity	Acceleration (g)	Velocity (cm/s)	Perceived Shaking	Potential Damage
I	**< 0.0017**	< 0.1	Not felt	None
II-III	**0.0017 - 0.014**	0.1 - 1.1	Weak	None
IV	**0.014 - 0.039**	1.1 - 3.4	Light	None
V	**0.039 - 0.092**	3.4 - 8.1	Moderate	Very light
VI	**0.092 - 0.18**	**8.1 - 16**	Strong	Light
VII	0.18 - 0.34	**16 - 31**	Very strong	Moderate
VIII	0.34 - 0.65	**31 - 60**	Severe	Moderate to heavy
IX	0.65 - 1.24	**60 - 116**	Violent	Heavy
X+	> 1.24	**> 116**	Extreme	Very heavy

Based on this table the calculated PGA of 0.110g would equate to strong shaking with the potential for damage classified as light.

4.0 Objectives of the Waste Rock and Overburden Management Plan

The objective of this plan is to provide guidelines for disposal of overburden and waste rock generated during the development of the Maverick site. Slope stability, surface water drainage, and metal transportation/leaching potential are appraised in this plan. Generally accepted engineering design practice including Mined Rock and Overburden Piles Investigation and Design Manual Interim Guidelines (Reference 1) were adopted as the design guidelines.

A summary of the design criteria and objectives is presented in Section 6.

5.0 Waste Characteristics

5.1 Types of Waste

During mining operations two types of solid waste are generated: overburden (including both ice-rich and non-ice-rich overburden), and waste rock. Overburden

includes all soil above the bedrock. Waste rock consists of rock that is mined from the pit and does not have economically viable concentrations of gold.

5.2 Overburden

The area has a thin veneer of organic overburden consisting of organics mixed with sand, gravel and cobbles to a depth of approximately 0.3m (reference 3).

Based on Aurchem Exploration's Project Proposal (Reference 2), an area approximately 2,500m^2 will be stripped each year. Based on an average depth of 0.3m, approximately 750 cubic meters of overburden will be generated each year.

As part of the mines reclamation plan, the stripped overburden will be stockpiled and used to cover the waste rock pile and other disturbed areas to provide a base for re-vegetation.

As the company intends to utilize the stripped organics to reclaim the waste rock dump and other disturbed areas on an on-going basis, the area required for stockpiling organics will be minimal. Aurchem has an established area on site for organic overburden storage and has been using this area to store overburden from past exploration activities. The material is used on an on-going basis as part of its progressive reclamation efforts on site.

The area is located near its mineable area zone as indicated on figure 1 and is approximately 400m x 20m. The material will be used to dress side slopes of the waste rock dump at the end of each mining season.

5.3 Waste Rock

The primary target of the mining operations for the first five years of operation will be the Maverick Zone (reference 2).

The volume of waste rock generated will depend on the depth of target ore vein mined each year. The depth of the proposed excavation is limited to the maximum depth that can be reached by hydraulic excavators or approximately 6m. Based on the mining plan (reference 2) the average volume of waste rock generated will be approximately 3,500 cubic meters per year for a total estimated volume of 17,500 cubic meters for the Maverick Zone waste rock dump.

5.4 Waste Rock Characterization

Based on site ARD testing and analysis (reference 5) the waste rock is considered non-acid generating. Additional random samples of the excavated waste rock will be sampled as per the environmental monitoring program pile to confirm this analysis.

The physical characteristics of the waste rock are inferred based on the material generated during test trenching as similar techniques will be used for mining, specifically excavation with a hydraulic excavator. Plate 2 depicts material generated by excavation of the Maverick Zone.

Plate 2: Typical Waste Rock

This material is classified as cobbles and rocks 100mm minus with gravel and sand.

The natural angle of repose of rock typically varies between about 30^0 and 43^0, depending on rock size and shape. Figure 4-6, sourced from Simons and Senturk (1977), provides estimates for angle of repose. For angular rock of size greater than 100mm, the natural angle of repose is $41\text{-}42^0$, covering most design situations.

