CONSTRUCTION SITE PLAN

Revision 1

BELLEKENO PROJECT

YUKON

ACCESS CONSULTING GROUP

www.accessconsulting.ca

November 2009

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1.0 INTRODUCTION

This document, prepared by Access Consulting Group of Whitehorse with input from EBA Engineering Consultants Ltd. and Wardrop Engineering Inc. of Vancouver, describes plans for construction of the Bellekeno Mine Project.

In order to achieve construction goals in the required time frame, this Construction Site Plan has been broken into three phases. Please refer to Figure 1-3 for an overview graphic description of the location of the three phases. Although approval for various parts of the construction plan will come under different licences, they are presented together here for the sake of coherence. Phase I has been submitted and approved by Energy Mines and Resources as a pre-season report addendum under existing MLU approval LQ00240, and described plans for reconstruction of the Christal Lake Road between the Duncan Creek Road and the Silver Trail Highway, plans for pioneering the Keno City Bypass, Flame and Moth mill site access road improvements and preparatory earthworks for the Flame and Moth mill pad. This submission is attached as Appendix I.

Phase II of the construction site plan (this submission) includes construction details for time sensitive elements of mill construction which need to be constructed before freeze up in 2009. Specifically, Phase II describes a number of plans for construction and general management plans including:

- Mill site foundations;
- Civil design criteria;
- Construction surface water management designs;
- Waste Management Plan;
- Preliminary Decommissioning and Reclamation Plan;
- Emergency Response Plan;
- Heritage Resources Protection Plan and;
- Wildlife Protection Plan.

Also included in Phase II of the construction site plan are details for construction of a temporary Potentially-AML waste rock storage Facility (P-AML WRSF) near the Bellekeno

East portal. Construction for this facility will be approved under authorization of Alexco's Class IV MLU approval LQ00240 but is included in this document for coherence.

Phase III of the construction site plan will include all remaining mine construction plans including those requiring the Type A Water Licence. This will include:

- Detailed design of the Dry Stack Tailings Facility (DSTF);
- Water management and treatment structures at the mill site;
- Mill building construction and mill site ancillary facilities;
- Final routing and construction details for Keno City Bypass;
- Camp expansion details including septic systems;
- Final non-AML Waste Rock Disposal Area (N-AML WRDA) designs;
- Plans for permanent Potentially-AML Waste Rock Storage Facilities (P-AML WRSF);
- Noise survey plans;

For a more detailed list of Phase III construction activities, see Section 4.4. The current project development schedule for construction and operation activities is outlined in Section 2.0 of this Construction Site Plan. Section 3.0 outlines the overall layout of the project facilities and associated mineral claims for the project area and the access road. Section 0 details Phase II construction activities proposed during the initial stages of construction, i.e. prior to the anticipated date of the issuance of a Type A Water Use Licence. Section 5.0 introduces environmental management and monitoring plans that will be implemented during construction activities to assure compliance with environmental provisions included in permits, legislation, corporate policies and industry Best Management Practices. Preliminary versions of these plans for project construction are appended and will be updated as the project progresses.

Project drawings are provided within Appendix A as well as within preliminary design reports, also appended to this document.

1.1 PROJECT DESCRIPTION

The Keno Hill Mining District is located in the vicinity of Keno City (63˚ 55'N, 135˚ 29'W), in central Yukon Territory, 354 km (by air) due north of Whitehorse. Access to the property is via a paved, two-lane highway from Whitehorse to Mayo (407 km) and an all-weather gravel road northeast from Mayo to Elsa (45 km); a total distance of 452 km. The property lies along the broad McQuesten River valley with three prominent hills to the south of the valley. Figure 1-1 shows the general project location within the Yukon Territory while Figure 1-2 shows the location on a smaller scale. The Bellekeno mine is located about 3 km east of Keno City, while the Flame and Moth mill site is about 1.2 km to the west (Figure 1-2).

The mining operation is designed to produce approximately 600,000 tonnes of ore and 500,000 tonnes of waste rock over the estimated five year mine life. A conventional flotation mill will process approximately 250 tonnes per day for years one and two, ramping up to 400 tonnes per day for years three to five for net production of approximately 25,500 tonnes of mill concentrate per year for the first two years of operation and 48,500 tonnes per year for years three to five. Ore crushing will be conducted only during the day shift (7am-7pm) but mining and other milling operations will be operated year round on a seven day per week, 24 hours per day basis.

A conventional flotation mill will be constructed at the site of former Flame and Moth underground & open pit mine. Run of Mine (ROM) mill feed will be delivered to the mill by haul trucks from the Bellekeno Mine site and dumped directly into a mobile crushing unit or ROM stockpile. This crushing unit will consist of one jaw crusher, one cone crusher, and one vibrating screen in a closed circuit. The crushed material (-13 mm) will be conveyed to a fine mill feed storage stockpile with 550 tonnes live capacity. The crushed material from the fine mill feed stockpile will be discharged through a draw down pocket onto a ball mill feed conveyor. The mill process will employ conventional crushing, grinding, flotation, and dewatering processes. The sulphides in the mill feed will be recovered by conventional differential flotation with a cyanide-free zinc suppressing regime. Silver and lead minerals will be recovered together to produce a silver-lead bulk concentrate and zinc minerals will be recovered to a separate zinc concentrate.

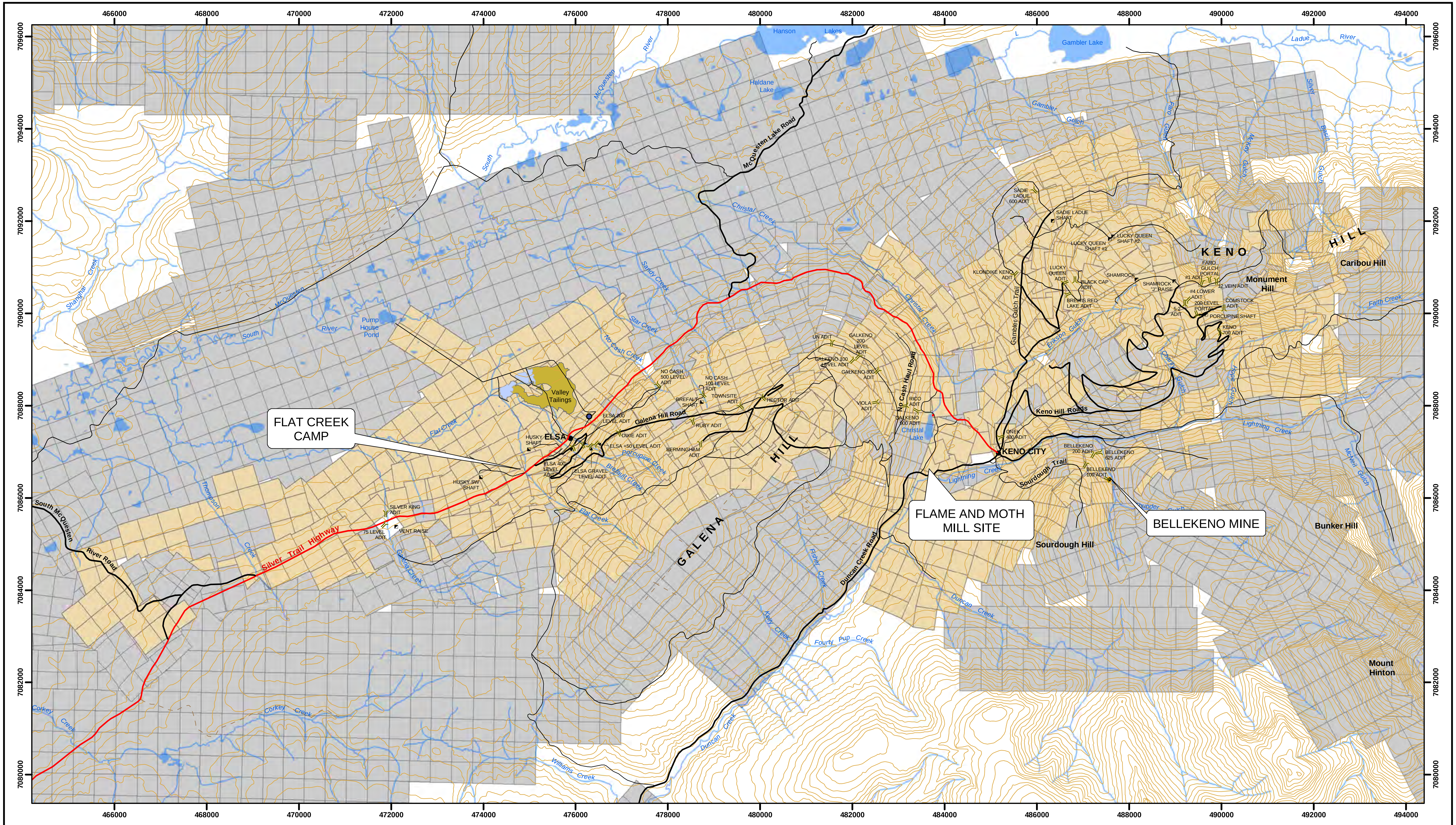
The final tailings from the zinc flotation circuit will be further floated to remove pyrite before being dewatered and backfilled in the underground mine. The pyrite concentrate will be hauled to the Bellekeno mine and used as backfill below the static water level in the mine. This improves the geochemical stability of the Dry Stack Tailings Facility and places the pyrite in a stable, secure location. Pressure filters will dewater all tailings to approximately 85% solids on a batch basis, producing material for conventional dry stack tailings (depyritized) and paste fill material (depyritized and pyritic concentrate) for underground backfill. Dewatered tailings will be discharged onto conveyor belts, and into two separate stockpiles before being loaded onto a truck for surface deposition as dry stack or to the underground backfill plant. Approximately 50% of the total tailings amount (only depyritized tailings) will be deposited as dry stack. All the pyrite concentrate together with the remaining depyritized tailings will be deposited underground for use in paste backfill.

Meteoric runoff and drainage from the dry stack tailings facility (DSTF) and mill pad will be collected using water diversion and collection systems. A common water collection/polishing pond will be situated between the DSTF and mill pad for runoff and mill discharge collection. Conventional lime treatment will be applied as necessary in order to meet water licence discharge standards.

All wastewater from the Bellekeno mine reports to the Bellekeno 625 treatment facility, which is licensed under Water Licence QZ06-074 and consists of conventional wastewater treatment technology using continual lime addition to treat mine portal effluent.

The majority of construction activities for Bellekeno Mine Development will occur at the mill site (at former Flame and Moth pit). At Bellekeno East, a number of mine related facilities are already permitted and in use for ongoing care and maintenance, surface exploration, and advanced underground exploration and development. These facilities will continue to be utilized to support Bellekeno mine operations. With the exception of the temporary potentially-AML waste rock storage facility, no additional construction will be required at the Bellekeno mine site during Phase II of construction.

Figure 1-1 Project Location Map within Yukon



Legend

N

1:75,000

(when plotted on 11x17 inch sheet)

0 1 2 4 6 km

Topography

- Town
- Silver Trail
- Secondary Road
- Limited-use road
- Trail
- Watercourse
- Waterbody

Mine Workings

- Valley Tailings
- Adit
- Shaft (to surface - connection to underground not determined)

Notes:
This map is for illustrative purposes only.
This is not a legal document.
National Topographic Data Base (NTDB) compiled by Natural Resources Canada at a scale of 1:50,000. Cadastral data compiled by Natural Resources Canada. Reproduced under license from © Her Majesty the Queen in Right of Canada, Department of Natural Resources Canada. All rights reserved.
Quartz claim boundaries are current as of November 21, 2008.
Data source: http://geomaticsyukon.ca.
Ownership is current as of November 26. Claim status report obtained from the Mining Recorder (Mayo)
Projection: UTM Zone 8 NAD83
NTS Sheet 105M/13 and 105M/14

ALEXCO

ACCESS

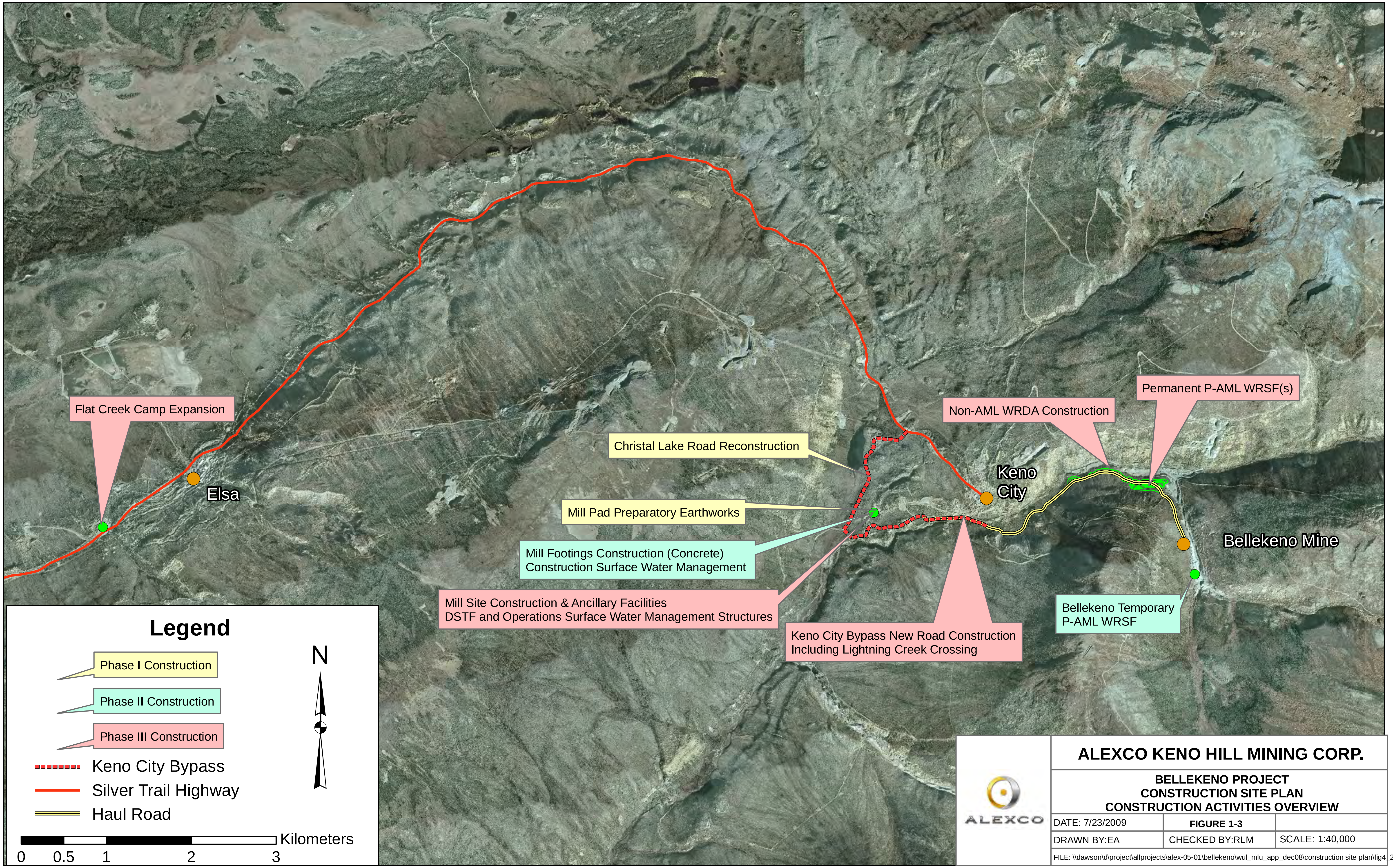
ALEXCO KENO HILL MINING CORP.

BELLEKENO PROJECT

CONSTRUCTION SITE PLAN

PROPERTY OVERVIEW AND SITE LOCATION MAP

Drawn By: HD	DATE: 7/22/2009	FIGURE 1-2
Checked by: DC	FILE: \\dawson\d\project\allprojects\alex-05-01\bellekeno\wul_mlu_app_dec08\fig1_2_propertyloc_b.mxd	


Flat Creek Camp Expansion
Elsa
Christal Lake Road Reconstruction
Keno City
Non-AML WRDA Construction
Permanent P-AML WRSF(s)
Mill Pad Preparatory Earthworks
Mill Footings Construction (Concrete)
Construction Surface Water Management
Bellekeno Mine
Mill Site Construction & Ancillary Facilities
DSTF and Operations Surface Water Management Structures
Keno City Bypass New Road Construction
Including Lightning Creek Crossing
Bellekeno Temporary
P-AML WRSF
Legend
Phase I Construction
Phase II Construction
Phase III Construction
Keno City Bypass
Silver Trail Highway
Haul Road
N
0 0.5 1 2 3 Kilometers
ALEXCO
ALEXCO KENO HILL MINING CORP.
BELLEKENO PROJECT
CONSTRUCTION SITE PLAN
CONSTRUCTION ACTIVITIES OVERVIEW
DATE: 7/23/2009
FIGURE 1-3
DRAWN BY:EA
CHECKED BY:RLM
SCALE: 1:40,000
FILE: \\dawson\d\project\allprojects\alex-05-01\bellekeno\wul_mlu_app_dec08\construction site plan\fig4_2 borrow are

1.2 MINOR PERMITTING

In addition to a Quartz Mining Licence various minor permits will be required during the construction phase of the Bellekeno Mine Project; these permits will have specific terms and conditions pertaining to installation and construction of facilities. Some typical permits required (but not limited to) are described below:

An Access to Highway Permit will required from YG Highways and Public Works, Transportation Maintenance Branch for connecting the Christal Lake road to the Silver Trail Highway (Application Form for Construction or Modification of an Access to a Controlled Highway). A preliminary meeting and site inspection with YG Highways and Public Works was held in October, 2008 regarding the intersection of the Christal Lake Road with the Silver Trail Highway indicated that this access site will require widening and brushing to increase visibility but is otherwise suitable for highway access.

An Access to Highway Permit may also be required for the intersection between Christal Lake road and Keno City Bypass with Duncan Creek Road. A joint site inspection between Alexco and Government of Yukon Department of Highways of the Duncan Creek road near Keno City occurred on June 24, 2009. Department of Highways has committed to facilitating our construction activities by undertaking upgrading work on Duncan Creek road during the summer of 2009. Specifically, this work may consist of brushing, clearing, and realignment of portions of the Duncan Creek road in the vicinity of the intersections of the Flame and Moth access road and the intersection of the Keno City Bypass Phase II. These measures will improve the sight distances and suitability of the intersections for mine haul traffic. A number of additional minor permits will need to be obtained or amended to include Bellekeno mine facilities:

- An Air Emissions Permit No. 4201-60-026 is currently held from YG Environment in accordance with the Environment Act *Air Emissions Regulations*. This permit will continue to be used in support of the Bellekeno Mine operation.

- A Commercial Dump Permit No. 81-012 is currently held from YG Environment in accordance with the Environment Act *Solid Waste Regulations* as well as the Public

Health and Safety Act. This permit will continue to be used in support of the Bellekeno Mine operation.

- Alexco currently holds two (2) sewage disposal system permits at Elsa issued by YG Environmental Health Services: one septic system permit for the Flat Creek Camp (Permit #3012) and a septic system for the four houses (Permit #3131) constructed in 2008. Should the planned camp expansion at Flat Creek Camp require expansion of the existing septic system, plans for this expansion will be submitted as part of Phase III of the construction site plan.

- Special Waste Permit No. 41-199 is currently held from YG Environment in accordance with the Environment Act *Special Waste Regulations* for burning waste oil, generating and/or storing waste batteries, waste oil, waste solvents, and other special wastes.

- A Land Treatment Facility Permit will be required from YG Environment in accordance with the Environment Act *Contaminated Sites Regulation*.

- A Storage Tank System Permit is required from YG Environment in accordance with the Environment Act *Storage Tank Regulations* for installation and operation of fuel storage tanks.

- Various permits including Electrical, Plumbing, Gas Installation and Building will be required for building construction from YG Community Services.

2.0 PROJECT SCHEDULE

The project was assessed by the Mayo designated office of YESAB under file number 2009-0030. The YESAB recommendations report which recommended the project proceed subject to recommended terms and conditions of mitigation measures is was issued on June 11, 2009. A YG Decision Document was received on July 11, completing the environmental and socioeconomic assessment. The completion of these two activities is a key step in the development of the project as only then can the Quartz Mining Licence (QML), which is required for construction to commence and ultimately for operation (in conjunction with the Type A Water Use Licence), be issued. It is understood that existing MLU authorization LQ00240 and a phased QML will enable initial project construction prior to issuance of the Water Use Licence.

The schedule assumes phased commencement of site construction by July 2009, commensurate with approvals as outlined elsewhere in this document. Commencement of milling and shipping concentrate is expected by the third quarter of 2010. See Figure 2-1 below for a detailed project schedule for Phase I and II of construction. A detailed schedule for Phase III of construction will be submitted in subsequent Mill Development and Operations Plan and Mine Development and Operations Plan.

Figure 2-1 Phase II Building Foundation Construction Schedule

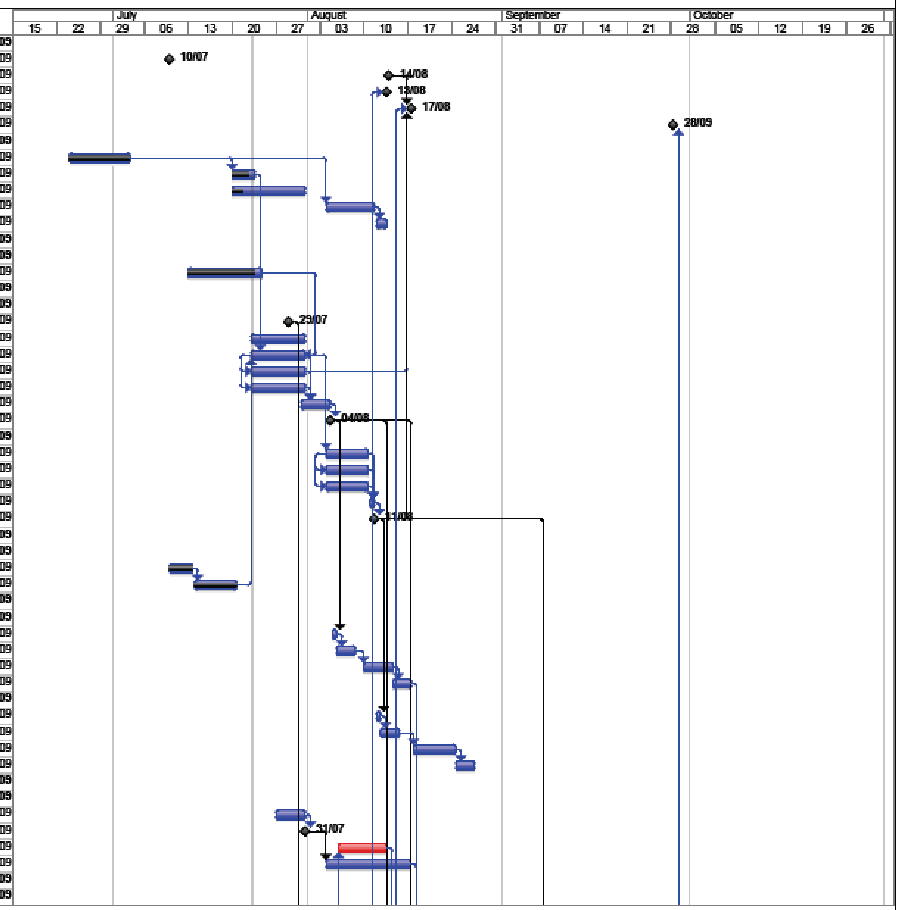
WARDROP
A TETRA TECH COMPANY

MILL BUILDING FOUNDATION SCHEDULE

PRELIMINARY ISSUE

ALEXCO

ID	Task Name	Duration	Start	Finish
1	**Major Milestones**	**53.13 days**	**Fri 10/07/09**	**Mon 28/09/09**
2	Scope Change Award	0 days	Fri 10/07/09	Fri 10/07/09
3	Construction Site Plan Approval	0 days	Fri 14/08/09	Fri 14/08/09
4	Start Formwork Placement	0 days	Thu 13/08/09	Thu 13/08/09
5	Start Concrete Pour	0 days	Mon 17/08/09	Mon 17/08/09
6	Finish Concrete Pour	0 days	Mon 28/09/09	Mon 28/09/09
7	**Geotechnical (EBA)**	**35 days**	**Wed 24/06/09**	**Thu 13/08/09**
8	Prepare & Issue Proposal for Final Geotechnical Report	7 days	Wed 24/06/09	Fri 03/07/09
9	Prepare & Issue Geotechnical Memo	4 days	Mon 20/07/09	Thu 23/07/09
10	Receive Final Geotechnical Report	10 days	Mon 20/07/09	Fri 31/07/09
11	Aggregate Testing	6 days	Tue 04/08/09	Tue 11/08/09
12	Concrete Mix Design	2 days	Wed 12/08/09	Thu 13/08/09
13	**Engineering**	**21 days**	**Mon 13/07/09**	**Tue 11/08/09**
14	**Prepare & Issue Optimized Layout**	**10 days**	**Mon 13/07/09**	**Fri 24/07/09**
15	Prepare & Issue Optimized Layout	10 days	Mon 13/07/09	Fri 24/07/09
16	**Structural**	**13 days**	**Thu 23/07/09**	**Tue 11/08/09**
17	**Concrete Package #1 - Building Foundations**	**8 days**	**Thu 23/07/09**	**Tue 04/08/09**
18	Issue Preliminary Foundation Arrangement to Order Formwork Materials	0 days	Wed 29/07/09	Wed 29/07/09
19	Prepare and Issue General Notes and Details - Building Foundations	7 days	Thu 23/07/09	Fri 31/07/09
20	Prepare and Issue Foundation Plan - Building Foundations	7 days	Thu 23/07/09	Fri 31/07/09
21	Prepare and Issue Elevation Drawing - Building Foundations	7 days	Thu 23/07/09	Fri 31/07/09
22	Prepare and Issue Section & Detail Drawing - Building Foundations	7 days	Thu 23/07/09	Fri 31/07/09
23	Review Drawings - Building Foundations	2 days	Fri 31/07/09	Tue 04/08/09
24	Issue Drawings - Building Foundations	0 days	Tue 04/08/09	Tue 04/08/09
25	**Concrete Package #2 - Slab-On-Grade**	**6 days**	**Tue 04/08/09**	**Tue 11/08/09**
26	Prepare and Issue Slab on Grade Drawing - Slab-on-Grade	5 days	Tue 04/08/09	Mon 10/08/09
27	Prepare and Issue Elevation Drawing - Slab-on-Grade	5 days	Tue 04/08/09	Mon 10/08/09
28	Prepare and Issue Section & Detail Drawing - Slab-on-Grade	5 days	Tue 04/08/09	Mon 10/08/09
29	Review Drawings - Slab-on-Grade	1 day	Tue 11/08/09	Tue 11/08/09
30	Issue Drawings - Slab-on-Grade	0 days	Tue 11/08/09	Tue 11/08/09
31	**Procurement**	**33 days**	**Fri 10/07/09**	**Thu 27/08/09**
32	**Pre-Eng. Building Reaction Settings**	**7 days**	**Fri 10/07/09**	**Mon 20/07/09**
33	Issue PO for Preliminary Engineering	2 days	Fri 10/07/09	Mon 13/07/09
34	Prepare & Issue Report for Reaction Settings	5 days	Tue 14/07/09	Mon 20/07/09
35	**Re-Bar**	**16 days**	**Wed 05/08/09**	**Thu 27/08/09**
36	**Re-Bar - Concrete Package #1**	**8 days**	**Wed 05/08/09**	**Mon 17/08/09**
37	Award - Re-Bar for Concrete Package #1	1 day	Wed 05/08/09	Wed 05/08/09
38	Detailing Rebar for Concrete Package #1	3 days	Wed 05/08/09	Sat 08/08/09
39	Fabrication / Bending - Re-Bar for Concrete Package #1	5 days	Mon 10/08/09	Fri 14/08/09
40	Delivery at Site - Re-Bar for Concrete Package #1	3 days	Fri 14/08/09	Mon 17/08/09
41	**Re-Bar - Concrete Package #2**	**11 days**	**Wed 12/08/09**	**Thu 27/08/09**
42	Award - Re-Bar for Concrete Package #2	1 day	Wed 12/08/09	Wed 12/08/09
43	Detailing Rebar for Concrete Package #2	3 days	Wed 12/08/09	Sat 15/08/09
44	Fabrication / Bending - Re-Bar for Concrete Package #2	5 days	Tue 18/08/09	Mon 24/08/09
45	Delivery at Site - Re-Bar for Concrete Package #2	3 days	Mon 24/08/09	Thu 27/08/09
46	**Contract**	**14 days**	**Mon 27/07/09**	**Mon 17/08/09**
47	**Concrete**	**14 days**	**Mon 27/07/09**	**Mon 17/08/09**
48	Obtain Firm Pricing - Concrete Supply & Install	5 days	Mon 27/07/09	Fri 31/07/09
49	Award - Concrete Supply & Install	0 days	Fri 31/07/09	Fri 31/07/09
50	Contractor Mobilize to Site - Formwork & Rebar Placement	6 days	Thu 06/08/09	Thu 13/08/09
51	Contractor Mobilize to Site - Concrete Supply & Install	14 days	Tue 04/08/09	Mon 17/08/09
52	**Construction**	**77.88 days**	**Wed 15/07/09**	**Mon 28/09/09**
53	**Earthworks**	**21.25 days**	**Wed 15/07/09**	**Tue 04/08/09**