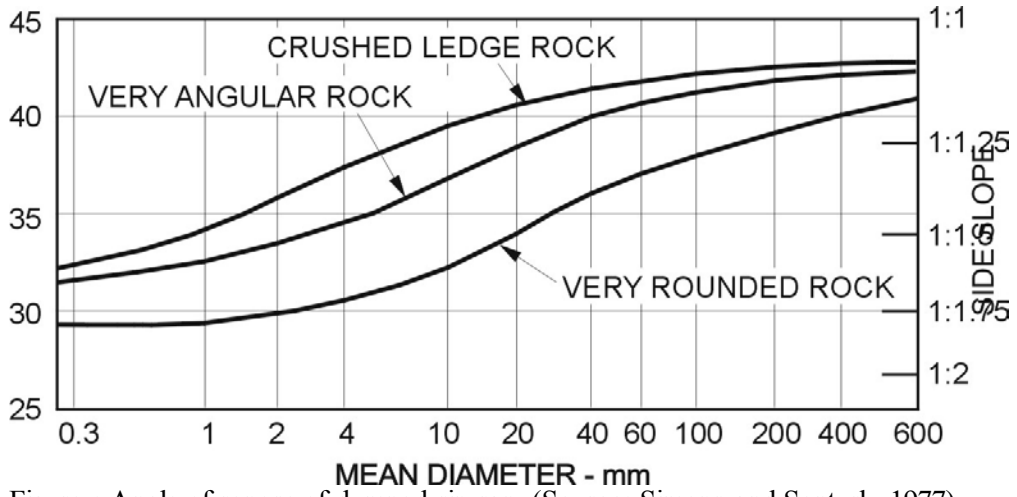


Figure : Angle of repose of dumped rip-rap. (Source: Simons and Senturk, 1977)

In order to provide an adequate factor of safety for embankment saturation, heavy equipment loads and seismic events, the desirable maximum slope for this material will be set at 2H:1V.

6.0 Waste Dump Design

In order to determine the level of design effort required, the waste dumpsite was evaluated and assigned a stability rating in accordance with Mined Rock and Overburden Piles Investigation and Design Manual Interim Guidelines (Reference 1). Main factors affecting dump stability ratings include the dump height, volume, slope, foundation, confinement of dump, dump material, construction method, groundwater and climatic conditions, and seismicity.

6.1 Dump Stability Analysis

In order to use the evaluation criteria a conceptual dump site model is developed and tested against the criteria.

The location proposed by Aurchem Exploration is depicted on drawing 12-900-1. The area measures 200m x 100m and is located approximately 200m south of the Maverick Zone. The area is relatively flat with an average slope of 4.5% trending to the north west.

The following summarizes pertinent characteristics of the conceptual dump site.

Total volume (5 years)	17,500 m^3
WRD area	200m x 100m
Maximum height	2m in 5 years
Foundation soils:	competent bedrock
Foundation slope:	less than 10 degree slope
Fill method:	heaped
Side slopes:	2H:1V

Based on the conceptual model and site information documented previously, the dump stability rating for the proposed site is summarized in the following table.

Table 6.1 Dump Stability Rating

FACTORS AFFECTING STABILITY	RANGE	DESCRIPTION	POINT RATING
Dump Height		<50m	0
Dump Volume	Small	< 1 million BCM	0
Dump Slope	Flat	<26^{o}	0
Foundation Slope	Flat	<10^{o}	0
Degree of Confinement	Mod. Confined	Even slopes, limited natural diversity, heaped fill	50
Foundation type	Competent	As strong as dump materials, not subject to adverse pore pressures, no adverse geologic structure	0
Dump material quality	High	Strong, durable, < 10% fines	0
Construction method	Favourable	Lifts <25m, wide platforms, dumping along contours, ascending construction, terraces	0
Piezometric & climatic conditions	Favourable	Low pressures, no seepage in foundation, development of phreatic surface in dump unlikely, low precip, minimal infiltration, no snow or ice layers in dump	0
Dump rate	Slow	<25 BCM's per lineal meter of crest per day	0
Seismicity	High	Seismic risk zone 4 or higher	100
		Total Point Rating	**150**

As defined by the guidelines (reference 1), the failure hazard for a dump stability rating of less than 300 is considered negligible.

As the failure hazard of the waste rock dump is considered negligible, the recommended level of investigation, design and construction, as per Guidelines for Investigation and Design of Mine Dumps (reference 1) are summarized as follows:

Reconnaissance: basic site reconnaissance, baseline documentation and testing
Testing: minimal lab testing required
Stability: routine check of stability only
Monitoring: visual monitoring only

6.2 WRD Design

Plans for the proposed WRD presented in figures 12900-3 and 12900-4 with the following summarizing the design criteria for the dump

Volume (5 years)	17,500 m^3
Max Depth	2m
Yearly lift depth	0.4m
Minimum side slopes	2H:1V
Desirable side slopes	3H:1V
Max ramp slopes	10%
Cross slope	2%

Although the waste rock has been characterized as non-acid generating, Aurchem Exploration has indicated a preference that all drainage from the waste rock dump be collected in an existing exploration trench as part of the company's environmental program. The collection of runoff will provide for the following functions:

- A source of process water for the milling operations
- Sedimentation basin to remove any sediment which may migrate from the dump site during construction and prior to final reclamation
- Water quality monitoring station

As indicated on figure 12900-3, the proposed WRD design and location provides for collection and drainage of the site to an existing trench to the north of the WRD site.

Although minimum recommended side slopes are 2H:1V, the WRD has been design with 3H:1V final sideslopes to reduce the potential for erosion after final reclamation.

The WRD design as indicated will have a top surface area of approximately 11,300 m^2 and an estimated volume of 22,300 m^3 which exceeds the predicted five year waste rock generation by approximately 25%. The total waste rock dump foot print at five years, including side slopes, is approximately 13,500m^2.

The WRD as designed if also favourable as it provides safe access using existing roads and does not require construction of ramps.

6.3 Drainage Control

Testing has indicated that the waste rock is non-acid generating (reference 5). The grandiortie bedrock material is competent and site observations have indicated relatively low permeability. It is expected that permafrost will further decrease permeability of the subgrade in the area of the dump site.

Based on these data, a liner to collect seepage from the site is not required but routine monitoring of drainage from the site is recommended.

The site is located at a drainage divide and no streams or water courses are impacted by the dump site. The Hydrological Atlas of Canada (reference 4) identifies average evapotranspiration at approximately 200mm per year for this region. Environment Canada Climate normals provide an average total precipitation of 287mm. The average runoff from the site is provided by the water balance model

$$P = N + E$$

Where P = precipitation, N = runoff and E = evapotranspiration

Thus the average annual runoff will be

$$N = P - E = 287 - 200 = 87mm$$

With a foot print, the total annual average runoff is estimated at 1,175 cubic meters.

As such, drainage control will be limited to channeling melt waters or rainfall events from the site and a 2% cross slope is recommended to ensure positive drainage from waste rock site. A shallow perimeter swale around the site will channel water from the site.

Aurchem Exploration has proposed that this drainage be collected in an exploration trench for use as process water for the mine site and will also serve as location for on-going testing of water for regulatory purposes.

A typical swale cross section is indicated on drawing 12-900-3. The swale should have side slopes of less than 3:1 and a bottom width of no less than 1.0m to reduce erosion potential.

Due to the lack of site specific climatic data, this analysis is considered approximate only and should be verified by collection of site data including precipitation and discharge measurements. If site conditions vary from Environment Canada data, the water control structures should be re-evaluated.