Project: Bellekeno Project - Master Sc
Date: Thu 23/07/09

Task | Split | Progress | Milestone | Summary | Project Summary | External Tasks | External Milestone | Deadline | Critical

Page 1

Figure 2-1 (continued) Phase II Building Foundation Construction Schedule

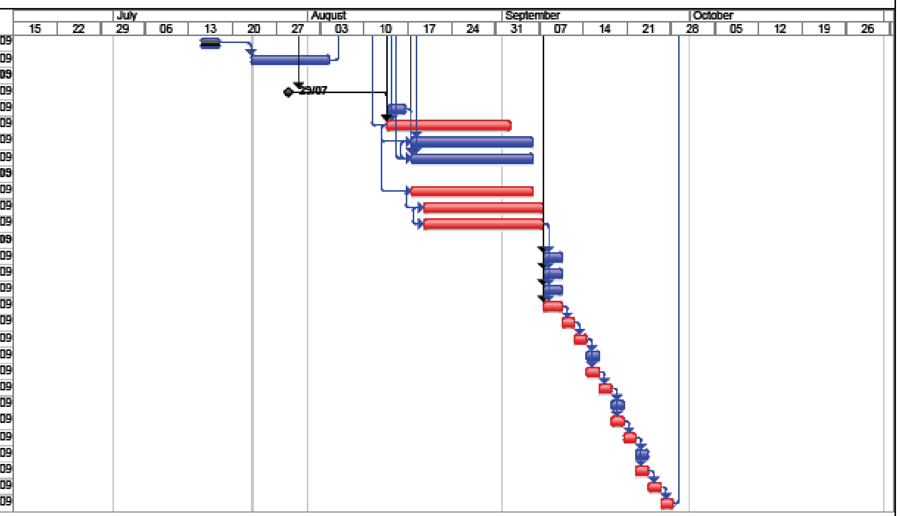
WARDROP
A TETRA TECH COMPANY

MILL BUILDING FOUNDATION SCHEDULE

PRELIMINARY ISSUE

ALEXCO

ID	Task Name	Duration	Start	Finish
54	Clearing & Grubbing	3 days	Wed 15/07/09	Fri 17/07/09
55	Civil Bulk Earthworks (Pad Preparation)	13 days	Thu 23/07/09	Tue 04/08/09
56	**Building Footing Foundations**	**40.38 days**	**Wed 29/07/09**	**Sat 05/09/09**
57	Order Formwork Materials	0 days	Wed 29/07/09	Wed 29/07/09
58	Grounding - Building Footing Foundations	3 days	Fri 14/08/09	Sun 16/08/09
59	Formwork Placement - Building Footing Foundations	20 days	Thu 13/08/09	Wed 02/09/09
60	Rebar Placement - Building Footing Foundations	20 days	Mon 17/08/09	Sat 05/09/09
61	Concrete Pour - Building Footing Foundations	20 days	Mon 17/08/09	Sat 05/09/09
62	**Building Grade Beams**	**22 days**	**Mon 17/08/09**	**Mon 07/09/09**
63	Formwork Placement - Building Grade Beams	20 days	Mon 17/08/09	Sat 05/09/09
64	Rebar Placement - Building Grade Beams	20 days	Wed 19/08/09	Mon 07/09/09
65	Concrete Pour - Building Grade Beams	20 days	Wed 19/08/09	Mon 07/09/09
66	**Slab-on-Grade**	**21 days**	**Mon 07/09/09**	**Mon 28/09/09**
67	Sump Pits	3 days	Mon 07/09/09	Thu 10/09/09
68	Embedded Metal Placement	3 days	Mon 07/09/09	Thu 10/09/09
69	Grounding	3 days	Mon 07/09/09	Thu 10/09/09
70	Insulation	3 days	Mon 07/09/09	Thu 10/09/09
71	Formwork for Slab Pour Section 1	2 days	Thu 10/09/09	Sat 12/09/09
72	Rebar Placement for Slab Pour Section 1	2 days	Sat 12/09/09	Mon 14/09/09
73	Concrete Pour for Section 1	2 days	Mon 14/09/09	Wed 16/09/09
74	Formwork for Slab Pour Section 2	2 days	Mon 14/09/09	Wed 16/09/09
75	Rebar Placement for Slab Pour Section 2	2 days	Wed 16/09/09	Fri 18/09/09
76	Concrete Pour for Section 2	2 days	Fri 18/09/09	Sun 20/09/09
77	Formwork for Slab Pour Section 3	2 days	Fri 18/09/09	Sun 20/09/09
78	Rebar Placement for Slab Pour Section 3	2 days	Sun 20/09/09	Tue 22/09/09
79	Concrete Pour for Section 3	2 days	Tue 22/09/09	Thu 24/09/09
80	Formwork for Slab Pour Section 4	2 days	Tue 22/09/09	Thu 24/09/09
81	Rebar Placement for Slab Pour Section 4	2 days	Thu 24/09/09	Sat 26/09/09
82	Concrete Pour for Section 4	2 days	Sat 26/09/09	Mon 28/09/09



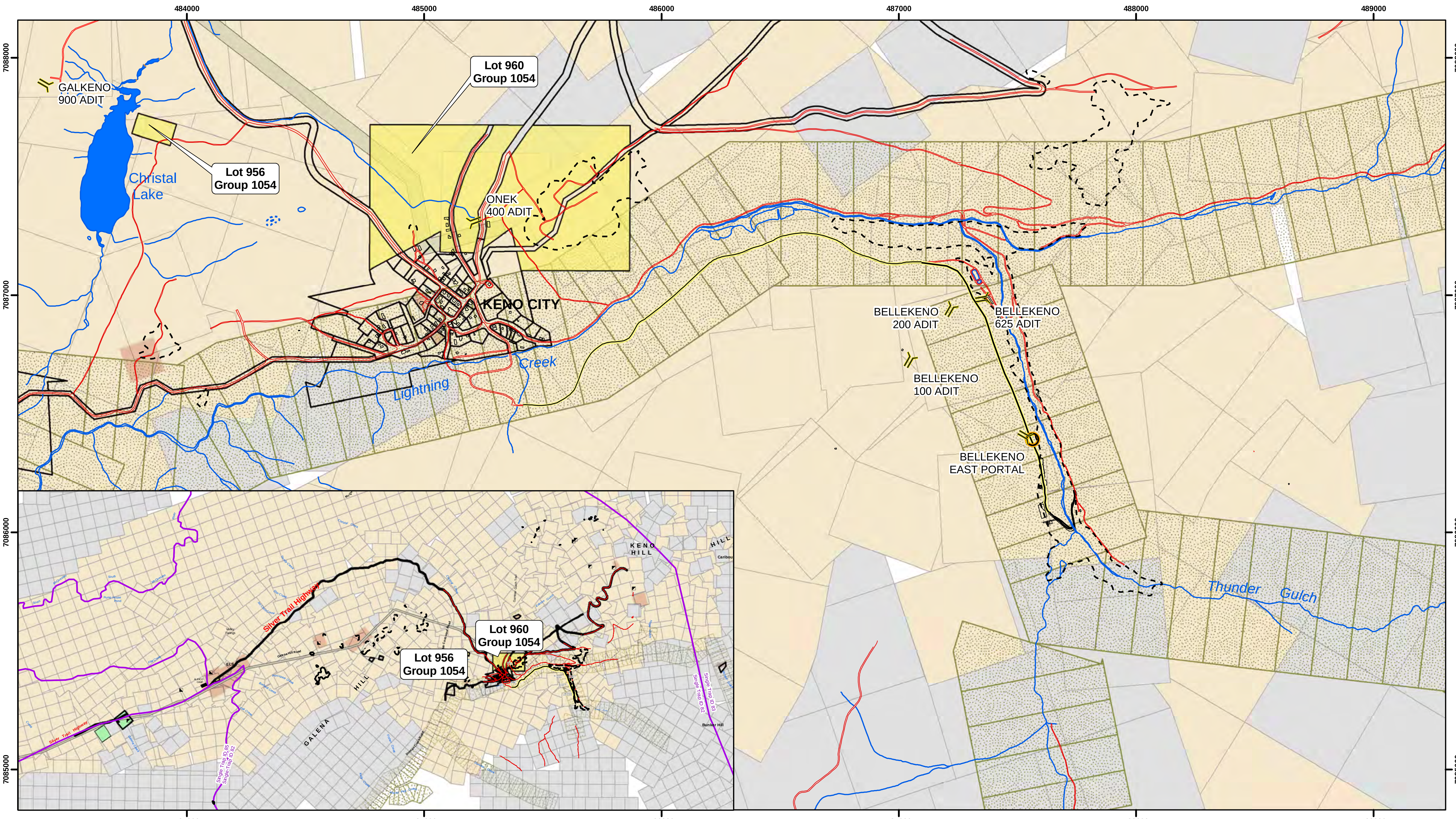
Project: Bellekeno Project - Master Sc
Date: Thu 23/07/09

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone | Critical

Page 2

3.0 LAND TENURE AND MINERAL CLAIMS

The project site is located in the Mayo Mining District of the Yukon and consists of 1563 quartz claims, quartz claim fractions, quartz leases, and quartz lease fractions as shown on Figure 3-1. This map was adapted from the Yukon Government's mining recorders' website.



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(when plotted on 11x17 inch sheet)
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Legend

- Elsa Reclamation and Development Co.and Alexco Resources Canada Corp. Quartz Claims
- Other Quartz Claim
- Surveyed Quartz Claim

Land Tenure

- Alexco Resource Corp. Land Parcel
- Land Parcel
- Land Disposition
- Easement
- Placer Claim & Lease

Mine Workings

- Adit
- Shaft (to surface - connection to underground not determined)
- Portal Location
- Pit/Placer

Topography

- Haul Road
- Public Road
- Exploration Roads
- Watercourse (Actual and Potential)
- Waterbody

Notes:
This map is for illustrative purposes only.This is not a legal document.
Quartz claim boundaries are current as of November 21, 2008.
Placer claim boundaries are current as of November 28, 2008.
Data source: http://geomaticsyukon.ca.
Quartz claim ownership is current as of November 26.
Claim status report obtained from the Mining Recorder (Mayo)
Land Disposition data obtained from EMR Lands, current as of Oct. 2, 2008.
Data source: http://geomaticsyukon.ca.
Cadastral Data obtained from NRCAN via ftp://ftpyukonccm.nrcan.gc.ca.
Data current as of Dec. 1, 2008.
Projection UTM Zone 8 NAD83

ALEXCO KENO HILL MINING CORP.
BELLEKENO MINE DEVELOPMENT
CONSTRUCTION SITE PLAN

LAND USE

Drawn By: HD	DATE: 7/22/2009	FIGURE 3-1
Checked by: RM	FILE: \\dawson\d\project\allprojects\alex-05-01\bellekeno\wul_mlu_app_dec08\fig4_2_landuse20090708.mxd	

3.1 CLAIMS AFFECTED BY CONSTRUCTION

A total of 66 quartz claims and 37 placer claims will be directly affected by construction related to Bellekeno Mine development (see Table 3-1 and Table 3-22, respectively). Of the quartz claims, 63 of these belong to Alexco through wholly owned subsidiaries Alexco Keno Hill Mining Corp. or Elsa Reclamation and Development Company and 3 belong to M. Bindig of Erikson Gulch near Keno City (see Figure 3-3). Of the placer claims which may be affected by construction, 21 are owned by Bardusan Placers Ltd. and the remaining 16 are owned by Frank Taylor.

Table 3-1 Quartz Claims Affected by Construction

LABEL	GRANTNUMBER	CLAIM_TYPE	STATUS	Claim_Owner
DAISY FRACTION	59645	Quartz	Active	AKHM
WILDCAT	55426	Quartz	Active	AKHM
K 30	YC42578	Quartz	Active	AKHM
LEM 1	YA17395	Quartz	Active	AKHM
K 93	YC56120	Quartz	Active	AKHM
K 32	YC42580	Quartz	Active	AKHM
LEM 3	YA17397	Quartz	Active	AKHM
K 94	YC56121	Quartz	Active	AKHM
SOLOMAN	55445	Quartz	Active	AKHM
DAVID	16097	Quartz	Active	AKHM
K 80	YC42628	Quartz	Active	AKHM
K 79	YC42627	Quartz	Active	AKHM
K 88	YC56115	Quartz	Active	AKHM
K 81	YC42629	Quartz	Active	AKHM
PUEBLO	59387	Quartz	Active	ERDC
MONTY	55312	Quartz	Active	ERDC
HUSKY 10	55546	Quartz	Active	ERDC
FRANCES 6	56402	Quartz	Active	ERDC
BES	56533	Quartz	Active	ERDC
IKWOGGY	16554	Quartz	Active	ERDC
LUCKY	16585	Quartz	Active	ERDC
FRANCES 3	55599	Quartz	Active	ERDC
RAM	13073	Quartz	Active	ERDC
ROSEMARY	55271	Quartz	Active	ERDC
SUDDO 9	59465	Quartz	Active	ERDC
WHIPSAW	14081	Quartz	Active	ERDC
EUREKA	14327	Quartz	Active	ERDC
SILVER FR.	38730	Quartz	Active	ERDC
TIPTOP	55065	Quartz	Active	ERDC
SEGLE	56534	Quartz	Active	ERDC

Table 3-2 Quartz Claims Affected by Construction (Continued)

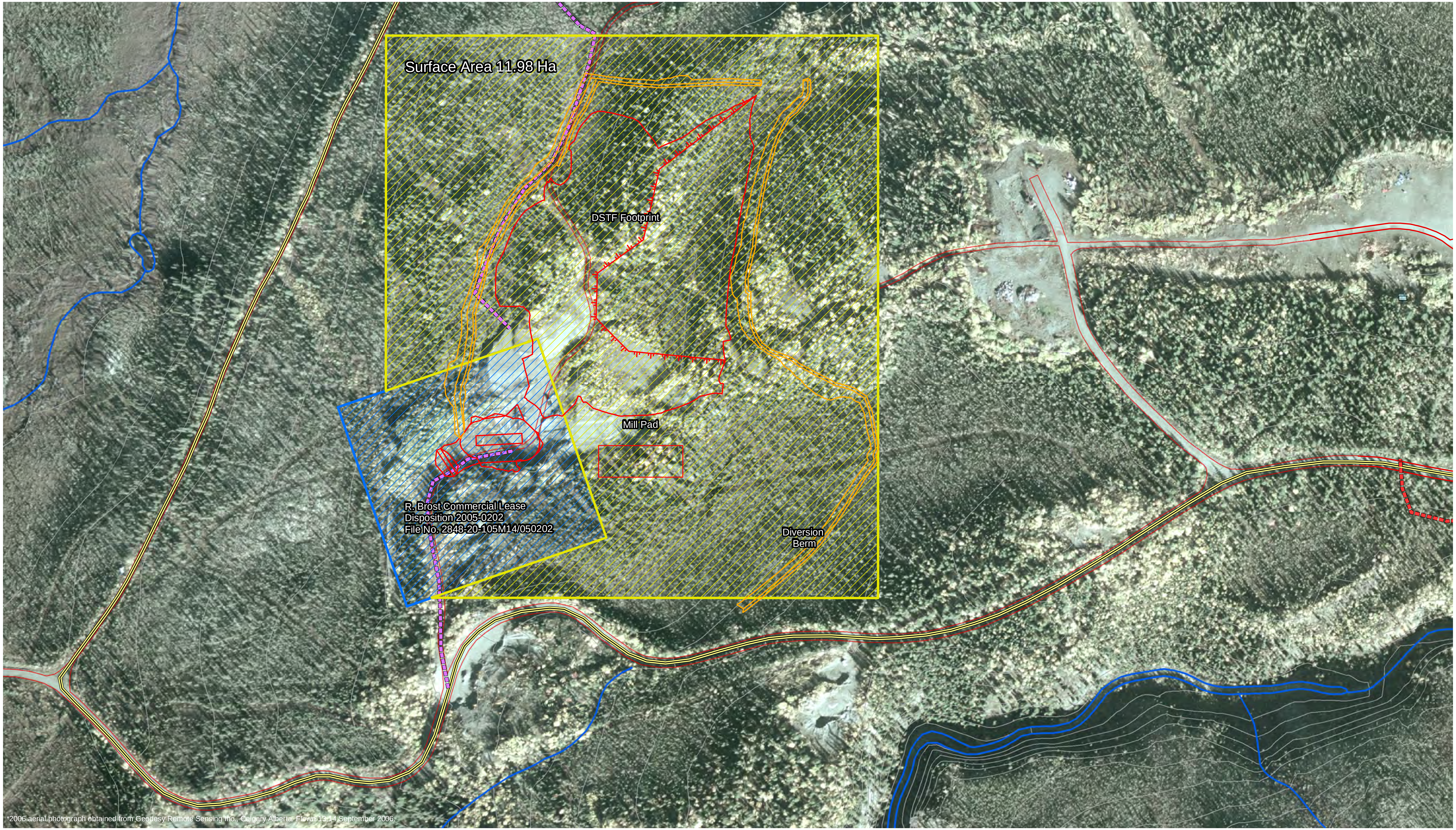
LABEL	GRANTNUMBER	CLAIM_TYPE	STATUS	Claim_Owner
MOTH	38642	Quartz	Active	ERDC
EXTENSION	16087	Quartz	Active	ERDC
BOBBIE 10	59494	Quartz	Active	ERDC
TUNDRA	12838	Quartz	Active	ERDC
FRANCES 5	56401	Quartz	Active	ERDC
ADAM FRACTION	83011	Quartz	Active	ERDC
HUSKY 8	55544	Quartz	Active	ERDC
ELI	55319	Quartz	Active	ERDC
ASTORIA	38819	Quartz	Active	ERDC
VALLEY	59338	Quartz	Active	ERDC
BETTY	16105	Quartz	Active	ERDC
BRISTOL	59316	Quartz	Active	ERDC
FLAME	38643	Quartz	Active	ERDC
FRANCES 7	56403	Quartz	Active	ERDC
OVERTIME 2	56582	Quartz	Active	ERDC
WESTON	16557	Quartz	Active	ERDC
TICK	15207	Quartz	Active	ERDC
HUSKY 6	55542	Quartz	Active	ERDC
HUSKY 4	55540	Quartz	Active	ERDC
VENTURE	16375	Quartz	Active	ERDC
NANCY	15374	Quartz	Active	ERDC
PREMIER	55029	Quartz	Active	ERDC
MONTE CARLO	16569	Quartz	Active	ERDC
ACRE FRACTION	56575	Quartz	Active	ERDC
APEX RF.	56443	Quartz	Active	ERDC
NOD FR.	16170	Quartz	Active	ERDC
FALLS 16	59452	Quartz	Active	ERDC
FRANCES 4	55600	Quartz	Active	ERDC
CHANCE	55120	Quartz	Active	ERDC
ARIZONA	16561	Quartz	Active	ERDC
SUDDO 7	59463	Quartz	Active	ERDC
CATHY FRACTION	83012	Quartz	Active	ERDC
SAM	55327	Quartz	Active	ERDC
RAGE 2	YC39563	Quartz	Active	Matthias Bindig
RAGE 1	YC39562	Quartz	Active	Matthias Bindig
RAGE 3	YC48007	Quartz	Active	Matthias Bindig

Table 3-3 Placer Claims Affected by Construction

Claim Name	Nbr	Grant Number	RegType	Claim Owner	Record Date	Expiry Date	NTS
Creek Claim	8	3742	Placer	Bardusan Placers Ltd.		10/11/2018	105M14
Creek Claim	7	3736	Placer	Bardusan Placers Ltd.	7/7/1964	10/11/2018	105M14
Creek Claim	6	3735	Placer	Bardusan Placers Ltd.	7/7/1964	10/11/2018	105M14
Creek Claim	5	3734	Placer	Bardusan Placers Ltd.	7/7/1964	10/11/2018	105M14
Creek Claim	4	3733	Placer	Bardusan Placers Ltd.	7/7/1964	10/11/2018	105M14
Creek Claim	3	3732	Placer	Bardusan Placers Ltd.	7/7/1964	10/11/2018	105M14
Creek Claim	2	3731	Placer	Bardusan Placers Ltd.	7/7/1964	10/11/2018	105M14
Creek Claim	1	3730	Placer	Bardusan Placers Ltd.	7/7/1964	10/11/2018	105M14
L	9	P 02187	Placer	Bardusan Placers Ltd.	10/11/1977	10/11/2018	105M14
L	8	P 02186	Placer	Bardusan Placers Ltd.	10/11/1977	10/11/2018	105M14
L	7	P 02185	Placer	Bardusan Placers Ltd.	10/11/1977	10/11/2018	105M14
L	6	P 02184	Placer	Bardusan Placers Ltd.	10/11/1977	10/11/2018	105M14
L	5	P 02183	Placer	Bardusan Placers Ltd.	10/11/1977	10/11/2018	105M14
L	4	P 02182	Placer	Bardusan Placers Ltd.	10/11/1977	10/11/2018	105M14
L	3	P 02181	Placer	Bardusan Placers Ltd.	10/11/1977	10/11/2018	105M14
L	2	P 02180	Placer	Bardusan Placers Ltd.	10/11/1977	10/11/2018	105M14
L	1	P 02179	Placer	Bardusan Placers Ltd.	10/11/1977	10/11/2018	105M14
L	4	P 16061	Placer	Bardusan Placers Ltd.	10/19/1988	10/11/2017	105M14
L	3	P 16060	Placer	Bardusan Placers Ltd.	10/19/1988	10/11/2017	105M14
L	2	P 16059	Placer	Bardusan Placers Ltd.	10/19/1988	10/11/2017	105M14
L	1	P 16058	Placer	Bardusan Placers Ltd.	10/19/1988	10/11/2017	105M14
Will	16	P 47972	Placer	Frank Taylor	6/29/2007	6/29/2010	105M14
Will	15	P 47971	Placer	Frank Taylor	6/29/2007	6/29/2010	105M14
Will	14	P 47970	Placer	Frank Taylor	6/29/2007	6/29/2010	105M14
Will	13	P 47969	Placer	Frank Taylor	6/29/2007	6/29/2010	105M14
Will	12	P 47968	Placer	Frank Taylor	6/29/2007	6/29/2010	105M14
Will	11	P 47926	Placer	Frank Taylor	11/1/2005	7/1/2010	105M14
Will	10	P 47925	Placer	Frank Taylor	11/1/2005	7/1/2010	105M14
Will	9	P 47924	Placer	Frank Taylor	11/1/2005	7/1/2010	105M14
Will	8	P 47923	Placer	Frank Taylor	11/1/2005	7/1/2010	105M14
Will	7	P 47922	Placer	Frank Taylor	11/1/2005	7/1/2010	105M14
Will	6	P 47921	Placer	Frank Taylor	11/1/2005	7/1/2010	105M14
Will	5	P 47920	Placer	Frank Taylor	11/1/2005	7/1/2010	105M14
Will	4	P 47919	Placer	Frank Taylor	11/1/2005	7/1/2010	105M14
Will	3	P 47918	Placer	Frank Taylor	11/1/2005	7/1/2010	105M14
Will	2	P 47917	Placer	Frank Taylor	11/1/2005	7/1/2010	105M14
Will	1	P 47916	Placer	Frank Taylor	11/1/2005	7/1/2010	105M14

3.2 MILL SITE TENURE

Alexco holds the quartz mining claims underlying the mill site and proposed DSTF area. In order to increase the level of tenure for the area around the Mill Site and ancillary facilities and the DSTF, a commercial lease has been applied for through Yukon Government EM&R Lands Branch (see Figure 3-2). The owner of commercial lease 105M14-050202 in the vicinity of the Flame and Moth area, Mr. R. Brost, has quit claim on the lease. This area will be added to Alexco's Flame and Moth lease area. Yukon Government will issue the mill site area lease with the quartz mining licence.