6.4 Site Preparation

Based on data provided by Aurchem Exploration, the proposed waste rock dump has a relatively thin veneer of organic overburden estimated at 0.3m and sparse vegetation. The Investigation and Design of Mine Dump Guidelines (reference 1) identify that stripping of organics is generally not required for organic overburden of less than 1.0m.

Drainage swales can be constructed by utilizing waste material during the first year of operation.

The data and assumptions used for the waste rock dump site should be confirmed by site investigation including random test pitting prior to construction of the waste rock dump.

6.5 Reclamation

The Aurchem Exploration reclamation plan identifies that organic material which is stripped during mining operations will be used as final cover for the waste rock pile with remediation seed mix used to stabilize the soil and reduce potential for erosion of fines.

As indicated on drawings 12900-3 and 12900-4, the final side slopes should be graded to a minimum of 3H:1V and a cross slope of 2% maintained on the surface to provide positive drainage.

6.6 Monitoring

As per the Guidelines for Investigation & Design of Mine Dumps, visual monitoring only of the dump site is required. This should include yearly inspection and remediation of any signs of erosion and visual checks for dump stability.

As the waste rock is not acid-generating and any runoff from the dump site will be contained in existing exploration trenches, the requirements for water quality monitoring will be minimal. If water from the trench impoundment is to be discharge to the environment, it is recommended that water sampling for metals and sediments be completed prior to discharge.

6.6 Alternative Methods for Waste Rock Disposal

Due to the relatively low volume of waste rock generated by the mining operation, waste rock from the planned mining operation could be used to reclaim exploration trenches or as backfill in the mine pit.

7.0 Conclusions and Recommendations

7.1 The volume of waste rock which will be generated by the mining operation is estimated at approximately 3,500 cubic meters per year or 17,500 cubic meters over the current mine development for five years.

7.2 The failure hazard of the proposed waste rock dump is considered negligible as per evaluation protocols outlined in the Guidelines for the Investigation & Design of Mine Dump Guidelines (reference 1).

7.3 The Investigation and Design of Mine Dump Guidelines provide the following recommendations for dump site development for a dump with a negligible failure hazard:

- Basic site reconnaissance
- Minimal lab testing
- Routine check of stability
- Minimal restrictions on construction
- Visual monitoring only

7.4 The location of the dump site is at a drainage divide and the water balance for dump site indicates minimal runoff and no diversion of surface waters.

7.5 The coarse gradation of the waste rock, a relatively level site and competent foundation provides inherent stability to the waste rock dump. A desirable side slope of 3H:1V is recommended for the final side slope grading.

7.6 The data and assumptions used for the waste rock dump site design should be confirmed by site investigation and test pitting prior to construction of the waste rock dump.

7.7 Climatic data used for the design should be confirmed by on-site collection of precipitation and run-off measurements.

8. 0 Limitations

This report and WRD drawings have been prepared for the sole benefit of Aurchem Exploration Ltd for the purposes set out in the report. The report may not be used by any other person or entity without the written consent of Aurchem Exploration Ltd and Vista Tek Ltd.

This report and design advice has been prepared based on information and data provided by Aurchem Exploration, available data sources and limitations of such as identified in the report. If it becomes apparent that any conditions differ from that presented in this report, the undersigned should be contacted immediately to reassess the recommendations provided herein.