N

1:2,500
(when plotted on 11x17 inch sheet)

0 50 100 200 m

Legend

- Existing Commercial Lease
- Proposed Surface Lease Area
- Potential Mill Access Road
- Haul Route
- Public Road
- Exploration roads
- Contour

ALEXCO

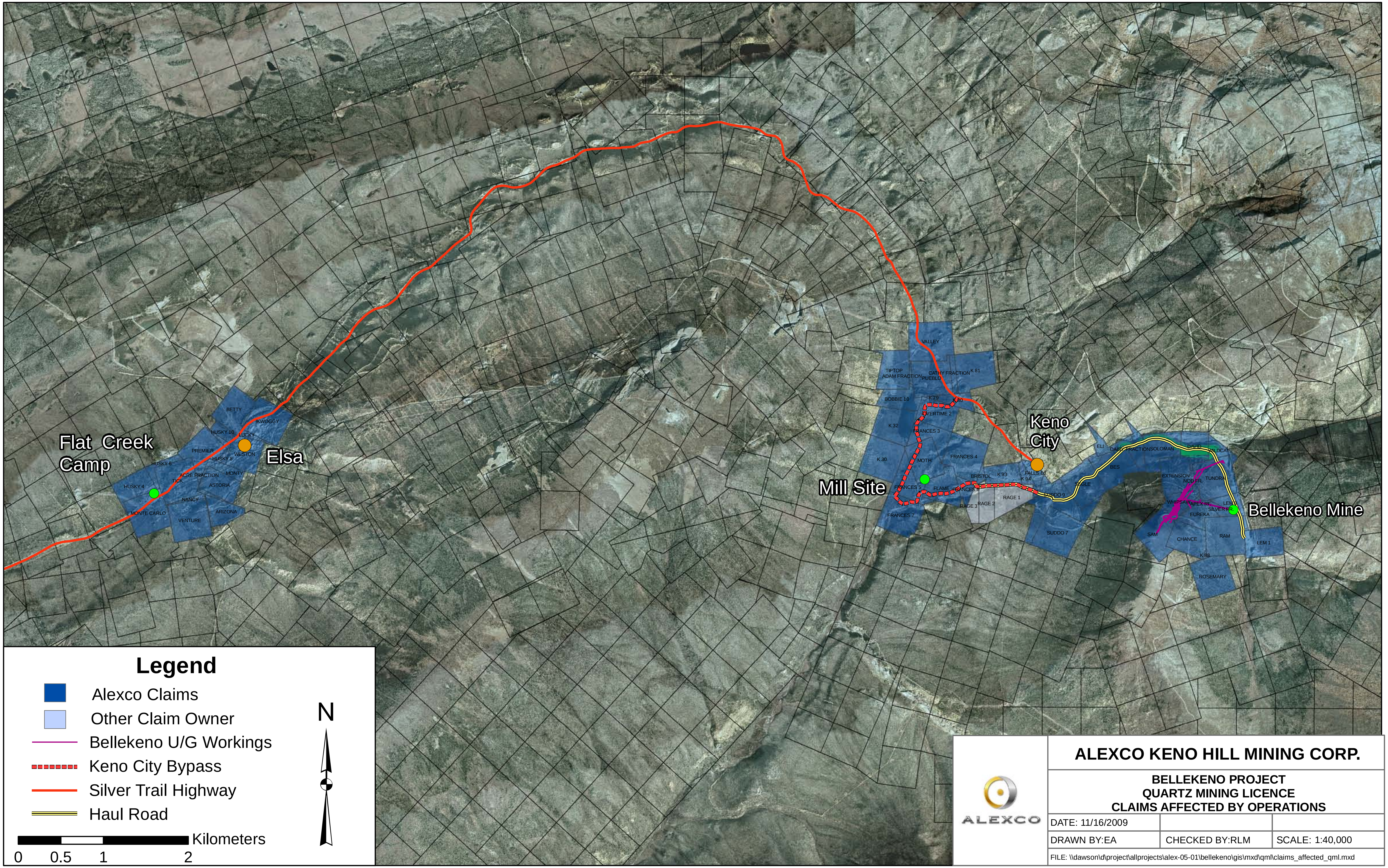
ACCESS CONSULTING GROUP

ALEXCO KENO HILL MINING CORP
BELLEKENO PROJECT

CONSTRUCTION SITE PLAN

Flame and Moth Surface Lease

Drawn By: EA	DATE: 7/17/2009	**FIGURE 3-2**
Checked by: RLM	D:\Project\AllProjects\ALEX-05-01\Bellekeno\Lease Application\F&M Lease for CSP.mxd	



Flat Creek Camp
Elsa
Mill Site
Keno City
Bellekeno Mine
Legend
Alexco Claims
Other Claim Owner
Bellekeno U/G Workings
Keno City Bypass
Silver Trail Highway
Haul Road
0 0.5 1 2 Kilometers
N
ALEXCO
ALEXCO KENO HILL MINING CORP.
BELLEKENO PROJECT
QUARTZ MINING LICENCE
CLAIMS AFFECTED BY OPERATIONS
DATE: 11/16/2009
DRAWN BY:EA
CHECKED BY:RLM
SCALE: 1:40,000
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4.0 CONSTRUCTION PLANS

This section describes in general terms construction activities associated with various components of the site construction plan. General site construction measures and construction surface water management, borrow areas, site access control and additional supplemental details regarding site road construction and management are included in Section 4.1 while Sections 4.2 – 4.4 describe Phases I—III of the construction plans. Section 4.6 introduces Decommissioning and Reclamation plans.

Project drawings are provided within Appendix A as well as within the design reports for specific mine components (also appended). As the project detailed engineering progresses, Issued for Construction drawings will be provided to Yukon Government Energy, Mines & Resources as required. Design criteria for the project are included within Appendix C.

4.1 General Site Construction Plans

4.1.1 Construction Surface Water Management Plan

These activities include those required to provide management of surface runoff to prevent sediment laden runoff from entering watercourses during construction. This Construction Surface Water Management Plan will be implemented to manage surface water runoff affected by project construction. Phase III of construction will involve construction of surface water management structures at the mill site which will provide water management for the life of the mine.

4.1.1.1 Erosion and Sediment Control

Construction of the mill pad and mill site will take place on previously impacted landscape, as the Flame and Moth site hosted a variety of surface exploration and underground and open pit mining operations between the 1950s and the 1990s. In particular, during the 1990s, the site was stripped in preparation of a 16,000 tonne open pit mine which never went into production. Perhaps partly because of this previous site disturbance, as well as the southern exposure and shallow soils over bedrock, there is no permafrost underlying the mill pad or mill site area, and the area is less prone to erosion than a previously undisturbed site.

Potential effects on erosion and sediment loading will be minimized by reducing the area of disturbance and maintaining and developing stable vegetation cover wherever possible during construction and all remaining project phases.

To avoid major erosion and sedimentation problems the following general practices will be implemented:

- The area of clearing and disturbed soil will be minimized – existing trails and disturbed areas will be used where possible to minimize the addition of new linear corridors and there will be no unnecessary disturbance to the organic mat and soils;
- Erosion protection measures (riprap, earth breaks or cross ditches) will be implemented as required;
- Early construction of diversion ditches and sediment control ponds to manage runoff and provide for settling of suspended solids will be implemented with inspection to ensure effectiveness;
- Construction activities will be completed efficiently to minimize the length of time disturbed soils are exposed;
- Site clearing will be timed to minimize soil compaction. To the maximum extent possible, disturbances will be restricted to times when soils are dry or frozen and avoid or delay construction during wet site conditions;
- Riparian areas will not be unnecessarily disturbed – a minimum buffer of 30 m will be maintained from surface watercourses to protect riparian areas;
- This Construction Surface Water Management Plan will be adapted as required to manage changing or unexpected site conditions.

The Construction Surface Water Management Plan is an adaptive management plan that describes conveyance structures and erosion and sediment control measures to be used during construction of mill site facilities. Measures to be implemented are outlined in Table 4-1:

Table 4-1 Surface Water Management Controls

Technique	Application
Diversion Ditches	Divert overland flow away from the construction site (interceptor ditches) or to sediment ponds (collection ditches).
Check Dams	Installed in ditches to reduce flow velocity.
Sediment Barrier	Brushwood wrapped in geotextile, hay bales, or sediment fences to trap sediment and reduce velocity of overland flow.
Sediment Ponds	Ponds to collect runoff through the construction site to settle out sediments, on an as needed basis
Revegetation	Disturbed areas minimized and reclaimed as soon as practical by surface roughening (using tracked equipment) then seeding. Straw, wood fiber/chips, erosion control blankets, granular materials and rock can be placed when disturbed soils have been seeded to provide erosion protection until a stabilizing vegetation cover is established. Best practices will be undertaken to avoid the introduction of invasive species. Active revegetation on areal disturbances, passive (natural revegetation) on linear sites.

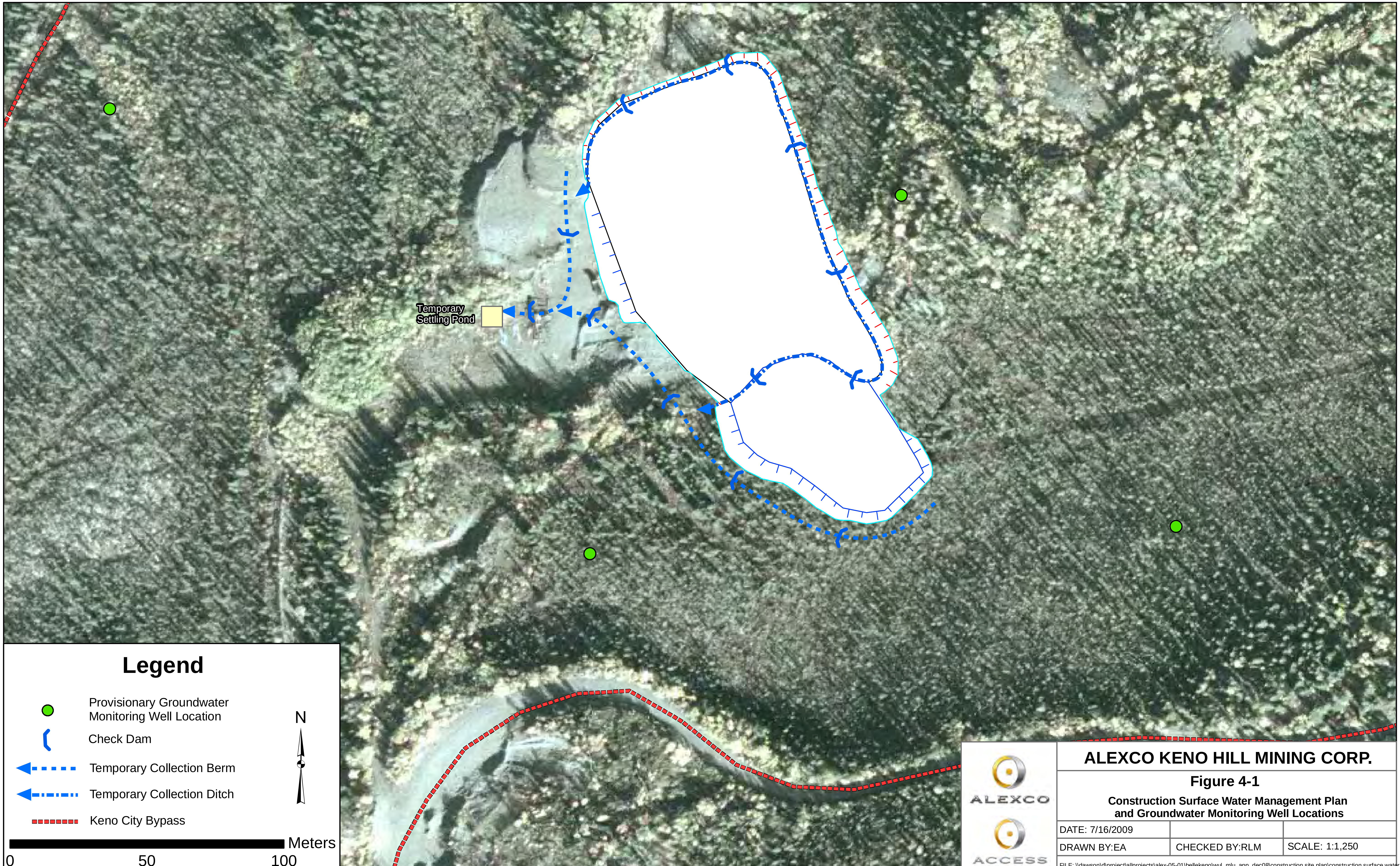
Figure 4-1 shows how surface runoff will be directed and stored and at the mine site. Surface water management plans which will be implemented during construction are outlined below.

4.1.2 Surface Water Management

The closest surface water drainage, Christal Creek, is approximately 300 meters from the Fame & Moth pit area, vegetated to the extent that surface runoff will be dispersed and absorbed, therefore no sediment from construction is expected to reach this watercourse. Nevertheless, we have outlined sediment control measures in the event of unusual storm rain events, or unusual snow pack combined with unusual snowmelt conditions should be experienced n the next year during construction.

During construction, a sediment pond may be employed if soil conditions indicate its necessity. Site clearing to date has shown there are only shallow soils over bedrock, and weather conditions to date have included minimal rain. However,, close monitoring will indicate if storage pond is required. Heavy equipment on site could construct a pond in a matter of hours if needed. The overland flow areas will promote sheet flow, thereby reducing flow velocities and encouraging infiltration.

The primary objective of the Construction Surface Water Management Plan (CSWMP) is to minimize construction related impacts to surface water quantity and quality, while also facilitating construction works. Surface water management controls are to be implemented to divert overland flow around construction areas, reduce erosion and remove suspended sediments from surface water before it is released into wide, natural overland flow areas or back into natural watercourses.


Temporary
Settling Pond
Legend
Provisionary Groundwater
Monitoring Well Location
Check Dam
Temporary Collection Berm
Temporary Collection Ditch
Keno City Bypass
N
Meters
0
50
100
ALEXCO
ACCESS
CONSULTING GROUP
ALEXCO KENO HILL MINING CORP.
Figure 4-1
Construction Surface Water Management Plan
and Groundwater Monitoring Well Locations
DATE: 7/16/2009
DRAWN BY:EA
CHECKED BY:RLM
SCALE: 1:1,250
FILE: \\dawson\d\project\allprojects\alex-05-01\bellekeno\wul_mlu_app_dec08\construction site plan\construction surface water mngmnt.mxd

This CSWMP considers construction areas to be disturbed non-industrial areas with a potential for inert sediment generation. No treatment or control measures have been included for any industrial chemicals or other contaminants.

The CSWMP is based on four main principles for managing surface water during the construction phase of the project, as follows:

- Construction of surface water controls – potentially includes construction of sediment ponds, minor site diversion ditches, check dams and sediment barriers, and establishment of stockpile areas prior to any large scale land clearing or construction activity begins.
- Diverting overland runoff from undisturbed areas – includes interception and diversion of runoff from undisturbed areas around the construction sites to keep the construction areas dry and to minimize the potential for sediment transport into natural watercourses.
- Control of sediment near the source - the size and number of erosion and sediment controls is reduced by controlling sediment near the source.
- Protect receiving waters downstream of the construction sites – runoff from disturbed areas is collected and treated in sediment ponds to remove sediment prior to re-use at the site or release to natural watercourses.
- Potential augmentation with flocculent blocks to assist sedimentation deposit into ponds.

A number of temporary water management control structures have been proposed for the CSWMP. These structures correspond to standard Best Management Practices (BMPs) which have been adopted for the Project (see Section 4.1.2.4). To assure continued performance and functionality, all control structures will be inspected regularly, maintained and repaired, as required.

4.1.2.1 Temporary Diversion Ditches

Minor site temporary diversion ditches may be used to capture overland water flow from undisturbed areas (only required for storm events, as normal runoff through wooded area is minor) and divert it around the construction sites and into wide, natural overland flow areas or natural watercourses downslope. They will have sufficient capacity to accommodate the 1:5 year, 24 hour return period peak flow (including a snowmelt contribution) with a minimum freeboard of 300 mm. These measures will not only facilitate construction, but will also limit the volume of water requiring treatment and the amount of sediment potentially eroded from disturbed areas.

Ditches with less than 2% grade are unlined but contain check dams to reduce velocities and settle sediment. Ditches that exceed 2% grade are lined with non woven geotextile over which rock riprap will be placed.

4.1.2.2 Check Dams

Check dams are small temporary structures installed within a ditch to reduce flow velocity, reducing potential to cause erosion in the channel and allowing sediment to settle.

For this project, it is recommended that check dams be temporary structures either constructed of in situ granular materials or haybales covered with geotextile cloth.

4.1.2.3 Sediment Barrier - Brushwood Barriers and Sediment Fences

Surface runoff onto the site from the adjacent wooded areas is expected to be minimal. Storm events may, however, cause runoff from the site itself down slope, therefore sediment barriers will be used as required. These are temporary filters made of brushwood available at the site wrapped in geotextile or sediment fences that provide a physical barrier to sediment and help reduce the velocity of overland surface water runoff. Sediment fences are linear filter barriers installed to prevent or minimize transport of sediment in overland runoff.

Brushwood barriers or alternatively sediment fences can be used down slope of disturbed areas and around stockpiles to capture sediment.

4.1.2.4 Additional Considerations

In addition to the control structures described above, the following BMPs will be applied to the construction sites:

- Maintain as much of the existing vegetation as possible. Limiting the disturbance is recognized as the single, most effective method of reducing erosion.
- Limit the length and steepness of excavated slopes by benching.
- Surface compaction reduces the potential for suspending sediment. Roughening the surface of disturbed areas serves to increase infiltration into the ground surface during rainfall events. Roughening the surface of a disturbed area can be accomplished by tracking the area with heavy equipment, such as a bulldozer, or track mounted excavator.
- Prevent tracking of sediments off-site by implementing dust control measures for roads.

All water management structures will be monitored weekly and after each rain event for maintenance purposes. Accumulated sediment will be cleaned out and buried and away from drainage flow paths and natural watercourses. Additional erosion and sediment controls may need to be implemented as required.

4.1.3 Groundwater Monitoring Wells

In order comply with Yukon Government's Decision Document on the Bellekeno Mine Development Proposal (YESAB file number 2009-0030), prior to commencement of mine operations, Alexco will install a number of groundwater monitoring wells around the Flame and Moth mill site in order to assess baseline ground water quality and to characterize groundwater flow pathways and velocities. Conceptually, groundwater characterization is required with respect to four elements around the Flame and Moth mill site and their potential influence or effects:

Table 4-2 Mill Site Groundwater Monitoring Program Elements

Element	Proposed Location	Rationale
Keno City Solid Waste Management Facility	200 m east of mill site	Potential source of groundwater contamination to the mill site from hazardous materials dumping for many years
Keno City water well	1200 m east of mill site	To confirm hydrogeological opinion that the mill site will not affect Keno City water well
Christal Creek	400 m west of mill site	Potential groundwater connection with aquifer beneath mill site
Lightning Creek	400 m south of mill site	Potential groundwater connection with aquifer beneath mill site, to address concerns from stakeholders about Lightning Creek drainage contamination

Conceptual locations for these wells are shown on Figure 4-1. Finalized well locations and a detailed groundwater monitoring program will be completed by a hydrologist or hydrogeologist and final designs will be submitted for approval once this work is completed.

4.1.4 Site Road Construction and Management Guidelines

As discussed in the introduction, construction plans for site access road improvements were submitted on June 26th 2009 under a pre-season report addendum under Alexco's Class 4 MLU authorization LQ00240.

A number of additional measures related to site access, road management and public safety and construction events notification are presented here:

- Speed limits will be enforced for mine traffic and posted along the access and site roads (maximum 40 km/hr, reduced to 20 km/hr at blind corners and bridge crossings). Mine traffic between the Bellekeno Mine and the mill site will be radio controlled for safety and speed control.
- To the maximum extent possible employees will be encouraged to take advantage of project bussing and transportation from Mayo/Elsa to the mine and mill site, thereby minimizing hunting opportunities and direct road mortalities;

- Private employee off-road vehicles will be prohibited on the access road and at the mine site.
- Existing trails and disturbed areas will be used where possible to minimize the addition of new linear corridors and there will be no unnecessary disturbance to the organic mat and soils.
- New trails, roads, or cut-lines will be doglegged to prevent predator line of sight into new habitat.
- Snow clearing equipment will be available on site to maintain the mine access road.
- Snow plows on the access road will create breaks in the snow berm every 0.5 km to allow for wildlife to escape from the access road.
- Signage posted near all construction sites.
- Weekly events notice to be continuously updated and posted at three locations (Post Office in Keno City, Post Office in Elsa, and Keno City Snack Bar). An example of the weekly events notice is shown below:

Alexco Resource Corp

Keno Hill Project

Weekly Events Notice

Week of: **Alexco site manager:**

EXPLORATION

- Continued surface exploration (diamond drilling) throughout Keno/Sourdough Hill areas;
- Expect routine light vehicle traffic through town from drill contractor (Kluane Drilling) to access sites on Keno Hill;

CARE & MAINTENANCE/CLOSURE

- Continued water treatment at Bellekeno, Galkeno 900, Galkeno 300, and Silver King 100;
- Expect occasional vehicle traffic to access treatment sites;
- Ongoing field studies for Closure Plan;
- Keno 700 physical hazards remediation expected to be complete next week;

MINE DEVELOPMENT

- Mining contractor (Procon) on reduce activity – care & maintenance & site security;
- mill site preparatory earthworks underway at old Flame & Moth open pit site;
- Underground drilling complete, contractor demobing;

GENERAL

- Keno City communication protocol meeting planned for July 27th;
- YG Highways & Public works to begin Duncan Creek Road realignment & brushing Tuesday July 21, contractor Ewing Transport, and;
- SAFETY NOTE: traffic awareness on Silver Trail Highway – increased traffic due to summer tourist and mining exploration activity from unrelated companies.

Road or bridge construction and maintenance at the Lightning Creek crossing will be performed so as to ensure minimal riparian and aquatic disturbance (i.e. hand cutting). Construction will be minimized around streams during critical spawning periods (May-June for grayling). Construction of the Lightning Creek crossing will follow the Department of Fisheries and Oceans Operational Statement for construction of a clear span bridge.

Preliminary Christal Lake road design/reconstruction details are shown in Drawings A00-20-051 through A00-20-057 in Appendix A. The road alignment follows the haul road and is not expected to encounter any permafrost; however, once geotechnical conditions are confirmed the access road alignment may be refined as roads will be constructed to avoid permafrost exposure where possible. Otherwise roads will be engineered to maintain permafrost conditions under and surrounding the road. Cut and fill operations will be minimized to reduce road footprint and conducted to achieve the design grades and final surfacing with crushed gravel. Ditch construction along roadways will incorporate settling ponds and baffles to reduce erosion and settle out sediments. These general principles will also be followed for all new road construction. Refer to Section 4.1.7 for the potential location of borrow areas.

4.1.5 Access Control

The access roads to the mill and mine sites will be at least partly via private roads and public use will not be allowed. Due to the fact that segments of all site access roads have been open to the public (and thereby have become public roads) it is has become impermissible (and impractical) to block access using gates to many of these road segments. In order to provide some measure of public safety, all new roads build by Alexco will incorporate signage indicating that they are private mine haul roads and warning the public against trespassing and use gating as necessary.

4.1.6 Power Line and Substation

Permanent power for the operation will be provided from the Yukon Energy grid by means of a power tap at main 69 KV Line between Elsa and Keno City. Yukon Energy will construct a spur line to the property which will terminate at the new Substation located either in the process facilities area, or on Alexco's lot 956 near the old Mackeno Mill site. The Substation will be nominally 10MVA capacity and will transform the incoming 69 kV power to 4160V for site distribution. Construction and backup power will be supplied by a 1 MW diesel generator unit located onsite. Figure A00-18-002 in Appendix A shows the arrangement for power line and distribution to the mill site.

4.1.7 Borrow Areas

Construction of earthwork structures will require a range of soil and rock types with specific geotechnical properties to provide suitable construction materials. It is expected that these materials will be sourced from borrow areas on site as well as several other sources in the area. Potential site borrow areas for the initial stages of construction have been identified and are shown in Figure 4-2. Appropriate material pre-stripped from the waste rock storage area and open pit will also be used as a source of borrow materials. Mine site borrow areas including material type and volume estimates are summarized in Table 4-2.

Potential borrow locations in the vicinity of the mill site have been identified and are shown on Figure 4-2. Geotechnical investigations will be conducted at potential borrow locations prior to the extraction of materials to confirm the quality and quantity of granular resource present.

Prior to the development of any of the borrow sources, drainage ditches will be constructed to divert clean run-off around the borrow area. Borrow areas will be excavated in near-horizontal layers and in such a matter that water will not collect and stand therein. In the event that the topography results in water from within a borrow area being discharged, it will be directed by drainage ditches to a sediment pond to allow the turbidity to settle out before discharge.

Once borrow sources have been exhausted, the area will be scarified, fertilized and seeded.

Table 4-3 Site Borrow Areas

Borrow Area #	Borrow Source	Material Type	Estimated Volume Available (m^3)	Probable Use
1	Old Flame and Moth Pit Stripping Spoils	Glaciofluvial/alluvial gravel and till	25,000	Mill pad construction, general mill site construction, water diversion and retention structures, closure measures
2	Lightning Creek Placer Tailings	Alluvial sand, silt and gravel, mostly size sorted by washing (sluicing) into storage areas of predominantly fines and coarser material	>1,000,000	Mill pad construction, general mill site construction, water diversion and retention structures, closure measures concrete aggregate, also as base for temp P-AML WRSF at BK East
3	Sourdough Trail Pit	Sand	20,000	Liner construction for temporary and permanent P-AML WRSF(s)
4	Bellekeno Mine	Non-AML waste rock	210,000	Access road construction, base for

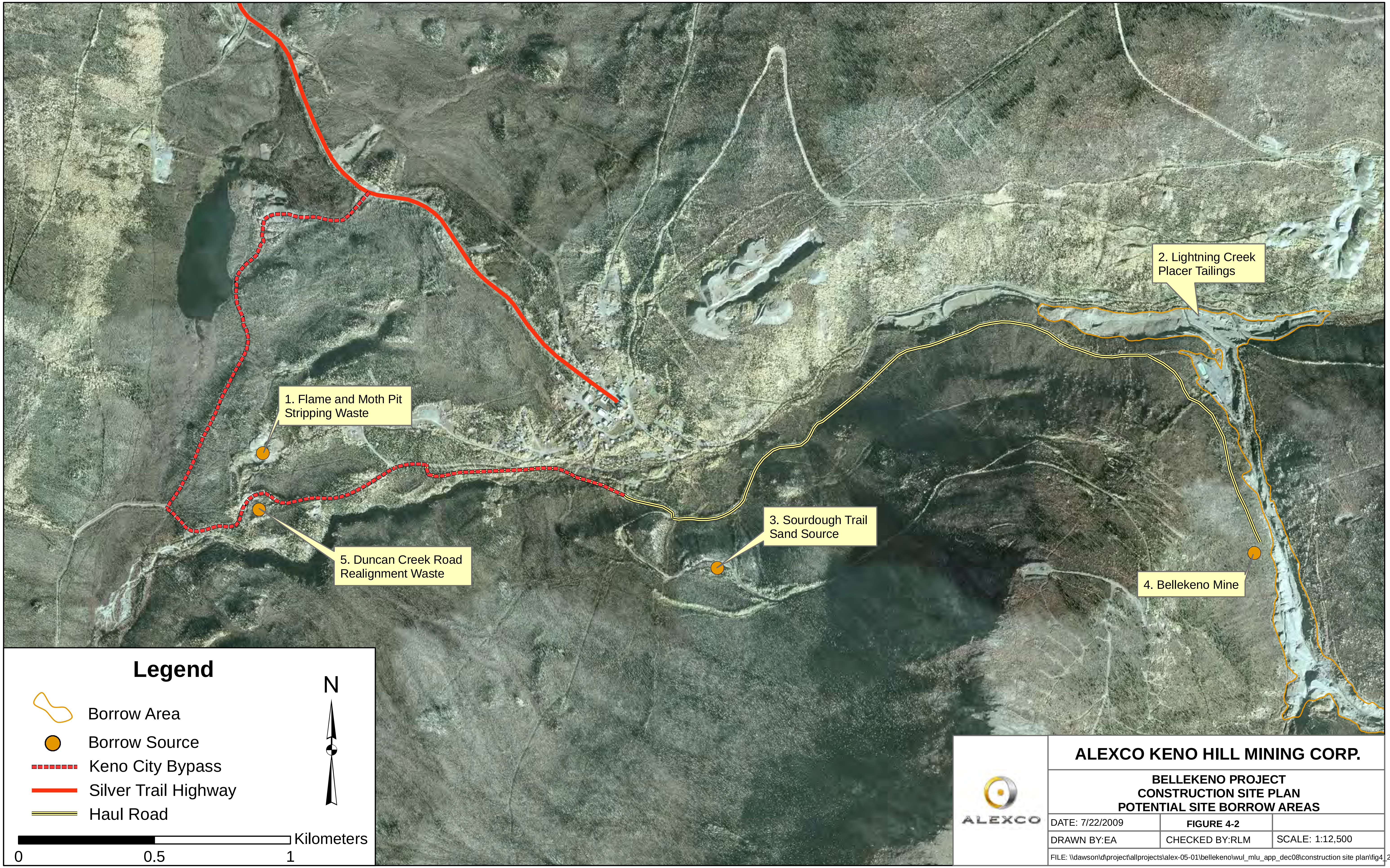
				possible future permanent P-AML WRSF(s)
5	Duncan Creek Road Real-ignment waste	glaciofluvial sand & gravel/till	100,000	Mill pad construction, concrete aggregate, fill, KC bypass road construction

4.1.8 Geochemical Evaluation Protocol

Non-AML waste rock will be used for a number of mine development construction activities. A comprehensive waste rock management program has been developed and approved as part of the Bellekeno Advanced Underground Exploration and Development Program and will continue be used during Mine Operations (see attached as Appendix B). This program was designed to efficiently identify and segregate Potentially Acidic/Metal Leaching (P-AML) from Non-AML using a number of field screening methods and is verified by extensive, systematic geochemical and ABA laboratory testing. The waste rock management plan will be relied on in order to ensure that all mine waste rock used for road material and general construction purposes is non-AML.

As a past producing mine, Flame and Moth pit site may contain mineralized material which could be potentially acid generating/metal leaching. This material will be identified visually and placed either in the pad under the concrete or for use in the coarse ore stockpile.

Other aggregate and other non-waste rock borrow building material sources (surficial sands and gravels from Sourdough Trail sand, Lightning Creek placer tailings, Duncan Creek realignment) are deemed unlikely to be acid generating or metal leaching and therefore will not be subject to geochemical/ABA testing prior to use.


2. Lightning Creek
Placer Tailings
1. Flame and Moth Pit
Stripping Waste
3. Sourdough Trail
Sand Source
5. Duncan Creek Road
Realignment Waste
4. Bellekeno Mine
Legend
Borrow Area
Borrow Source
Keno City Bypass
Silver Trail Highway
Haul Road
N
0
0.5
1
Kilometers
ALEXCO
ALEXCO KENO HILL MINING CORP.
BELLEKENO PROJECT
CONSTRUCTION SITE PLAN
POTENTIAL SITE BORROW AREAS
DATE: 7/22/2009
FIGURE 4-2
DRAWN BY:EA
CHECKED BY:RLM
SCALE: 1:12,500
FILE: \\dawson\d\project\allprojects\alex-05-01\bellekeno\wul_mlu_app_dec08\construction site plan\fig4_2 borrow are

4.2 PHASE I CONSTRUCTION

Phase I of construction involved preparatory earthworks for the mill pad footprint to enable concrete work. This work commenced on July 15th and will be completed by approximately July 30th. Reconstruction/rehabilitation of the Christal Lake Road will be undertaken after preparatory earthworks have been completed. Please see Appendix I for site construction plans submitted as Phase I.

Preparatory Earthworks Mill Pad, July 16, 2009

4.3 PHASE II CONSTRUCTION

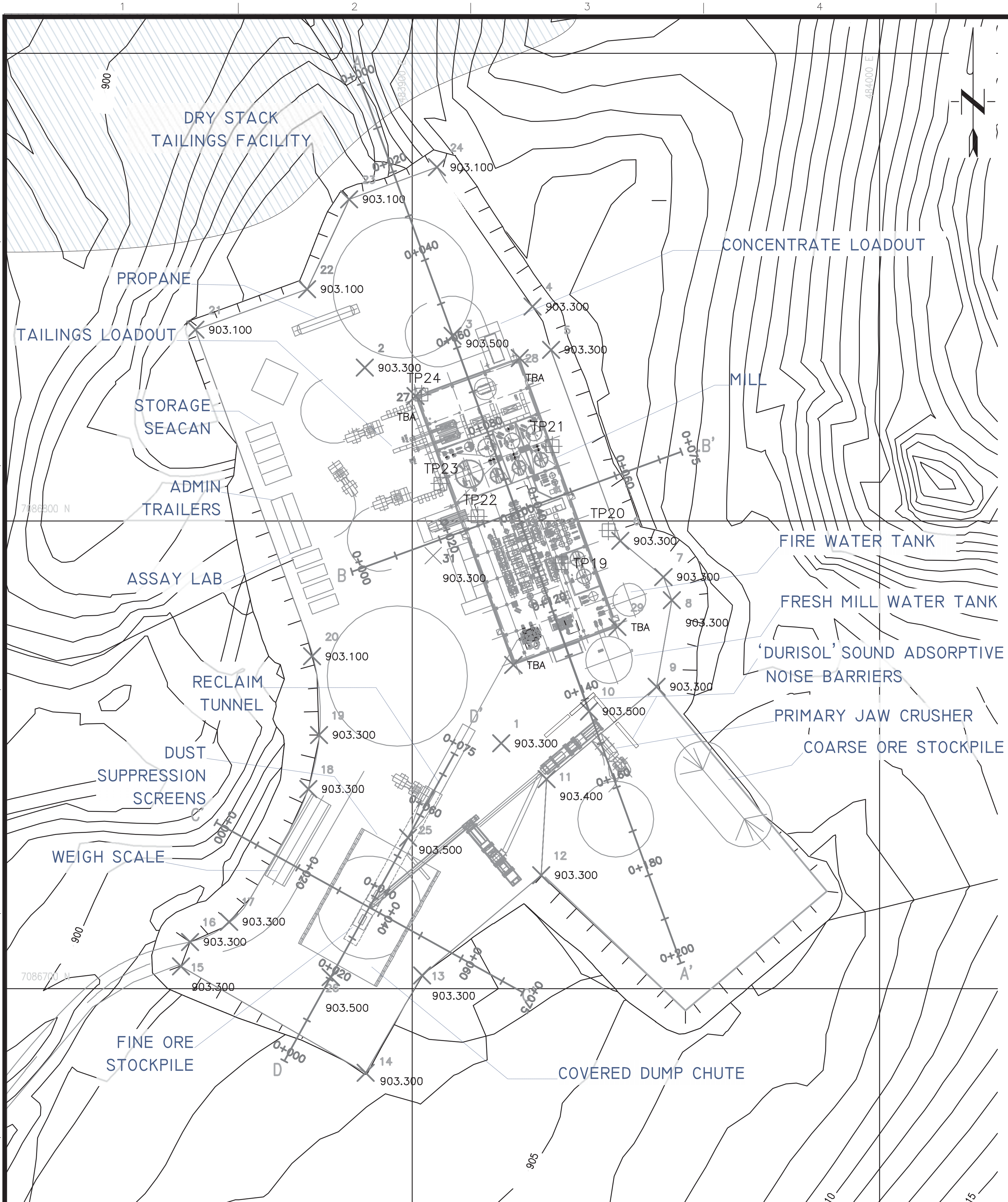
The following general areas and activities are scheduled during Phase II of project construction. These represent the construction activities to be accomplished prior to the issuance of the Type A Water Use Licence. In general, Phase I and II represent the construction activities required to be completed during the 2009 weather window in order to commence production in 2010.

4.3.1 Infrastructure

The following sections outline construction plans for project infrastructure mill pad concrete work and construction of temporary Non-AML WRSF at Bellekeno.

Prior to initial construction activities, the Yukon Water Board will be notified of planned water usage through the provision of a Schedule 3 – Notice of Water Use/Waste Deposit Without a Licence, water will be taken from Lightning Creek in order to assist with achieving desired compaction in the mill pad. As project permitting proceeds it is anticipated that a Type A Water Licence could be issued by mid-2010 and subsequently water related activities would be carried out in accordance with the licence.

Phase I and II of project construction is shown in Figure 4-3 and further details of the project construction plans and sequence follow. See Figure 2-1 for the targeted development schedule for Phase I and II.



ALEXCO KENO HILL MINING CORP.

BELLEKENO PROJECT

PLANT SITE LAYOUT

0 10M 20M 30M 40M

JULY 2009

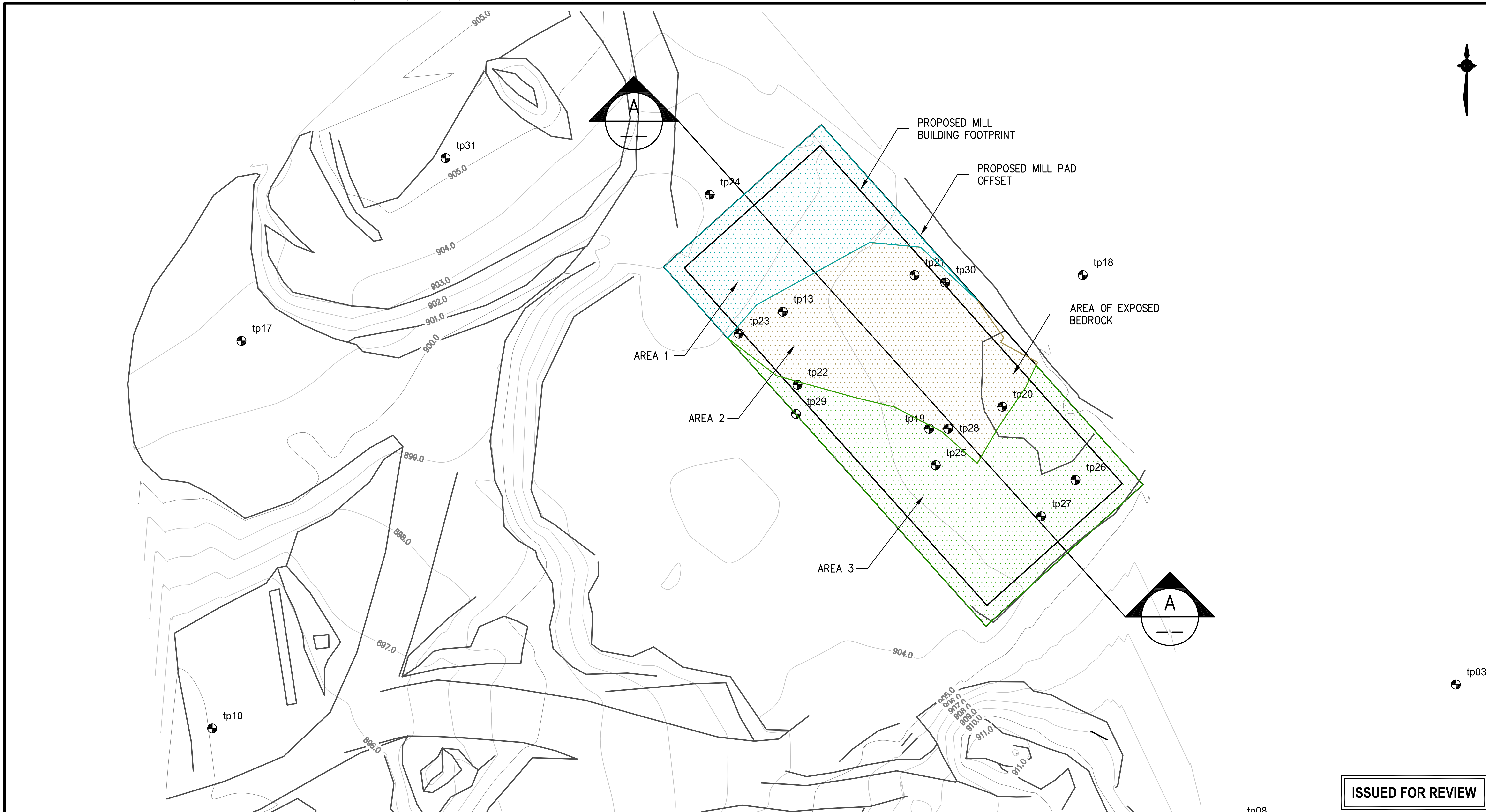
FIGURE 4-3

4.3.2 Mill Pad Concrete Foundation Construction

See Appendix A for construction drawings. Specifically related to mill foundations and concrete work, see Drawing E00-15-001 and E00-15-002. For Design Criteria, see Appendix C.

Two geotechnical test pitting programs have been carried out at the Flame and Moth mill and DSTF area by EBA Engineering to determine the extent of permafrost in the locations planned for infrastructure development. All organic soils, weak mineral soils, ice-rich soils and any other soils deemed to be unsuitable will be removed down to competent mineral soils or fractured bedrock under the mill facilities, and collection/treatment ponds will be constructed on a prepared foundation.

O:\Keno\W14101178 Mill Site Search\3 Site Overview\W14101178.002 ENGINEERING SUPPORT SERVICES\Site Topo - July 21, 2009-rev1.dwg [FIGURE 1] July 23, 2009 - 5:18:07 pm (BY: CHRIS DIXON)



LEGEND:

- TESTPIT LOCATION

0 25

Scale: 1: 500 (metres)

CLIENT

ALEXCO

EBA Engineering Consultants Ltd.

FLAME AND MOTH MILL SITE GEOTECHNICAL RECOMMENDATIONS

SITE LOCATION PLAN

PROJECT NO.	DWN	CKD	REV
W14101178.002	CJD	JRT	0
OFFICE	DATE		
EBA-WHSE	JULY 2009		

Figure 4-4

4.3.3 Bellekeno Temporary Potentially-AML Waste Rock Storage Area

A ~ 10,000 tonne temporary potentially-AML WRSF will be constructed on Thunder Gulch near the Bellekeno East Portal. For additional details and location of this facility refer to Appendix J, entitled Technical Memo Regarding Temporary P-AML Waste Rock Storage Facility Geotechnical Stability from EBA Engineering Ltd.

4.4 Phase III Construction Activities (Provisionary)

Phase III Construction Activities will not commence until pertinent “Construction and Operation” plans have been submitted and approved. Specifically, these will be submitted as per Section 15.1 of QML-0009 as a mine development and operation plan, a mill development and operation plan, a dry stack tailings facility plan, and a Lightning Creek road development and operation plan. The following is a preliminary overview of Phase III construction activities.

At the Flame and Moth Mill Site, in addition to the Mill building itself a number of other ancillary facilities will be at the mill site. These will consist primarily of mobile units or will be constructed on site. Specifically, these will include the following:

- Fine and Coarse ore stockpiles
- Administration building;
- Assay Laboratory facility;
- First Aid unit;
- Electrical Substation;
- Warehouse Storage;
- Propane Storage;
- Fuel Tank;
- Weigh scale
- Sea Container Storage and Loadout; and
- Water Treatment facility

The overall general arrangement for the mill site is provided in Figure 4-3. (Some of the drawings or figures in supporting documentation are earlier versions and may show slightly differing arrangements for final layout mine components. These will be updated in due course and a final site as built will be provided to Yukon Government.) Phase I and Phase II of construction will represent activities that can be completed under the existing Type B Water Licence.

4.4.1 Flat Creek Camp Expansion

As described in the Bellekeno Mine Development Project Proposal (YESAB file number 2009-0030), the existing ~ 80 man exploration camp at Flat Creek will be expanded to accommodate approximately 150 people with the addition of another trailer camp unit. If required, an additional temporary "road-builders" type camp provided by the initial earthworks contractor will service the project during the construction phase.

Flat creek camp expansion activities will commence when the weather is suitable and will comprise clearing, leveling and filling of the site. An engineered conventional septic tank and below ground tile field for sanitary waste disposal will be installed as soon as practical after that, pending approval by Yukon Government Environmental Health Services. A well to supply the camp will be drilled in order to provide an additional potable water supply for the camp.

Electrical power for the camp will continue to be supplied by Yukon Energy Corp. and existing propane tanks will provide fuel for heating and cooking. The existing kitchen/dining area has enough capacity for operations and will continue to be used. Board walkways will connect the building units.

4.4.2 Mill Building Construction

The mill building will be constructed according to Wardrop Engineering Inc., designs as depicted on Drawing numbers E00-10-001, E00-10-002, E00-10-003, E00-10-004 in Appendix A for Mill building General Arrangement drawings. Civil and Mechanical design criteria are found in Appendix C.

4.4.3 Mill Site Ancillary Facilities

An Administrative Building of modular construction (trailer unit approximately 260 m^2) will be set up adjacent to mill building (see Figure 1-3 General Arrangement).

4.4.4 Mill Process Area

The main Process Area comprises the following facilities (shown on Figure 4-3):

- Mill building;
- Assay lab;
- Office trailer;
- Sample preparation lab;
- Fine and coarse ore stockpiles;
- Mobile jaw and cone crushers;
- Warehouse storage containers;
- Propane storage;
- Sea container storage and loadout area, and;
- Fuel tank;
- Weigh scale.

The Water Treatment Plant, which will be housed within a building, is designed to treat excess process water and surface runoff from the DSTF and mill pad prior to discharge into the receiving environment.

Work on the foundations for buildings in the process plant area is scheduled to commence late in Stage 1 or as early as practical in Stage 2 so as to enable buildings to be erected and closed in prior to the onset of winter conditions. Concrete will be provided from a temporary batch plant erected close to the plant area. Aggregate for the batch plant is expected to be produced from crushing of mine pre-strip material, subject to final testing. Civil Design Criteria is described in Appendix C.

4.4.4.1 Crusher Area

The Crusher Area is located south of the Mill building. The area will be graded to the correct elevation and will be surrounded with Durasol sound reduction panels and dust suppression screens.

During Phase III, area will be constructed to grade and equipment and building foundations will be prepared for subsequent building erection and equipment installation. Buried services and duct banks will be constructed to connect the substation to other facilities.

4.4.4.2 Water Supply & Distribution

To support the construction camp, a well will be located near the camp to provide a potable water supply. The water will be purified by a packaged treatment unit located in a trailer adjacent to the camp and stored within a tank installed near to the camp.

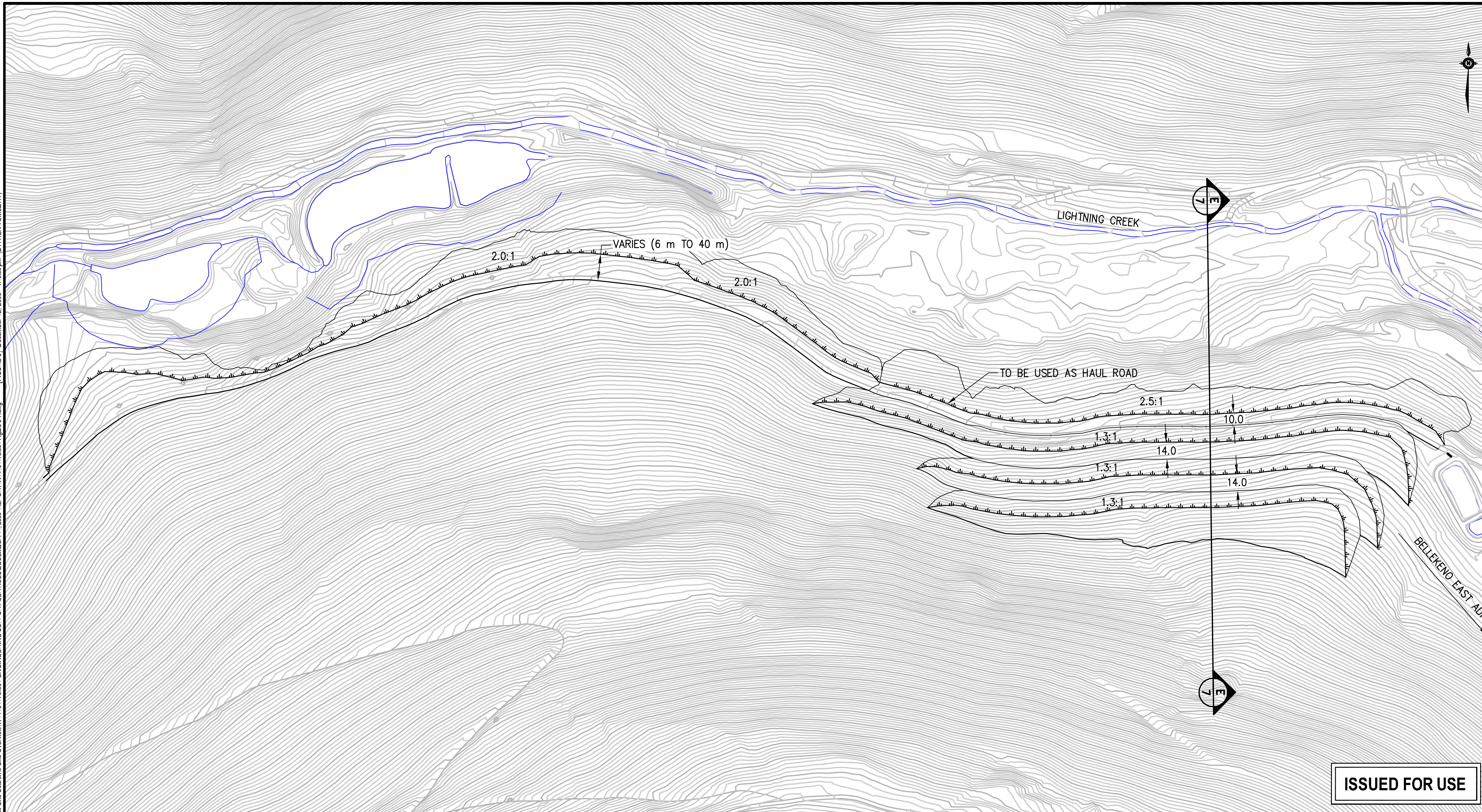
Mill freshwater will be drawn from treated water from the Galkeno 900 adit and from the mill site runoff collection pond, with backup surface locations on Christal Lake and Christal Creek surface water Makeup water from the wells will be pumped via pipeline to a 10 meter diameter by 10 m high storage tank in the mill building. Drawing A00-09-012 in Appendix A provides a flow sheet of water distribution.

Camp waste will be managed as per the Waste Management Plan within Appendix D.

4.5 NON-AML WASTE ROCK DISPOSAL AREA

Preliminary designs for the non-AML WRDA were submitted as part of the Project Proposal for assessment (Figure 4-5).

The waste rock will be hauled from the Bellekeno adit directly to the WRDA. The WRDA will be constructed as a wrap around dump, so the lower benches will be constructed first. The lowest bench will follow the existing road alignment and have a slope to the existing ground surface of 2.5H:1V. The waste rock will be dumped in 10 m benches and allowed to fall to the bench below it at the natural angle of repose of the rock. The stability of the pile was checked using Geostudio 2007 – Slope W module. The factors of safety calculated for the waste WRDA and the guidelines set forth by the BC Mine Waste Rock Pile Research Committee (1991) are summarized in Table [6-11]. The WRDA will not need re-contouring at closure as the long-term stability of the pile should meet the guidelines. Waste rock piles in the area have been standing at the natural angle of repose without significant stability problems for over 30 years.



ISSUED FOR USE

WASTE ROCK VOLUME = 200,000 m³

NOTE:
BASE PLAN PROVIDED BY
ALEXCO RESOURCE CANADA CORP.

0 100
Scale: 1: 3,000 (metres)

CLIENT

ALEXCO

EBA Engineering
Consultants Ltd.

eba

ENGINEERING SUPPORT SERVICES
BELLEKENO MINE PROJECT, YUKON

WASTE ROCK DISPOSAL AREA
PLAN

PROJECT NO.	DWN	CKD	REV
W14101178.001	KJT	CJD	1
OFFICE	DATE		
EBA-WHSE	DECEMBER 11, 2008		

Figure 6

Q:\Whitehorse\Data\0201drawings\Keno\W14101178 Mill Site Search\3 Site Overview\W14101178.001 ENGINEERING SUPPORT SERVICES\DECEMBER 11, 2008 REPORT\W14101178.001 Figure 6-7.dwg [FIGURE 6] December 12, 2008 - 4:10:55 pm (BY: KEN TOMCZYK)

Please refer to the Bellekeno Mine Project Proposal (YESAB file number 2009-0030) Appendix E for further details and information. Further geotechnical studies and final design will be undertaken and IFC drawings submitted prior to construction as part of Phase III.

4.6 OTHER PHASE III ACTIVITIES

- Keno City Bypass route and Lightning Creek crossing will be constructed;
- Site roads will be cleared and built to final grades;
- Mill site services installation will be completed including water supply, power supply and waste disposal facilities;
- Main Process area and Crusher Area: general site grading will be completed along with buried services, building erection, commencement of mechanical and electrical installation;
- Dry Stack Tailings Facility (year 1): trees will be felled and water diversion and collection structures will be constructed;
- Ancillary mill site facility building installation will commence;
- Progressive reclamation of disturbed areas will take place as required.