Respectfully submitted,

Vista Tek Ltd

Victor Menkal, P.Eng.
Senior Engineer

Encl 4

References

1. Investigation & Design of Mine Dumps, Interim Guidelines, Piteau Associates Engineering Ltd. 1991

2. Aurchem Exploration Vic Deposits Mining Plan, 2012

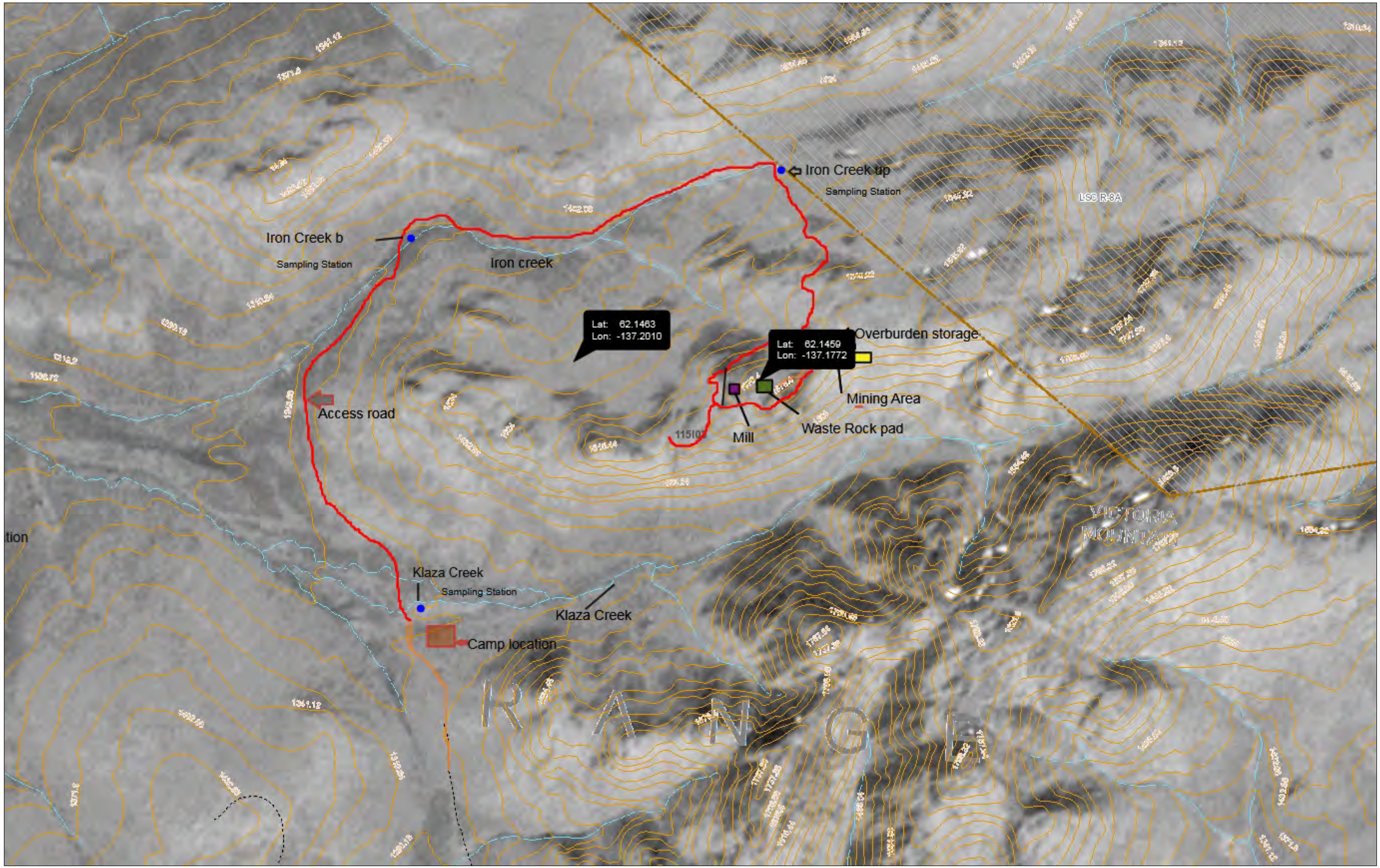
3. Per. Com. J.Chown, Vice President Aurchem Exploration Ltd.