Operations mill site surface water management plans will be presented as part of Phase III of construction in 2010. This will include:

- Construction of water diversion structures above the mill site;
- Progressive construction of water diversion structures above the DSTF;
- Construction of water collection structures below the mill in order to collect all mill site runoff;
- Progressive construction of water collection structures below the DSTF;
- Construction of permanent water collection/polishing pond including conventional lime treatment facilities;
- Construction of permanent water conveyance and discharge structures from the mill site water treatment pond to Christal Creek;

4.7 DECOMMISSIONING AND RECLAMATION PLAN

A Preliminary Decommissioning and Reclamation Plan that addresses both temporary and permanent closure for the Bellekeno Project has been prepared and is attached as Appendix E. Please refer to this plan for closure measures and estimated costs.

5.0 ENVIRONMENTAL MANAGEMENT & MONITORING FOR CONSTRUCTION ACTIVITIES

5.1 ENVIRONMENTAL MONITOR

As a component of construction activities, environmental mitigation and monitoring will take place to provide assurance that activities comply with environmental provisions included in permits, legislation, corporate policies and industry Best Management Practices. An Environmental Monitor will be appointed to monitor construction activities and provide assurance that project environmental management commitments and standards are being achieved. An experienced Construction Supervisor will be responsible for supervising all construction activities.

The Environmental Monitor's objectives will be to:

- Ensure the effective implementation of environmental control measures laid out in the appended environmental management and protection plans (see Section 5.2 below);
- Ensure that the project is in compliance with project authorizations, applicable legislation/regulations and industry Best Management Practices;
- Provide Alexco's construction and site management team with practical advice on site environmental management issues; and
- Monitor environmental parameters to assess the efficacy of control measures and make necessary adjustments if required.

The Environmental Monitor will be present during all construction activities. The construction QA/QC manual will outline personnel responsibilities and be implemented by a professional engineer and inspectors all of whom are suitably qualified.

5.2 ENVIRONMENTAL MANAGEMENT, MONITORING AND PROTECTION PLANS

In addition to mitigating measures included within the mine design, a number of environmental management, monitoring and protection plans have been developed to address potential environmental and socio-economic effects during construction activities including:

1. Waste Management Plan (Appendix D)
2. Preliminary Decommissioning and Reclamation Plan (Appendix E)
3. Emergency Response Plan (Appendix F)
4. Heritage Resources Protection Plan (Appendix G)
5. Wildlife Protection Plan (Appendix H)

The plans are appended and will require updating and revision as the project progresses and moves into the operational phase.

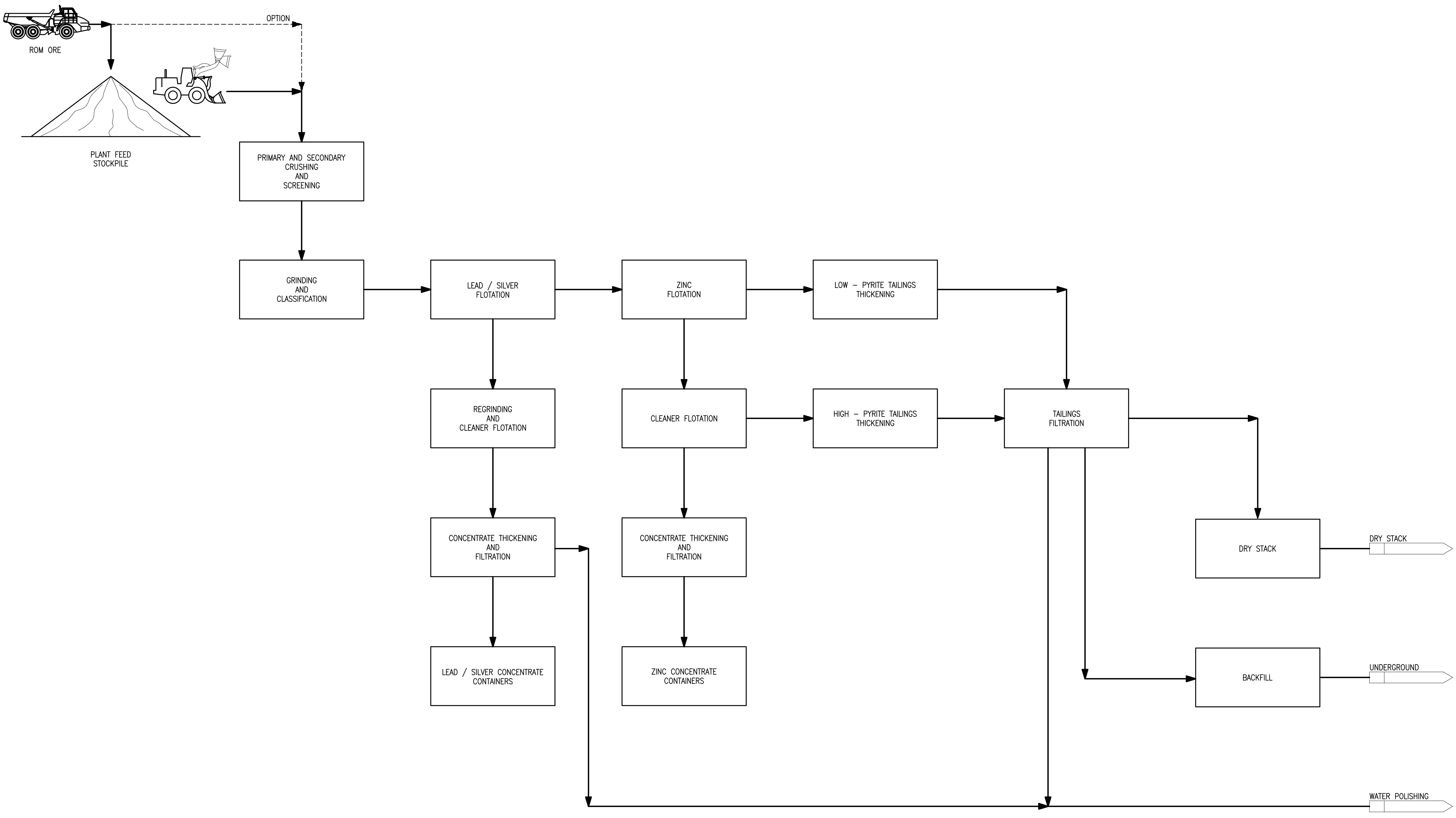
Prepared by: Reviewed by:

E. Allen, M.Sc. R. L. McIntyre, R.E.T., CCEP

November 17, 2009

APPENDIX A

PROJECT DRAWINGS



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DWG. NO.	REFERENCE DRAWINGS

REV. No.	ISSUE No.	DESCRIPTION	DATE	BY
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A	1	ISSUED FOR CLIENT REVIEW	21MAY09	CC

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		DATE
SECTION:	PROCESS	
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DESIGN. BY:	RA	25MAR09
DRAWN BY:	PH	25MAR09
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YUKON TERRITORY

ALEXCO

WARDROP Engineering Inc.

TITLE

BELLEKENO PROJECT

SIMPLIFIED FLOWSHEET
PROCESS FLOWSHEET No.1

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WARDROP Engineering Inc.

TITLE

BELLEKENO PROJECT
WATER BALANCE
PROCESS FLOWSHEET No.12
408 tpd

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WARDROP Engineering Inc.

TITLE

BELLEKENO PROJECT

PASTE BACKFILL
PROCESS FLOWSHEET No.13

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YUKON TERRITORY

ALEXCO

WARDROP Engineering Inc.

TITLE

BELLEKENO PROJECT

MILL BUILDING
GENERAL ARRANGEMENT
OPERATING FLOOR PLAN

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
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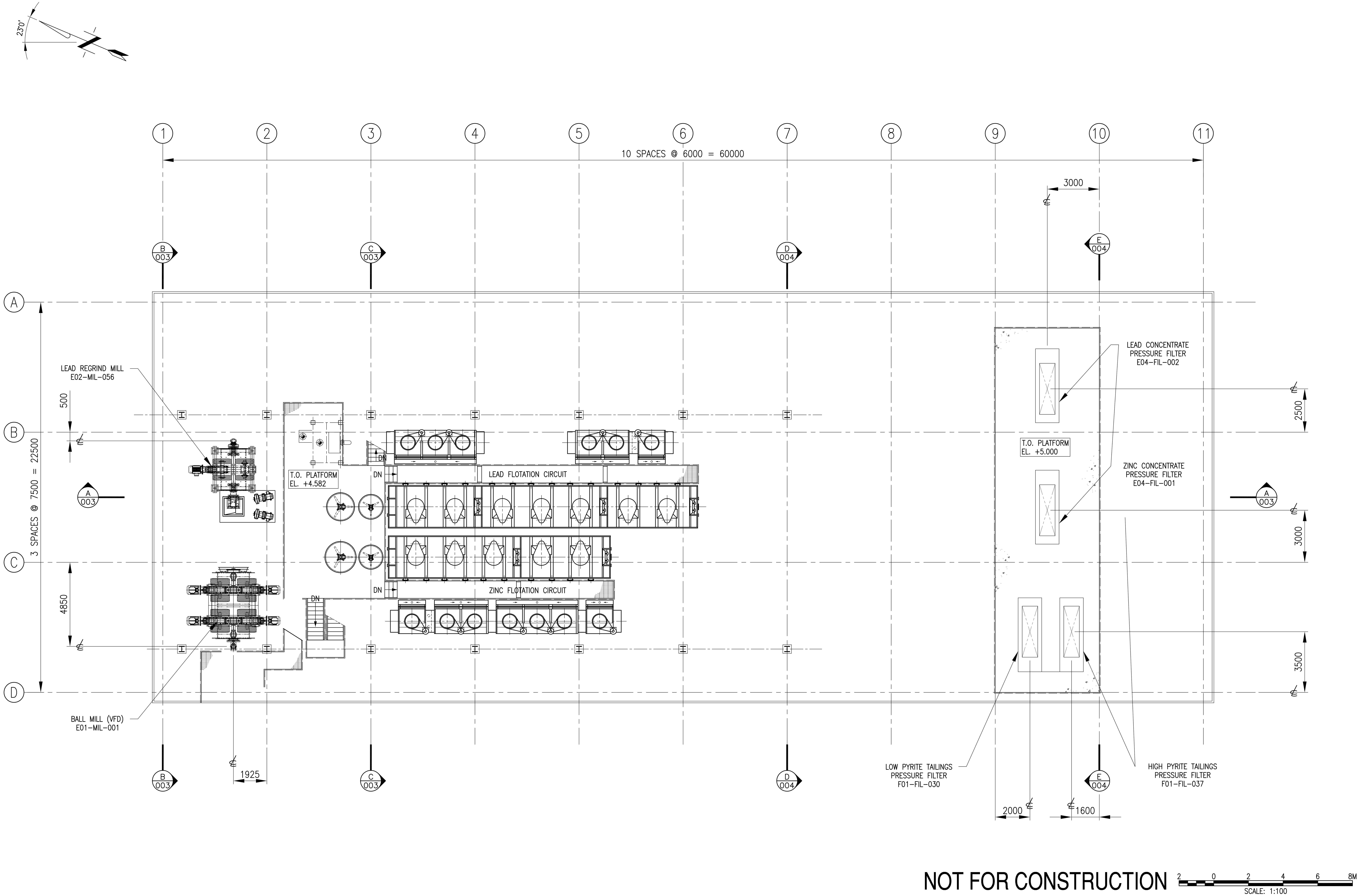

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BELLEKENO PROJECT

MILL BUILDING
GENERAL ARRANGEMENT
UPPER FLOOR PLAN

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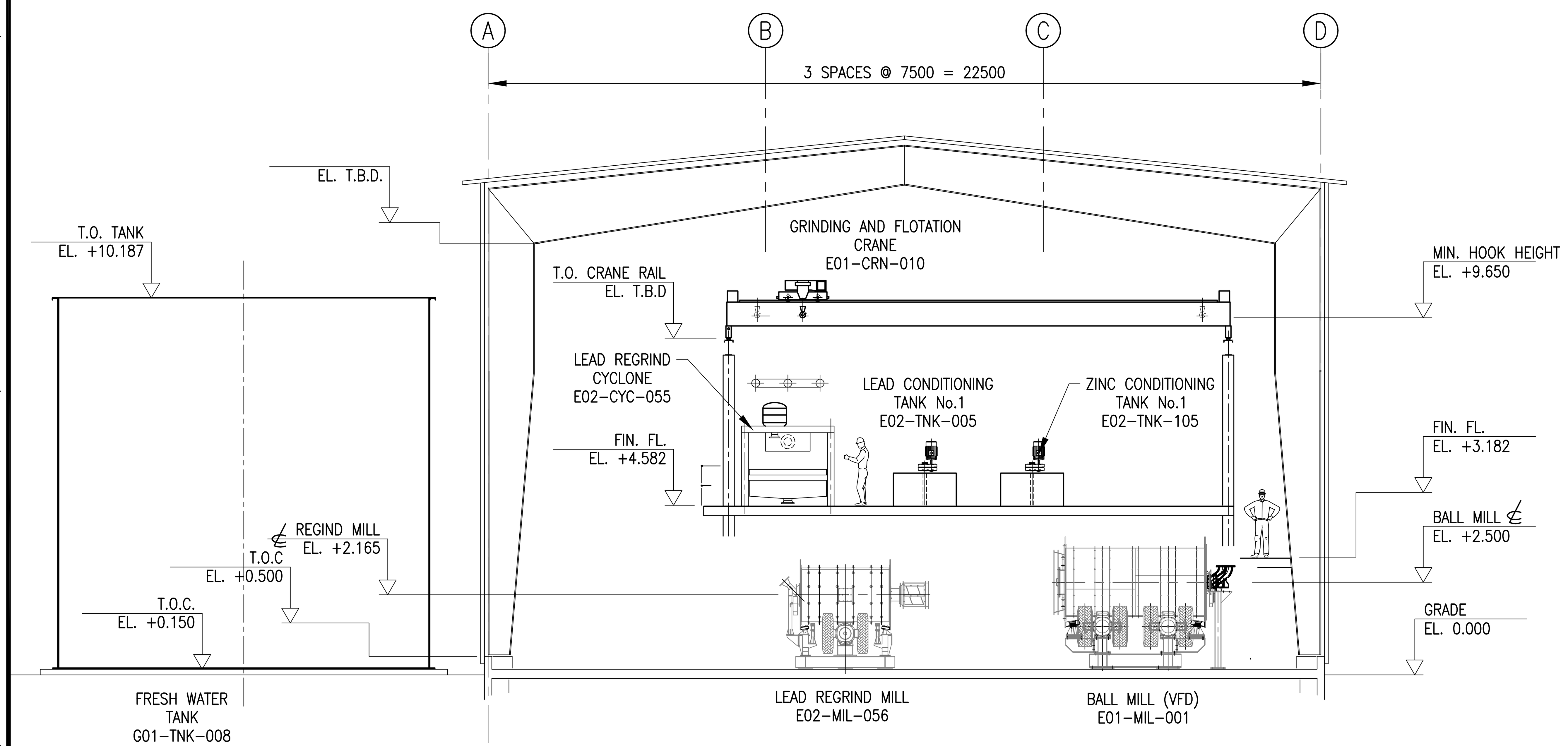

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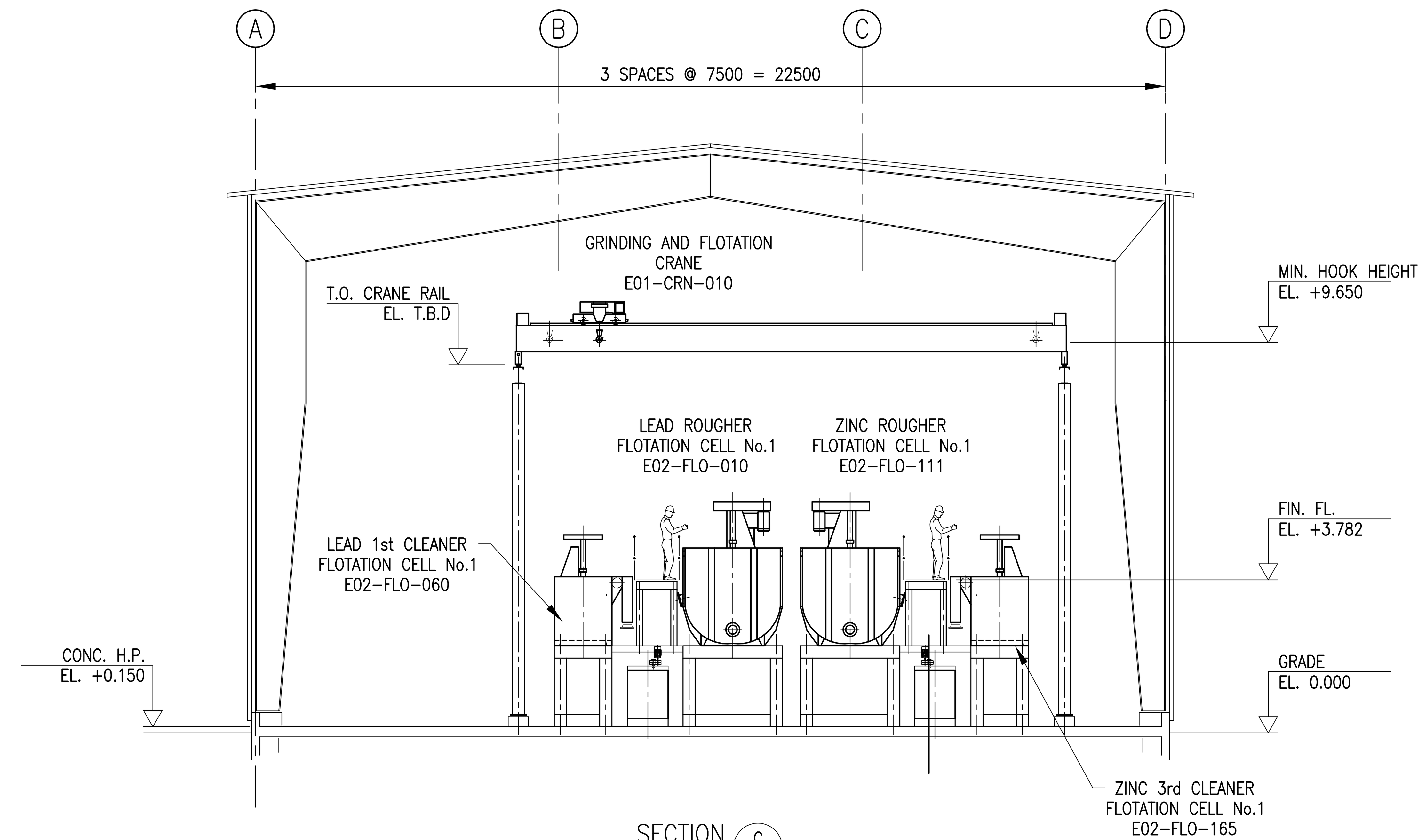

SECTION C/001

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MILL BUILDING
GENERAL ARRANGEMENT
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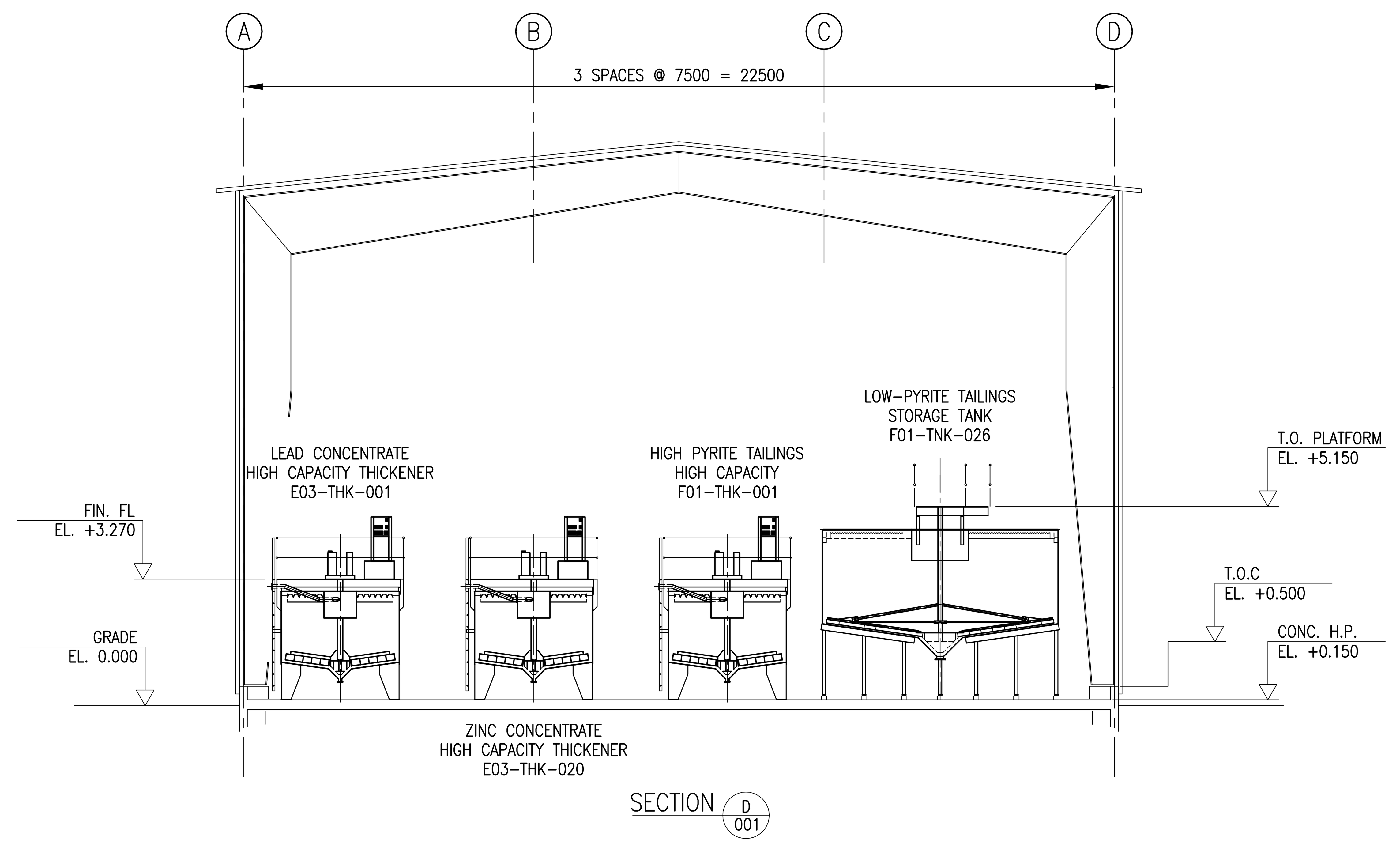

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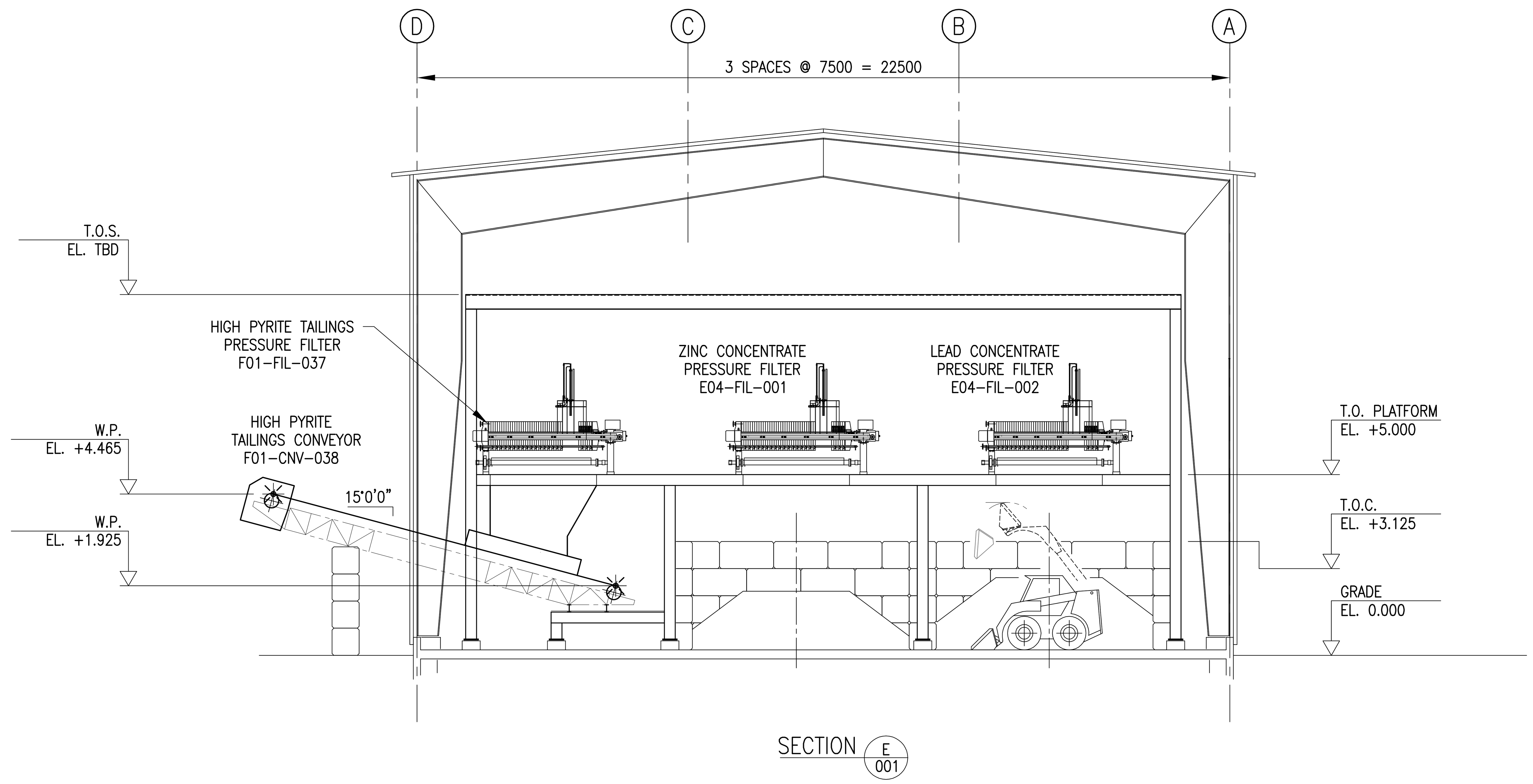

SECTION E/001

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YUKON TERRITORY

ALEXCO

WARDROP Engineering Inc.