4. Hydrological Atlas of Canada, Fisheries and Environment Canada, 1978

5. Aurchem Exploration, Vic Deposit ARD Investigation, Access Consulting Ltd. December 2012

Yukon
Energy, Mines and Resources

Aurchem Pilot Mill



Legend

- Land Applications - Active
- Land Applications - Denied
- Land Dispositions
  - Transfer Request
  - Agreement for Sale
  - Easement
  - Lease
  - Reservation
- Land Licenses
- Notations
- Development Hold Areas
- Surveyed Land Parcels
- Surveyed Easements
- Municipalities and Subdivisions
  - MUNICIPAL BOUNDARY
  - SPATIAL EXTENT
  - SUBDIVISION
- 1:10,000 Mapsheet Index
- 1:50,000 NTS Mapsheet Index
- Settlement Lands (Surveyed)
  - A: Surface and Subsurface Rights
  - B: Surface Rights
  - FS: Fee Simple
- Settlement Lands (Unsurveyed)
  - A
  - B
  - FS
- Interim Protected Lands (Unsu
- Areas withdrawn from staking
  - No
  - Yes
- NTS Trails and Cutlines (50K)
  - Cutline
  - Limited-use road
  - Trail
- Spot Height (50K)
- Contours (50K)
- Orthophotos - Whitehorse - 20

Notes

DWG 12900-1

1.3 0 0.64 1.3 Kilometers

Yukon Albers
Produced from: Yukon Mining Viewer

Scale: 1: 25,180

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

Date Printed: 26-Nov-2012

MAVERICK ZONE

SEDIMENT - PROCESS WATER POND

MILL LOCATION

WASTE ROCK DUMP

N 6 892 900
N 6 892 800
N 6 892 700
N 6 892 600
N 6 892 500

E 387 300
E 387 300
E 387 400
E 387 500
E 387 600
E 387 700
E 387 800

0 50 METERS

LEGEND:

- INDEX CONTOUR
- INTERMEDIATE CONTOUR
- EXPLORATION TRENCH
- ACCESS ROAD
- POND

NOTES:

1. BASE MAPPING NRCAN
2. SITE DATA AURCHEM EXPLORATION
3. CONTOUR INTERVAL 2m
4. ALL DIMENSIONS IN METERS

VISTA PROJ NO 12900-3

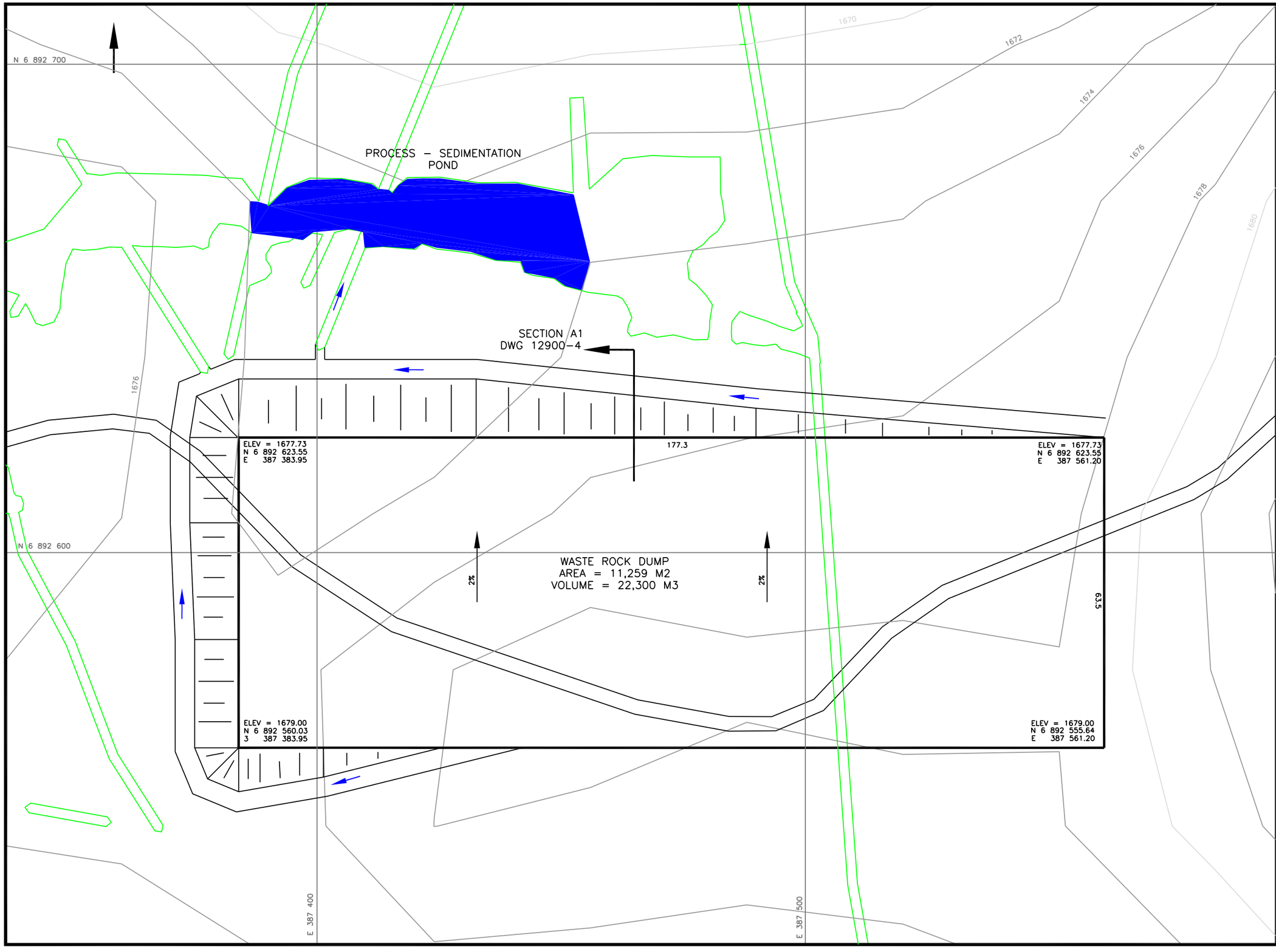
NO	REVISION	DATE	BY	APP'D

VISTA GEK LTD
803 WOOD ST, WHITEHORSE, YT, Y1A 2G6
867 393-3458 867 393-3465 FAX

JOB TITLE
AURCHEM VIC PROPERTY

DRAWING TITLE
2013 – 2018 MINING SITE PLAN

DESIGNED BY VM	SCALE NTS
DRAWN BY VM	DATE 28.11.2012
CHECKED BY	JOB NUMBER 2012-900
SHEET 2 OF 4	DRAWING NO 12900-2



LEGEND:

- INDEX CONTOUR
- INTERMEDIATE CONTOUR
- EXPLORATION TRENCH
- ACCESS ROAD
- POND
- DRAINAGE CHANNEL

NOTES:

1. BASE MAPPING NRCAN
2. SITE DATA AURCHEM EXPLORATION
3. CONTOUR INTERVAL 2m
4. ALL DIMENSIONS IN METERS
5. ENGINEER TO CONFIRM SUB-GRADE PRIOR TO CONSTRUCTION
6. MIN SWALE GRADE 0.5%
7. WASTE ROCK BROKEN BEDROCK 100mm MINUS MINIMUM
8. LINE SWALES WITH 100mm MINUS BROKEN ROCK OR COBBLES

PERMIT TO PRACTICE
YUKON ENGINEERS

VISTA PROJ NO 2012-900

NO	REVISION	DATE	BY	APP'D

VISTA TEK LTD
803 WOOD ST, WHITEHORSE, YT, Y1A 2G6
867 393-3456 867 393-3465 FAX

JOB TITLE
AURCHEM VIC PROPERTY

DRAWING TITLE
2013 – 2018 WASTE ROCK DUMP PLAN

DESIGNED BY VM	SCALE AS SHOWN
DRAWN BY VM	DATE 28.11.2012
CHECKED BY	JOB NUMBER 2012-900
SHEET 3 OF 4	DRAWING NO 12900-3