TITLE

BELLEKENO PROJECT

MILL BUILDING
GENERAL ARRANGEMENT
SECTIONS

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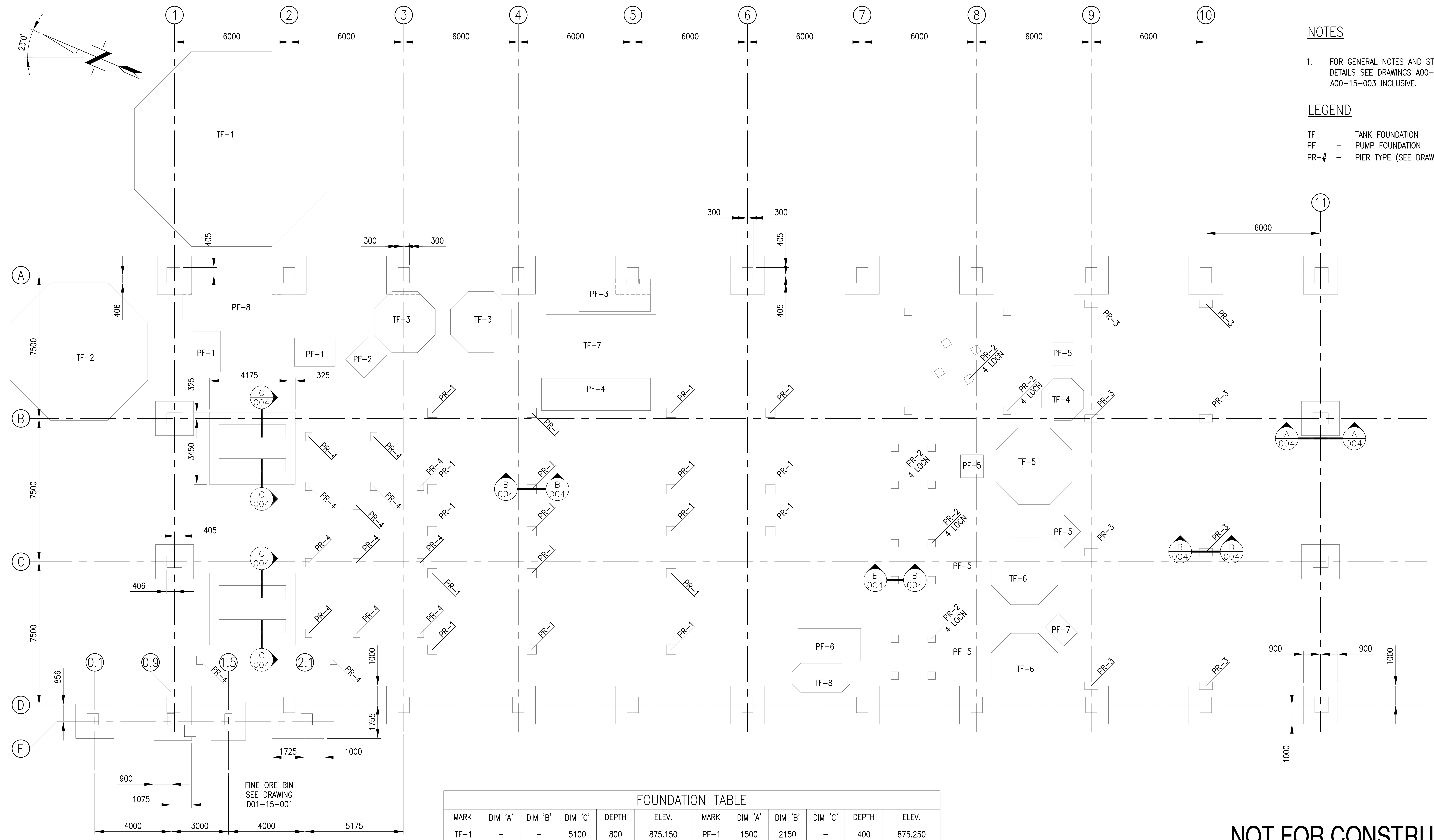


NOTES

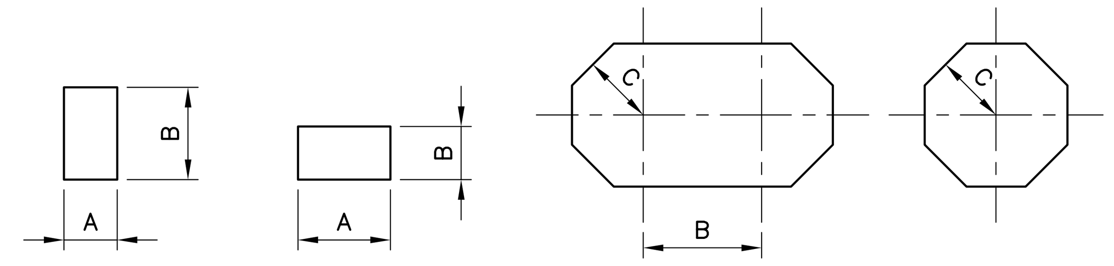
1. FOR GENERAL NOTES AND STANDARD DETAILS SEE DRAWINGS A00-15-001 TO A00-15-003 INCLUSIVE.

LEGEND

TF – TANK FOUNDATION
PF – PUMP FOUNDATION
PR-# – PIER TYPE (SEE DRAWING E00-15-004)

FOUNDATION TABLE

MARK	DIM 'A'	DIM 'B'	DIM 'C'	DEPTH	ELEV.	MARK	DIM 'A'	DIM 'B'	DIM 'C'	DEPTH	ELEV.
TF-1	–	–	5100	800	875.150	PF-1	1500	2150	–	400	875.250
TF-2	–	–	3600	800	875.150	PF-2	1350	1700	–	400	875.250
TF-3	–	–	1600	600	875.250	PF-3	1700	3750	–	400	875.250
TF-4	–	–	1100	400	875.250	PF-4	1700	5700	–	400	875.250
TF-5	–	–	2000	600	875.250	PF-5	1200	1200	–	400	875.250
TF-6	–	–	1750	600	875.250	PF-6	1700	3150	–	400	875.250
TF-7	5800	3150	–	600	875.250	PF-7	1000	1400	–	600	875.250
TF-8	–	1550	760	400	875.150	PF-8	1500	5150	–	600	875.250



ALL RECTANGULAR FOUNDATION DIMENSIONS ARE TO BE READ AS AxB AND CENTERED ABOUT EQUIPMENT CENTRELINES

ALL OCTAGONAL FOUNDATION DIMENSIONS ARE TO BE READ AS C CENTERED ABOUT EQUIPMENT CENTRELINES

NOT FOR CONSTRUCTION

SCALE: 1:100

WARDROP A TETRA TECH COMPANY — PEOPLE, PASSION, PERFORMANCE. TRUSTED GLOBALLY

REFERENCE No. 0953960100-DWG-S0004

DWG. NO.	REFERENCE DRAWINGS
A00-15-003	OVERALL GENERAL NOTES – CONCRETE SHEET 3
A00-15-002	OVERALL GENERAL NOTES – CONCRETE SHEET 2
A00-15-001	OVERALL GENERAL NOTES – CONCRETE SHEET 1

PRELIMINARY DRAWING

NOT TO BE USED FOR CONSTRUCTION

CLIENT | PRO.MAN. | PRO.ENG. | PROCESS | ELECTR. | INSTR. | PIPING | MECH. | STRUCT. | SERVICES | ARCH. | LAYOUT

REV. No.	ISSUE No.	DESCRIPTION	DATE	BY
C	1	ISSUED FOR INFORMATION	09JUL09	AKF
B	1	ISSUED FOR INFORMATION ONLY	24JUN09	MRK
A	1	ISSUED FOR SQUAD REVIEW	05JUN09	MRK

		DATE
SECTION:	CONCRETE	
SCALE:	1:100	
DESIGN. BY:	ATM	08APR09
DRAWN BY:	MRK	13APR09
CHECK. BY:		
APP. BY:		

YUKON TERRITORY

ALEXCO

WARDROP | Engineering Inc.

TITLE

BELLEKENO PROJECT

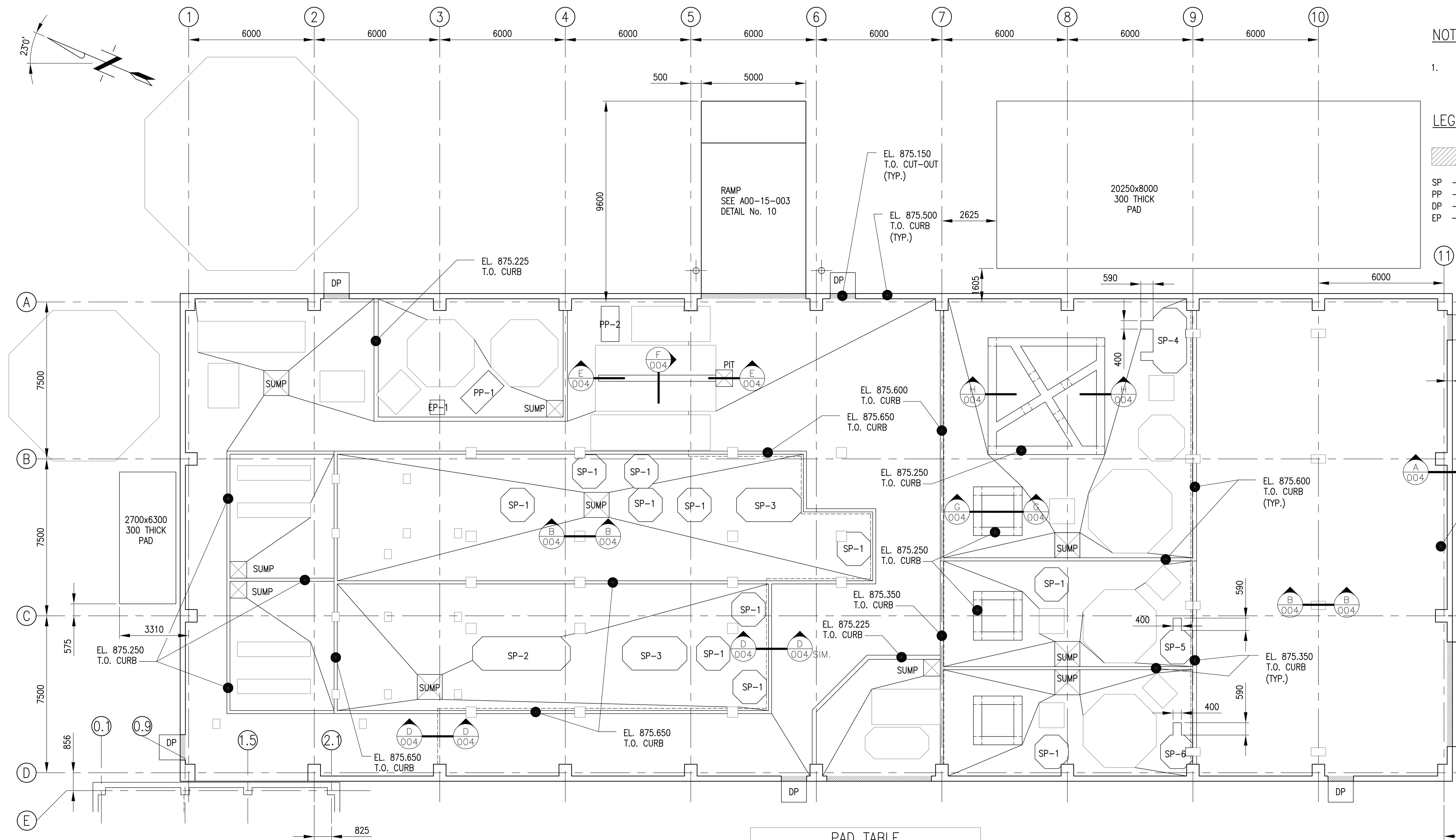
MILL BUILDING
CONCRETE
FOUNDATION PLAN

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
E0015001.DWG	09539601.00	E00-15-001	C

A1

U:\A-G\ALEXCO RESOURCE CORP – 5396\09539601.00 – BELLEKENO PROJECT (UPDATED PEA)\15-CONC\DWG\E0015001.DWG

09/07/09 11:17



NOTES

1. FOR GENERAL NOTES AND STANDARD DETAILS SEE DRAWINGS A00-15-001 TO A00-15-003 INCLUSIVE.

LEGEND

CUT-OUT INDICATION

SP – STANDPIPE PAD
PP – PUMP PAD
DP – DOOR PAD
EP – EQUIPMENT PAD

PAD TABLE

MARK	DIM 'A'	DIM 'B'	DIM 'C'	ELEV.
SP-1	–	–	800	875.250
SP-2	–	3100	800	875.250
SP-3	–	1500	800	875.250
SP-4	–	1500	800	875.250
SP-5	–	–	800	875.250
SP-6	–	–	800	875.250
EP-1	700	700	–	875.250
PP-1	750	1900	–	875.250
PP-2	850	1700	–	875.250

NOT FOR CONSTRUCTION

ALL RECTANGULAR FOUNDATION DIMENSIONS ARE TO BE READ AS AxB AND CENTERED ABOUT EQUIPMENT CENTRELINES

ALL OCTAGONAL FOUNDATION DIMENSIONS ARE TO BE READ AS C CENTERED ABOUT EQUIPMENT CENTRELINES

SCALE: 1:100

WARDROP A TETRA TECH COMPANY — PEOPLE, PASSION, PERFORMANCE. TRUSTED GLOBALLY

REFERENCE No. 0953960100-DWG-S0005

DWG. NO.	REFERENCE DRAWINGS
E00-15-004	MILL BUILDING – CONCRETE – MISC. SECTIONS AND DETAILS
E00-15-003	MILL BUILDING – CONCRETE – ELEVATIONS
E00-15-001	MILL BUILDING – CONCRETE – FOUNDATION PLAN

PRELIMINARY DRAWING

NOT TO BE USED FOR CONSTRUCTION

REV. No.	ISSUE No.	DESCRIPTION	DATE	BY
C	1	ISSUED FOR INFORMATION	09JUL09	AKF
B	1	ISSUED FOR INFORMATION ONLY	24JUN09	MRK
A	1	ISSUED FOR SQUAD REVIEW	05JUN09	MRK

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SECTION: CONCRETE		
SCALE: 1:100	DATE	
DESIGN. BY:	ATM	08APR09
DRAWN BY:	MRK	13APR09
CHECK. BY:		
APP. BY:		

YUKON TERRITORY

ALEXCO

WARDROP Engineering Inc.

TITLE
BELLEKENO PROJECT
MILL BUILDING
CONCRETE
GROUND FLOOR PLAN

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
E0015002.DWG	09539601.00	E00-15-002	C

11:17
09/07/09
A1

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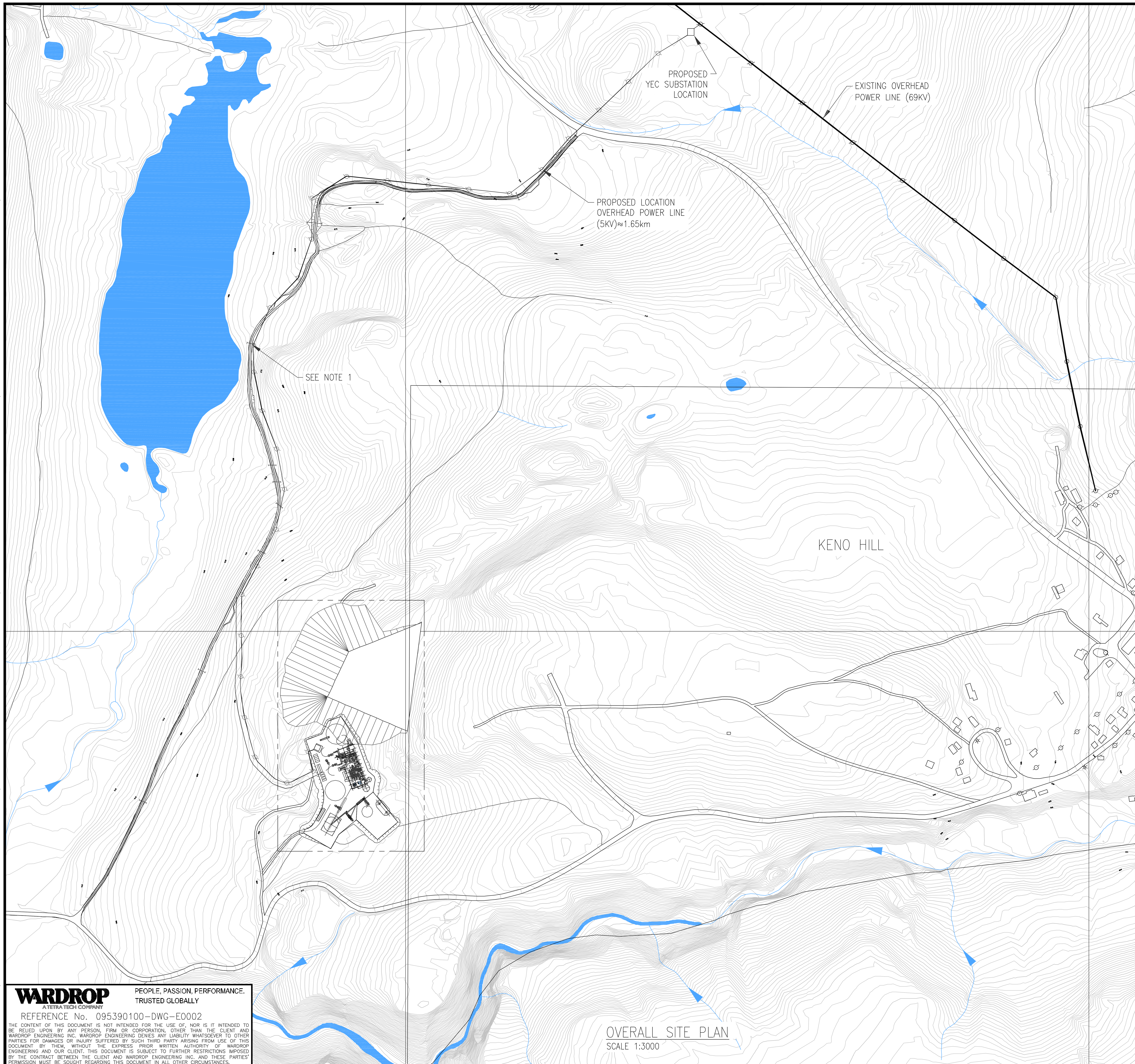

OVERALL SITE PLAN
SCALE 1:3000

NOTES:

1. POWERLINE AND POWER POLE NOT TO SCALE.

LEGEND:

–⊖– PROPOSED POWER LINE

FLAME AND MOTH SITE PLAN
SCALE 1:1500

1:1500 30 0 20 40 60m

1:3000 50 0 50 100m

DWG. NO.	REFERENCE DRAWINGS
A00–18–001	OVERALL SITE SINGLE LINE DIAGRAM
A00–10–002	OVERALL SITE GENERAL ARRANGEMENT

PRELIMINARY DRAWING
NOT TO BE USED FOR CONSTRUCTION

CLIENT | PRO.MAN. | PRO.ENG. | PROCESS | ELECTR. | INSTR. | PIPING | MECH. | STRUCT. | SERVICES | ARCH. | LAYOUT

REV. No.	ISSUE No.	DESCRIPTION	DATE	BY
B	1	ISSUED FOR INFORMATION	25MAY09	JSM
A	1	ISSUED FOR INFORMATION	22MAY09	JSM

		DATE
SECTION:	ELECTRICAL	
SCALE:	AS NOTED	
DESIGN. BY:	SA	04MAY09
DRAWN BY:	JSM	04MAY09
CHECK. BY:	SS	25MAY09
APP. BY:	SPN	25MAY09

YUKON TERRITORY
ALEXCO
WARDROP Engineering Inc.

TITLE
BELLEKENO PROJECT
OVERALL SITE
FLAME AND MOTH
ELECTRICAL GENERAL ARRANGEMENT

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
A0018002.DWG	09539601.00	A00–18–002	B

A1
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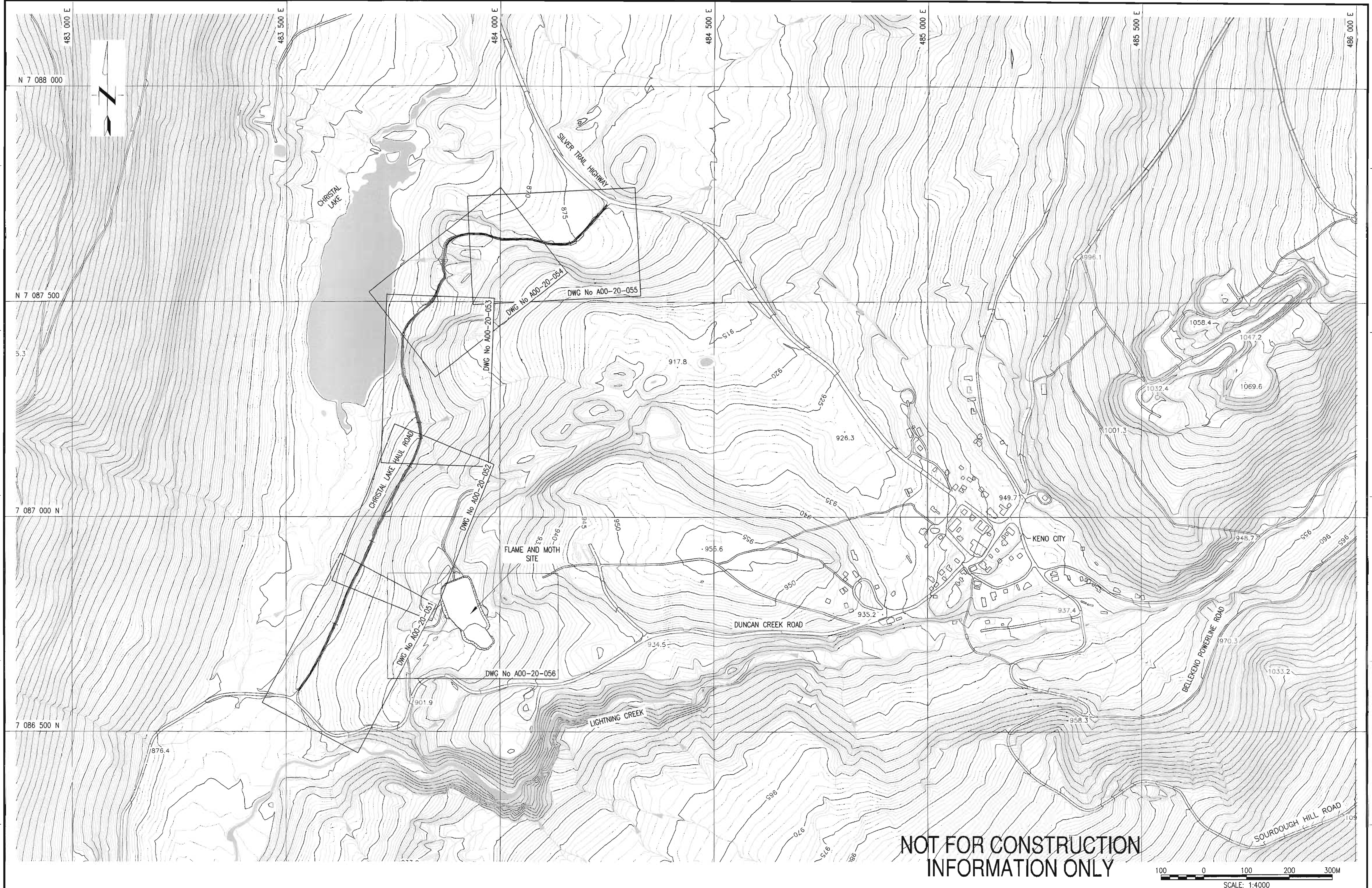
09/08/27 17:06



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DWG. NO.	REFERENCE DRAWINGS

PROFESSIONAL ENGINEER — YUKON TERRITORY — DWAYNE HARVIE — 2009-6-23

REV. No.	ISSUE No.	DESCRIPTION	DATE	BY
A	1	ISSUED FOR PRELIMINARY DESIGN PURPOSES	23JUN09	MW

CLIENT / PROJ.MAN. / PROJ.ENG. / PROCESS / ELECTR. / INSTR. / PIPING / MECH. / STRUCT. / SERVICES / ARCH. / LAYOUT

SECTION:	CIVIL-EARTH	
SCALE:	1:4000	DATE
DESIGN. BY:	MW	MAY09
DRAWN BY:	AO	MAY09
CHECK. BY:	JM	
APP. BY:		

YUKON TERRITORY

ALEXCO

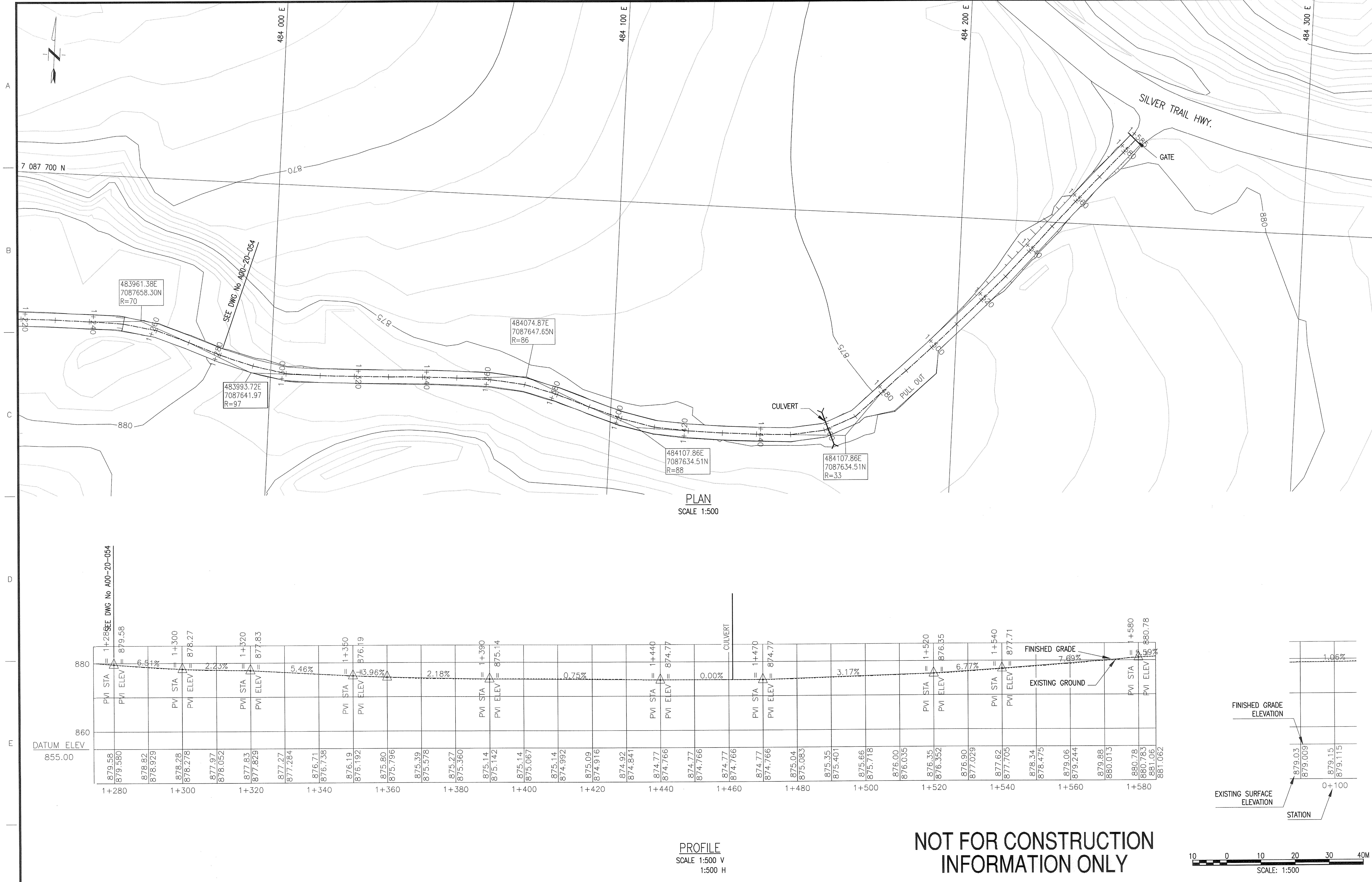
WARDROP Engineering Inc.

TITLE
BELLEKENO PROJECT
PLANT SITE FOOTPRINT AND CHRISTAL LAKE HAUL ROAD SHEET INDEX

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV
A0020057.DWG	09539601.00	A00-20-057	A

U:\A-G\ALEXCO RESOURCE CORP - 5398\09539601.00 - BELLEKENO PROJECT (UPDATED PEA)\20-CIVIL-EARTH\DWG\A0020050.DWG

09/06/03 16:26



NOT FOR CONSTRUCTION
INFORMATION ONLY

DWG. NO.	REFERENCE DRAWINGS
A00-20-057	PLANTSITE FOOTPRINT AND CHRISTAL LAKE HAUL ROAD SHEET INDEX

PROFESSIONAL ENGINEER — YUKON TERRITORY — DWAYNE HARVIE — 2009-6-2

REV. No.	ISSUE No.	DESCRIPTION	DATE	BY
B	1	ISSUED FOR PRELIMINARY DESIGN PURPOSES	23JUN09	MW
A	1	ISSUED FOR PEA UPDATE	05JUN09	MW

SECTION:	CIVIL-EARTH	
SCALE:	AS NOTED	DATE
DESIGN. BY:	MW	MAY09
DRAWN BY:	AO	MAY09
CHECK. BY:	JM	
APP. BY:		

YUKON TERRITORY

ALEXCO

WARDROP Engineering Inc.

TITLE

BELLEKENO PROJECT
PLANTSITE PREPARATION AND SITE ROADS
CHRISTAL LAKE HAUL ROAD
PLAN AND PROFILE
STA 1+280 TO 1+610

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
A0020055.DWG	09539601.00	A00-20-055	B

09/06/03 16:28

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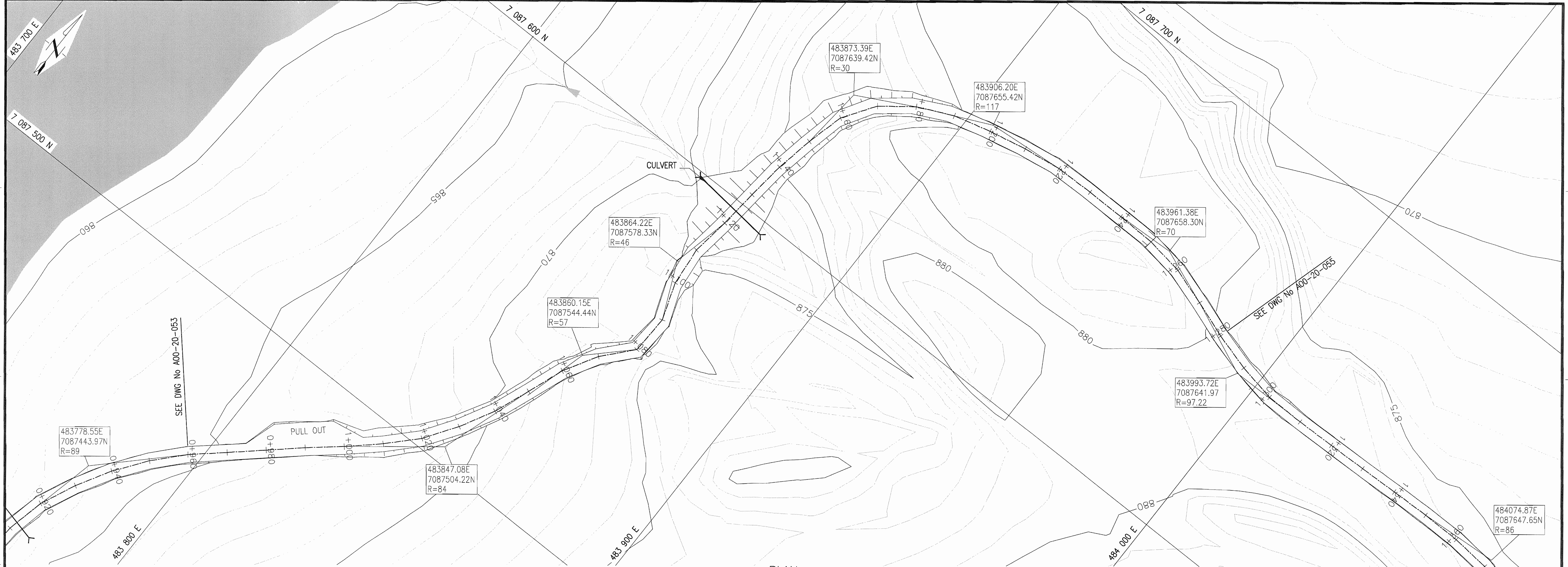
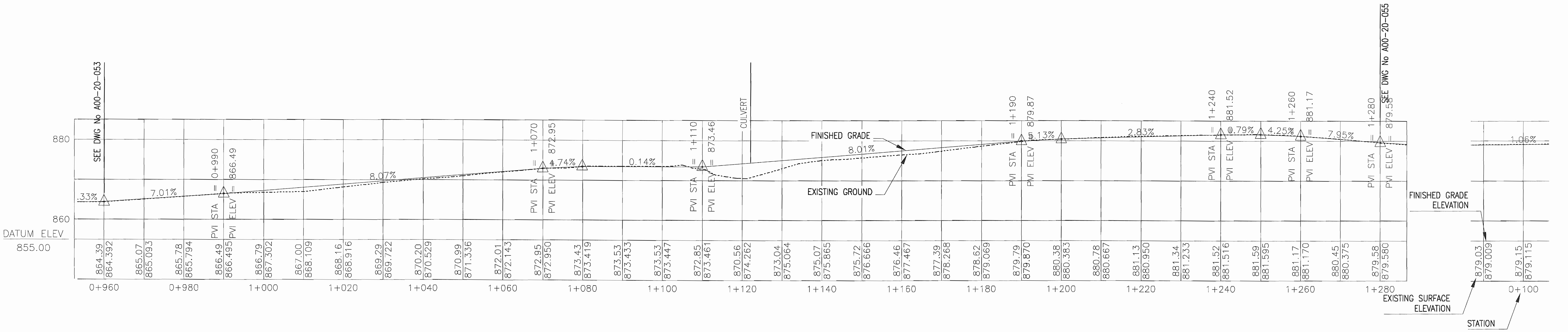


PLAN
SCALE 1:500



PROFILE
SCALE 1:500 V
1:500 H

NOT FOR CONSTRUCTION INFORMATION ONLY

10 0 10 20 30 40M
SCALE: 1:500

DWG. NO.	REFERENCE DRAWINGS

PROFESSIONAL ENGINEER
YUKON TERRITORY
DWAYNE HARVIE
2009-6-25

REV. No.	ISSUE No.	DESCRIPTION	DATE	BY
B	1	ISSUED FOR PRELIMINARY DESIGN PURPOSES	23JUN09	MW
A	1	ISSUED FOR PEA UPDATE	05JUN09	MW

CLIENT / PROJ.ENG. / PROJ.MAN. / PROCESS / ELECTR. / INSTR. / PIPING / MECH. / STRUCT. / SERVICES / ARCH. / LAYOUT

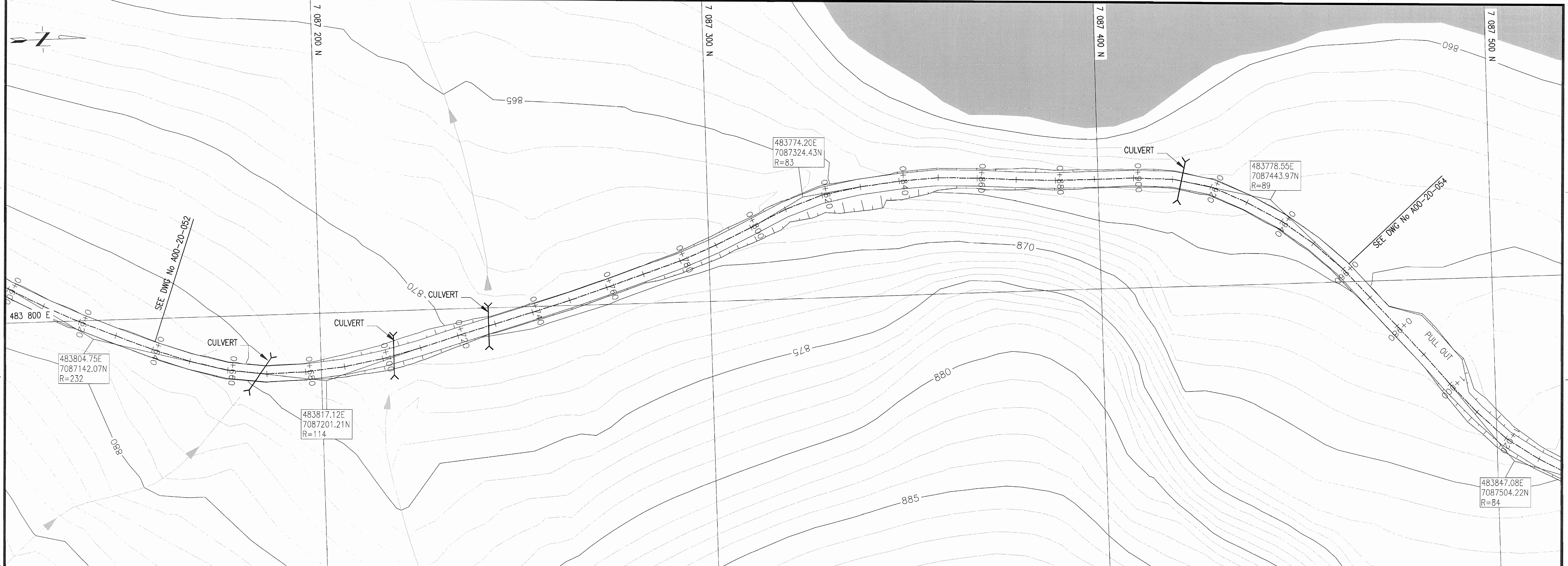
SECTION:	CIVIL-EARTH	
SCALE:	AS NOTED	DATE
DESIGN. BY:	MW	MAY09
DRAWN BY:	AO	MAY09
CHECK. BY:	JM	
APP. BY:		

YUKON TERRITORY
ALEXCO
WARDROP Engineering Inc.

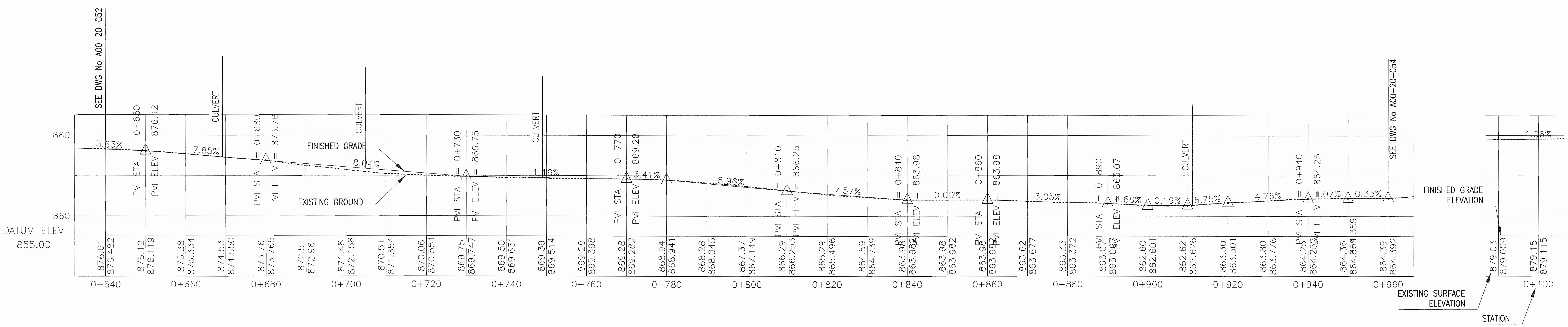
TITLE
BELLEKENO PROJECT
PLANTSITE PREPARATION AND SITE ROADS
CHRISTAL LAKE HAUL ROAD
PLAN AND PROFILE
STA 0+960 TO 1+280

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
A0020054.DWG	09539601.00	A00-20-054	B

A1
U:\A-G\ALEXCO RESOURCE CORP - 5396\09539601.00 - BELLEKENO PROJECT (UPDATED PEA)\20-CIVIL-EARTH\DWG\A0020054.DWG
09/06/03 18:20



PLAN
SCALE 1:500



PROFILE
SCALE 1:500 V
1:500 H

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INFORMATION ONLY

SCALE: 1:500

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DWG. NO.	REFERENCE DRAWINGS

PROFESSIONAL ENGINEER
YUKON TERRITORY
DWAYNE HARVIE
2009-6-23

REV. No.	ISSUE No.	DESCRIPTION	DATE	BY
B	1	ISSUED FOR PRELIMINARY DESIGN PURPOSES	23JUN09	MW
A	1	ISSUED FOR PEA UPDATE	05JUN09	MW

CLIENT, PROJ.MAN., PROCESS, ELECTR., INSTR., PIPING, MECH., STRUCT., SERVICES, ARCH., LAYOUT

SECTION:	CIVIL-EARTH	
SCALE:	AS NOTED	DATE
DESIGN. BY:	MW	MAY09
DRAWN BY:	AO	MAY09
CHECK. BY:	JM	
APP. BY:		

YUKON TERRITORY

ALEXCO

WARDROP Engineering Inc.

TITLE
BELLEKENO PROJECT
PLANTSITE PREPARATION AND SITE ROADS
CHRISTAL LAKE HAUL ROAD
PLAN AND PROFILE
STA 0+640 TO 0+960

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
A0020053.DWG	09539601.00	A00-20-053	B

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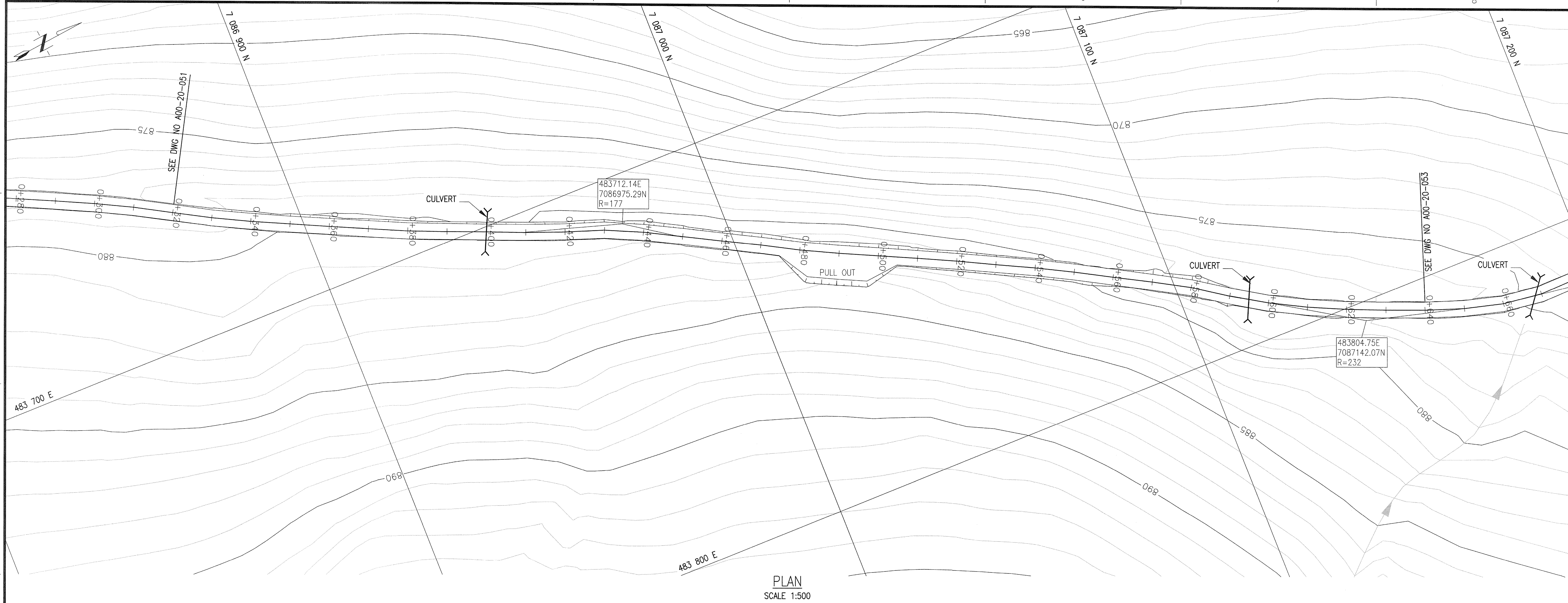
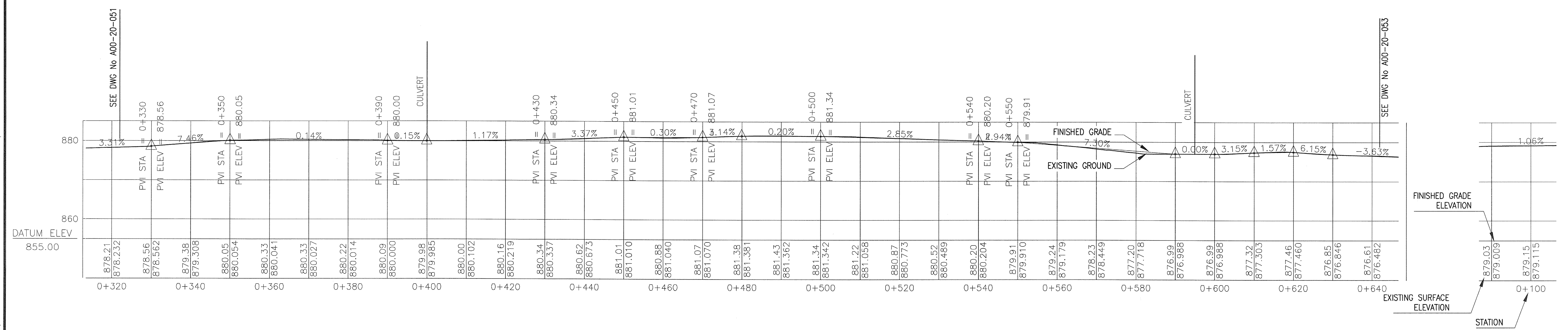


PLAN
SCALE 1:500



PROFILE
SCALE 1:500 V
1:500 H

Station	Existing surface elevation	Finished grade elevation
0+320	878.21	878.232
	878.56	878.562
0+340	879.38	879.308
	880.05	880.054
0+360	880.33	880.041
	880.33	880.027
0+380	880.22	880.014
	880.09	880.000
0+400	879.98	879.985
	880.00	880.102
0+420	880.16	880.219
	880.34	880.337
0+440	880.62	880.673
	881.01	881.010
0+460	880.88	881.040
	881.07	881.070
0+480	881.38	881.381
	881.43	881.362
0+500	881.34	881.342
	881.22	881.058
0+520	880.87	880.773
	880.52	880.489
0+540	880.20	880.204
	879.91	879.910
0+560	879.24	879.179
	878.23	878.449
0+580	877.20	877.718
	876.99	876.988
0+600	876.99	876.988
	877.32	877.303
0+620	877.46	877.460
	876.85	876.846
0+640	876.61	876.482

NOT FOR CONSTRUCTION
INFORMATION ONLY

10 0 10 20 30 40M
SCALE: 1:500

DWG. NO.	REFERENCE DRAWINGS
A00-20-057	PLANTSITE FOOTPRINT AND CHRISTAL LAKE HAUL ROAD SHEET INDEX

PROFESSIONAL ENGINEER YUKON TERRITORY DWAYNE HARVIE 2009-6-23

REV. No.	ISSUE No.	DESCRIPTION	DATE	BY
B	1	ISSUED FOR PRELIMINARY DESIGN PURPOSES	23JUN09	MW
A	1	ISSUED FOR PEA UPDATE	05JUN09	MW

CLIENT, PROJ.MAN., PROJ.ENG., PROCESS, ELECTR., INSTR., PIPING, MECH., STRUCT., SERVICES, ARCH., LAYOUT

SECTION:	CIVIL-EARTH	
SCALE:	AS NOTED	DATE
DESIGN. BY:	MW	MAY09
DRAWN BY:	AO	MAY09
CHECK. BY:	JM	
APP. BY:		

YUKON TERRITORY

ALEXCO

WARDROP Engineering Inc.

TITLE
BELLEKENO PROJECT
PLANTSITE PREPARATION AND SITE ROADS
CHRISTAL LAKE HAUL ROAD
PLAN AND PROFILE
STA 0+320 TO 0+640

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
A0020052.DWG	09539601.00	A00-20-052	B

16:29 09/06/03

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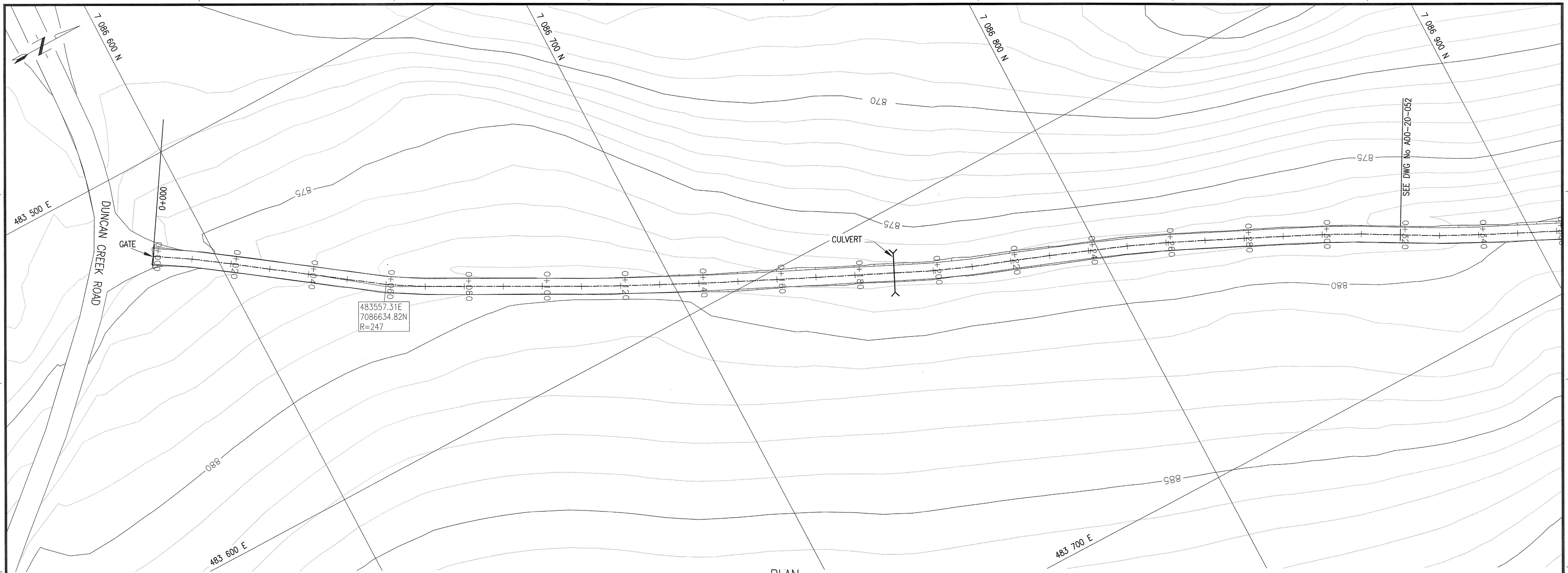
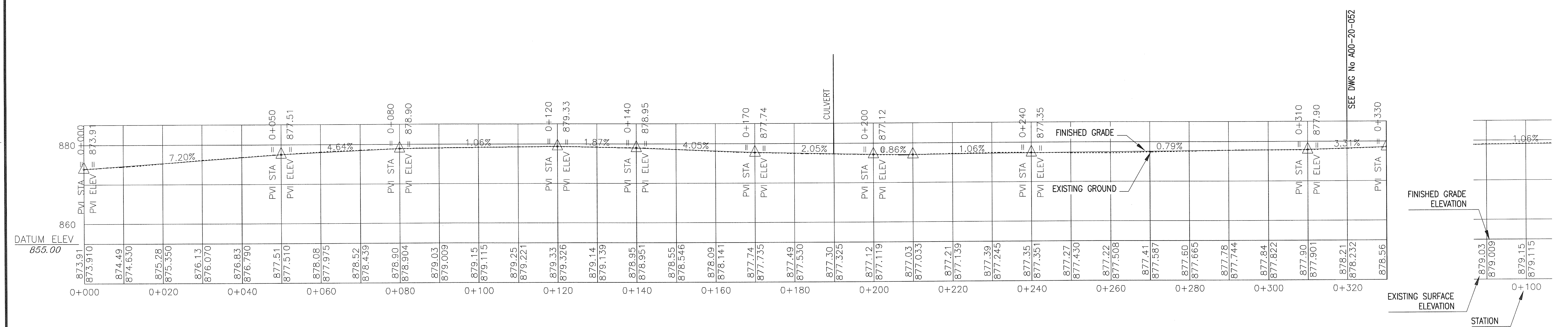


PLAN
SCALE 1:500



Station	Finished grade	Existing surface
0+000	873.91	873.910
	874.49	874.630
0+020	875.28	875.350
	876.13	876.070
0+040	876.83	876.790
	877.51	877.510
0+060	878.08	877.975
	878.52	878.439
0+080	878.90	878.904
	879.03	879.009
0+100	879.15	879.115
	879.25	879.221
0+120	879.33	879.326
	879.14	879.139
0+140	878.95	878.951
	878.55	878.546
0+160	878.09	878.141
	877.74	877.735
0+180	877.49	877.530
	877.30	877.325
0+200	877.12	877.119
	877.03	877.033
0+220	877.21	877.139
	877.39	877.245
0+240	877.35	877.351
	877.27	877.430
0+260	877.22	877.508
	877.41	877.587
0+280	877.60	877.665
	877.78	877.744
0+300	877.84	877.822
	877.90	877.901
0+320	878.21	878.232
	878.56	

PROFILE
SCALE 1:500 V
1:500 H

NOT FOR CONSTRUCTION INFORMATION ONLY

10 0 10 20 30 40M
SCALE: 1:500

DWG. NO.	REFERENCE DRAWINGS
A00-20-057	PLANTSITE FOOTPRINT AND CHRISTAL LAKE HAUL ROAD SHEET INDEX

PROFESSIONAL ENGINEER YUKON DWAYNE HARVIE TERRITORY

REV. No.	ISSUE No.	DESCRIPTION	DATE	BY
B	1	ISSUED FOR PRELIMINARY DESIGN PURPOSES	23JUN09	MW
A	1	ISSUED FOR PEA UPDATE	05JUN09	MW

CLIENT, PROJ.MAN., PROJ.ENG., PROCESS, ELECTR., INSTR., PIPING, MECH., STRUCT., SERVICES, ARCH., LAYOUT

		DATE
SECTION:	CIVIL-EARTH	
SCALE:	AS NOTED	
DESIGN. BY:	MW	MAY09
DRAWN BY:	AO	MAY09
CHECK. BY:	JM	
APP. BY:		

YUKON TERRITORY

ALEXCO

WARDROP Engineering Inc.

TITLE
BELLEKENO PROJECT
PLANTSITE PREPARATION AND SITE ROADS
CHRISTAL LAKE HAUL ROAD
PLAN AND PROFILE
STA 0+000 TO 0+320

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
A0020051.DWG	09539601.00	A00-20-051	B

U:\A-C\ALEXCO RESOURCE CORP - 5396\09539601.00 - BELLEKENO PROJECT (UPDATED PEA)\20-CIVIL-EARTH\DWG\A0020051.DWG

GENERAL NOTES:

CONCRETE

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH WARDROP'S SPECIFICATION NUMBER 03-30-00 CAST-IN-PLACE CONCRETE IN CASE OF CONFLICT REFER TO THE GENERAL CONTRACT CONDITION.
2. THESE STANDARD NOTES SHALL BE USED UNLESS OTHERWISE NOTED ON THE PROJECT DRAWINGS.
3. CONCRETE DESIGN, SUPPLY AND CONSTRUCTION MUST COMPLY WITH THE LATEST EDITION OF GOVERNING CODES, SPECIFICATIONS AND STANDARDS INCLUDING:
   -NATIONAL BUILDING CODE OF CANADA (NBCC)
   -CAN/CSA-A23.1 CONCRETE MATERIALS AND METHODS OF CONCRETE CONSTRUCTION
   -CAN/CSA-A23.2 METHODS OF TEST FOR CONCRETE
   -CAN/CSA-A23.3 DESIGN OF CONCRETE STRUCTURES
4. MINIMUM CONCRETE COMPRESSIVE STRENGTH AT 28 DAYS MUST BE AS FOLLOWS:
   -ALL STRUCTURAL CONCRETE UNO. 30 MPa
   -LEAN OR BLINDING CONCRETE 15 MPa
5. USE CAN/CSA-A3001 PORTLAND CEMENT TYPE GU UNO.
6. NOMINAL MAXIMUM AGGREGATE SIZE 20mm UNO., IN ACCORDANCE WITH CAN/CSA-A23.1
7. ALL REINFORCEMENT TO BE IN ACCORDANCE WITH CAN/CSA-G30.18 GRADE 400 MPa DEFORMED STEEL BARS.
8. USE CAN/CSA-G30.5 WELDED WIRE FABRIC FOR CONCRETE REINFORCEMENT.
9. REINFORCING STEEL SHALL BE DETAILED, SHOP FABRICATED AND PLACE IN ACCORDANCE WITH:
   -CAN/CSA-A23.1 AND CAN/CSA-A23.2
   -RSIC – REINFORCING STEEL INSTITUTE OF CANADA MANUAL OF STANDARD PRACTICE
   -CRSI – CONCRETE REINFORCING STEEL INSTITUTE MANUAL OF STANDARD PRACTICE
   CONSTRUCTION CONTRACTOR IS RESPONSIBLE FOR SHOP DRAWING REVIEW.
10. UNLESS NOTED OTHERWISE ON DRAWINGS ALL SPLICES SHALL BE IN ACCORDANCE WITH CAN/CSA-A23.3 GRADE 400 MPa. SPLICES TO BE STAGGERED AND MUST HAVE A MINIMUM CLASS "B" SPLICE LENGTH AS LISTED BELOW:
    TOP BARS SHALL BE SPLICED USING 1.3 TIMES THE FIGURES BELOW:

f'c	BAR SIZE	10M	15M	20M	25M	30M	35M
30 MPa		400	600	800	1100	1300	1500

11. ALL REINFORCEMENT HOOKS AND BENDS MUST BE STANDARD UNO.
12. REINFORCEMENT SPACING SHOWN ON DRAWINGS IN ALL CASES IS CENTER TO CENTER OF BAR.
13. ALL REINFORCEMENT BARS NOT SPECIFICALLY LOCATED ON THE DRAWING MUST BE PLACED SYMMETRICALLY WITH RESPECT TO SUPPORTS.
14. DOWEL WALLS TO FOOTINGS WITH SAME BAR SIZE AND SPACING AS WALL REINFORCEMENT UNO.
15. CLEAR CONCRETE COVER TO REINFORCEMENT, UNO.
    -CONCRETE POURED ON GROUND: 75mm
    -CONCRETE EXPOSED TO GROUND OR EXPOSED TO WEATHER: 40mm FOR 15M BARS OR SMALLER; 50mm FOR 20M BARS OR LARGER
    -INTERIOR FACES OF SLABS AND WALLS: MIN. 20mm OR BAR DIA.
    -INTERIOR FACES OF COLUMNS AND BEAMS: 40mm
16. BAR NOTATION GIVES THE FOLLOWING INFORMATION IN THIS ORDER:
    NUMBER OF BARS (IF QUOTED) – BAR SIZE
    BAR SPACING AND PLACING INFORMATION (IF QUOTED)
    FOR EXAMPLE – 15M @ 150 TOP
17. SECURE CROSSING BARS AT INTERSECTIONS BY USING TIE-WIRE OF NOT LESS THAN 1.6mm THICK. REINFORCING STEEL SHALL HAVE ADEQUATE SUPPORTS SPACED NOT MORE THAN 1200mm APART IN ANY DIRECTION AND SHALL BE FIRMLY ANCHORED BEFORE CONCRETE IS POURED. PLASTIC CHAIR SUPPORTS SHALL BE USED IN CORROSIVE ATMOSPHERE.
18. FOR OPENINGS OR INSERTS LESS THAN 450mm THE REINFORCING STEEL SHALL BE DEFLECTED, NOT CUT.
19. WELDING OF REINFORCEMENT OR THE USE OF POSITIVE MECHANICAL SPLICING IN PLACE OF LAP SPLICES IS PERMITTED ONLY WITH THE WRITTEN APPROVAL OF THE ENGINEER.
20. TOLERANCES FOR PLACING REINFORCEMENT:
    FOR CLEAR CONCRETE PROTECTION OF REINFORCEMENT WHERE DEPTH OF A FLEXURAL MEMBER THICKNESS OF A WALL OR SMALLEST DIMENSION OF A COLUMN IS:
    200mm OR LESS- +/- 8mm
    200mm TO 600mm- +/-12mm
    600mm OR LARGER- +/-20mm
    LATERAL SPACING OF BARS SHALL BE WITHIN +/-30mm OF THE SPECIFIED SPACING.
    LONGITUDINAL LOCATION OF BENDS AND ENDS OF BARS +/-50mm.
    AT DISCONTINUOUS ENDS OF MEMBERS +/-20mm.
    REGARDLESS OF ANY TOLERANCE REQUIREMENTS FOR PLACING THE CONCRETE COVER SHALL IN NO CASE BE REDUCED BY MORE THAN ONE THIRD OF THE SPECIFIED COVER.
21. FLOOR SLAB ON GRADE TO BE POURED IN CHECKER BOARD PATTERN WITH CONSTRUCTION JOINTS AND CONTROL JOINTS AT 6000 C/C IN EACH DIRECTION. EXACT LOCATION MAY BE VARIED TO SUIT BUILDING FOUNDATIONS AND EQUIPMENT PADS. EXPANSION JOINTS IN FLOOR ARE TO BE PROVIDED WHERE SHOWN ON THE DRAWINGS.
22. TO CONTROL SHRINKAGE CRACKING OF CONCRETE, CURE AND PROTECT FRESHLY DEPOSITED CONCRETE IN ACCORDANCE WITH CAN/CSA-A23.1.
23. POURING OF CONCRETE BELOW 5 DEGREES C. SHALL CONFORM TO THE COLD WEATHER CONCRETING REQUIREMENTS OF CSA STANDARD CAN. 3 – A23.1.
24. BEFORE CONCRETE IS POURED ALL OPENINGS, ANCHOR BOLTS, INSERTS ETC. INCLUDING EMBEDDED ITEMS FOR THE MECHANICAL, ELECTRICAL, OR ANY OTHER TRADES SHALL BE CHECKED AGAINST THE DRAWINGS.
25. ALL ANCHOR BOLTS SHALL CONFORM TO CAN/CSA-G40.21 GRADE 300W (300MPa).
26. ALL ANCHOR BOLTS SHALL BE SET USING A TEMPLATE FIXED TO THE FORMWORK TO ENSURE THAT PLACEMENT TOLERANCES ARE MAINTAINED.
27. ANCHOR BOLTS AND EMBEDDED MATERIAL SHALL BE PLACED ACCORDING TO DIMENSIONS AS SHOWN ON THE DRAWINGS AND WITH TOLERANCES AS FOLLOWS;
    SINGLE BOLTS & EMBEDDED MATERIAL: +/-3mm IN LOCATION & ELEVATION
    BOLT GROUPS: +/-3mm IN LOCATION & ELEVATION
    MAXIMUM DIFFERENCE WITHIN GROUPS: +/-3mm
    ROCK BOLTS: +/-3mm
28. GROUTING UNDER MACHINE BASES SHALL BE 'SIKA GROUT 212 HP' AND UNDER STRUCTURAL COLUMNS SHALL BE 'MASTERFLOW 928' OR APPROVED EQUIVALENT.
29. FOR WATERPROOFING THE CONCRETE STRUCTURES, WHERE INDICATED, APPLY ONE COAT OF XYPEX CONCENTRATE AT 0.8Kg/m2 PLUS ONE COAT OF XYPEX MODIFIED AT 0.8Kg/m2/ BY XYPEX CORPORATION LTD. OR APPROVED EQUAL ON THE CONCRETE SURFACES AS NOTED ON THE DRAWINGS. APPLY AS PER MANUFACTURERS SPECIFICATIONS.
30. CHAMFER EXPOSED CORNERS OF COLUMNS AND BEAMS 20mm UNO.
31. CLEAN SURFACES OF ALL CONSTRUCTION JOINTS THOROUGHLY AND REMOVE LAITANCE. IN ADDITION, WET THE SET CONCRETE SURFACE AT CONSTRUCTION JOINTS THOROUGHLY AND COAT WITH NEAT CEMENT GROUT PRIOR TO POURING NEW CONCRETE.
32. APPLY SEALANT TO ALL JOINTS USING SIKAFLEX-ICSL SEALANT OR APPROVED EQUAL. APPLY AS PER MANUFACTURER'S INSTRUCTIONS.
33. CONCRETE FLOORS AND GROUND SLABS SHALL HAVE TROWELLED FINISHES UNLESS OTHERWISE NOTED ON THE DRAWINGS.
34. FOR FLOOR SLAB SEALER/HARDENERS SEE DRAWINGS.
35. MISCELLANEOUS STEEL TO COMPLY WITH CAN/CSA-G40.21 GRADE 300W UNO., ALL PIPE MATERIALS SHALL CONFORM TO ASTM A53 TYPE S GRADE B (Fy = 240MPa MIN.).
36. SLEEVES, PIPES, OR HOLES MUST BE PLACED THROUGH CONCRETE ONLY WHERE SHOWN ON DRAWINGS OR APPROVED BY THE ENGINEER.
37. FOR THE AREAS WHERE STYROFOAM INSULATION IS NOT USED UNDER SLAB ON GRADE, USE 0.25mm (10 MILS) THICK POLYETHYLENE SHEET UNDER ALL SLABS POURED ON GRADE, UNO.
38. THE FINAL 0.15m BELOW THE SLAB-ON-GRADE SHALL BE CONSTRUCTED WITH CRUSHED BASE COARSE GRAVEL THAT CONFORMS TO THE SPECIFICATIONS DETAILED IN TABLE 1 OF THE TECHNICAL MEMO FROM EBA DATED 23 JULY 2009 (FILE: W14101178.002)

FOUNDATIONS, EXCAVATION, AND BACKFILL

1. ALL CIVIL WORK TO BE CARRIED OUT IN ACCORDANCE WITH SPECIFICATION NUMBER 31-23-01 AND TECHNICAL MEMO FROM EBA (FILE: W14101178.002) DATED 23 JULY 2009 AND SUBSEQUENT CORRESPONDENCES.
2. ALL STRUCTURES AND TANKS ARE DESIGNED TO BE FOUNDED AT THE ELEVATIONS AND LOCATIONS SHOWN ON THE DRAWINGS AND MUST BE ON SOLID UNDISTURBED NATIVE GROUND, COMPACTED STRUCTURAL FILL, ROCK OR LEAN CONCRETE.
3. EXCAVATE TO THE BASE OF FOOTING ELEVATION. REMOVE AND WASTE ANY REMAINING TOPSOIL, ORGANIC CLAY AND OTHER DELETERIOUS MATERIALS WITHIN THE PROPOSED RAFT FOOTING AREA. CONDUCT FINAL CLEAN-UP OF FOOTING BASE WITH HAND TOOLS. REMOVE ANY FROZEN SOIL.
4. AFTER PREPARATION, PROTECT FOOTING BASES FROM WETTING, DRYING AND FREEZING. REMOVE ALL AFFECTED SOIL AS REQUIRED.
5. DO NOT CONSTRUCT FOOTINGS ON FROZEN SOIL MATERIAL AND DO NOT PERMIT THE SOILS BELOW THE FOOTING TO FREEZE AFTER CONSTRUCTION OF FOOTINGS.
6. ON COMPLETION OF THE EXCAVATION, THE GEOTECHNICAL ENGINEER MUST CONFIRM IN THE FIELD THE BEARING CAPACITY AND TYPE OF NATIVE MATERIAL AT THE FOUNDING ELEVATION BEFORE PLACING FORMS, REINFORCEMENT OR CONCRETE. THIS CONFIRMATION MUST BE IN WRITING. ANY NECESSARY REMEDIAL WORK SHALL BE COMPLETED AS DIRECTED BY THE GEOTECHNICAL ENGINEER. SHOULD NATIVE MATERIAL BE CONFIRMED TO BE FROST SUSCEPTIBLE, THE EXCAVATION FOR LOCAL FOOTINGS SHOULD CARRY DOWN TO BELOW FROST LEVEL AND BACKFILL WITH COMPACTED NON FROST SUSCEPTIBLE (NFS) MATERIAL IN ACCORDANCE TO THE RECOMMENDATION OF THE GEOTECHNICAL ENGINEER.
7. REMOVE UNSUITABLE MATERIAL AND REPLACE WITH COMPACTED STRUCTURAL FILL OR LEAN CONCRETE AS DIRECTED BY THE GEOTECHNICAL ENGINEER.
8. DO NOT INCREASE THE HEIGHT OF COLUMNS, PIERS, OR WALLS WITHOUT WRITTEN APPROVAL FROM THE ENGINEER.
9. PLACE BACKFILL SIMULTANEOUSLY ON BOTH SIDES OF WALLS, GRADE BEAMS, AND BURIED STRUCTURES TO AVOID UNBALANCED LOADING.
10. BACKFILL BOTH SIDES OF GRADE BEAMS (FOUNDATION WALL) WITHIN 600mm FROM SIDE TO SIDE. COMPACT BACKFILL TO A MINIMUM OF 98% OF STANDARD PROCTOR MAXIMUM DRY DENSITY (ASTMD-698) AT OR NEAR OPTIMUM MOISTURE CONTENT.
11. ANY OVER EXCAVATION OF FOUNDATION GRADES MUST BE MADE GOOD WITH BLINDING CONCRETE FOR FOOTINGS ON ROCK OR WITH COMPACTED STRUCTURAL FILL TO ACHIEVE THE BEARING CAPACITY.
12. EXCAVATE TO THE SUBGRADE ELEVATION OF FLOOR SLAB. REMOVE AND WASTE ANY REMAINING TOPSOIL, ORGANIC CLAY AND OTHER DELETERIOUS MATERIALS WITHIN THE PROPOSED RAFT FOUNDATION AREA.
13. THE SURFACE SHOULD BE PROOF ROLLED TO DETECT WET AND/OR SOFT SOILS. SUBGRADE AREAS WHICH EXHIBIT UNACCEPTABLE DEFLECTION DURING PROOF ROLLING SHOULD BE EXCAVATED AND REPLACED WITH COMPACTED PIT RUN GRANULAR FILL.
14. GRANULAR SOILS BELOW FLOOR SLAB SHOULD BE PLACED AND UNIFORMLY COMPACTED IN THIN LIFTS 300mm MAXIMUM TO A MINIMUM OF 100 PERCENT OF STANDARD PROCTOR MAXIMUM DRY DENSITY (ASTM D-690) AT OR NEAR OPTIMUM MOISTURE CONTENT.

DWG. NO.	REFERENCE DRAWINGS

PROFESSIONAL ENGINEER YUKON TERRITORY S.F. NG Aug 12, 09

REV. No.	ISSUE No.	DESCRIPTION	DATE	BY
0	1	ISSUED FOR CONSTRUCTION	Aug 12, 09	

SECTION:	CONCRETE	
SCALE:	NONE	DATE
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DRAWN BY:	MRK	14APR09
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APP. BY:		12 Aug 09

YUKON TERRITORY

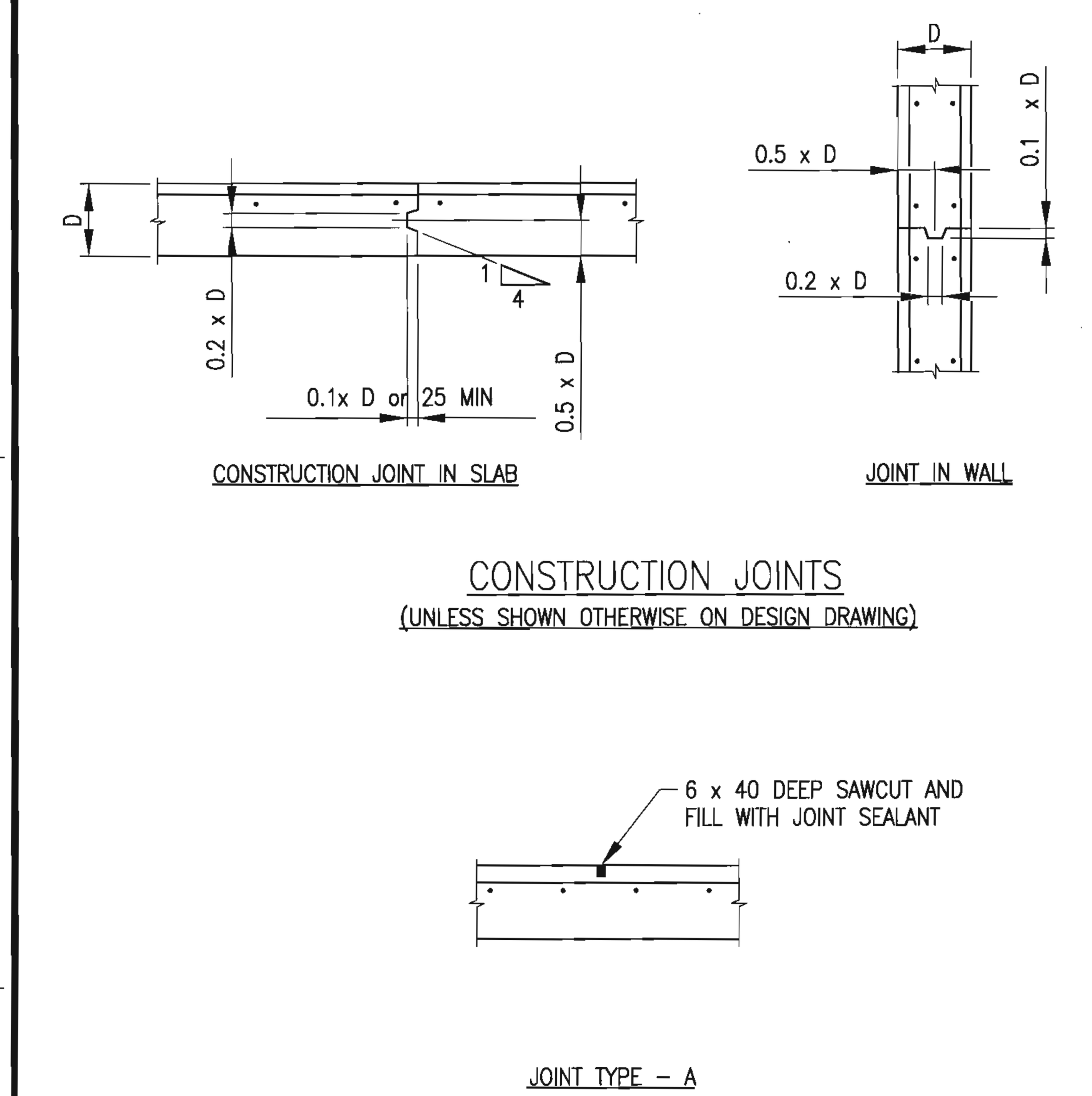
ALEXCO

WARDROP Engineering Inc.

TITLE
BELLEKENO PROJECT
OVERALL GENERAL NOTES
CONCRETE – SHEET 1

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
A0015001.DWG	09539601.00	A00-15-001	0

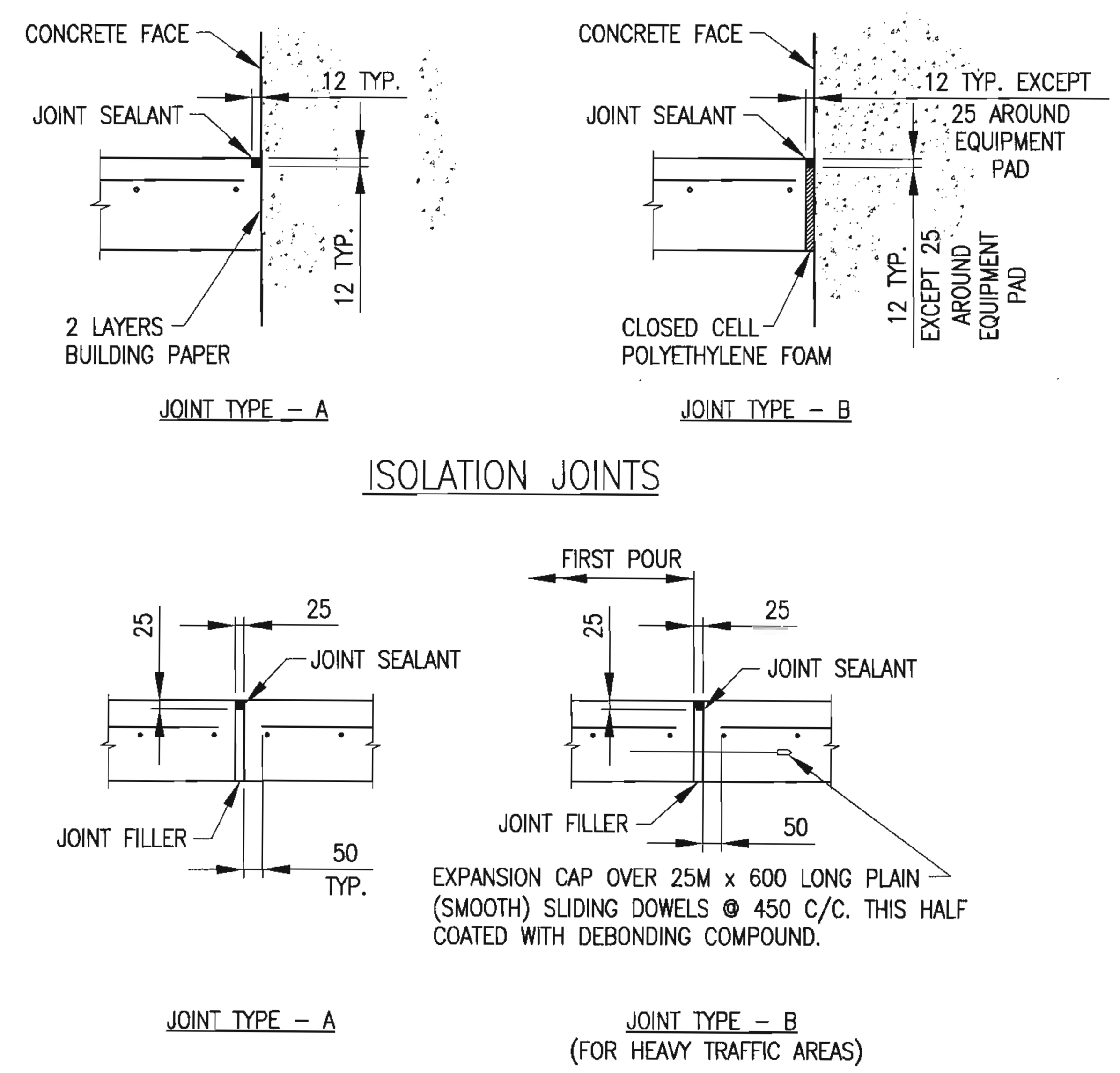
U:\A-G\ALEXCO RESOURCE CORP – 5396\09539601.00 – BELLEKENO PROJECT (UPDATED PEA)\15-CONC\DWG\A0015001.DWG



CONSTRUCTION JOINTS
(UNLESS SHOWN OTHERWISE ON DESIGN DRAWING)

CONTROL JOINTS

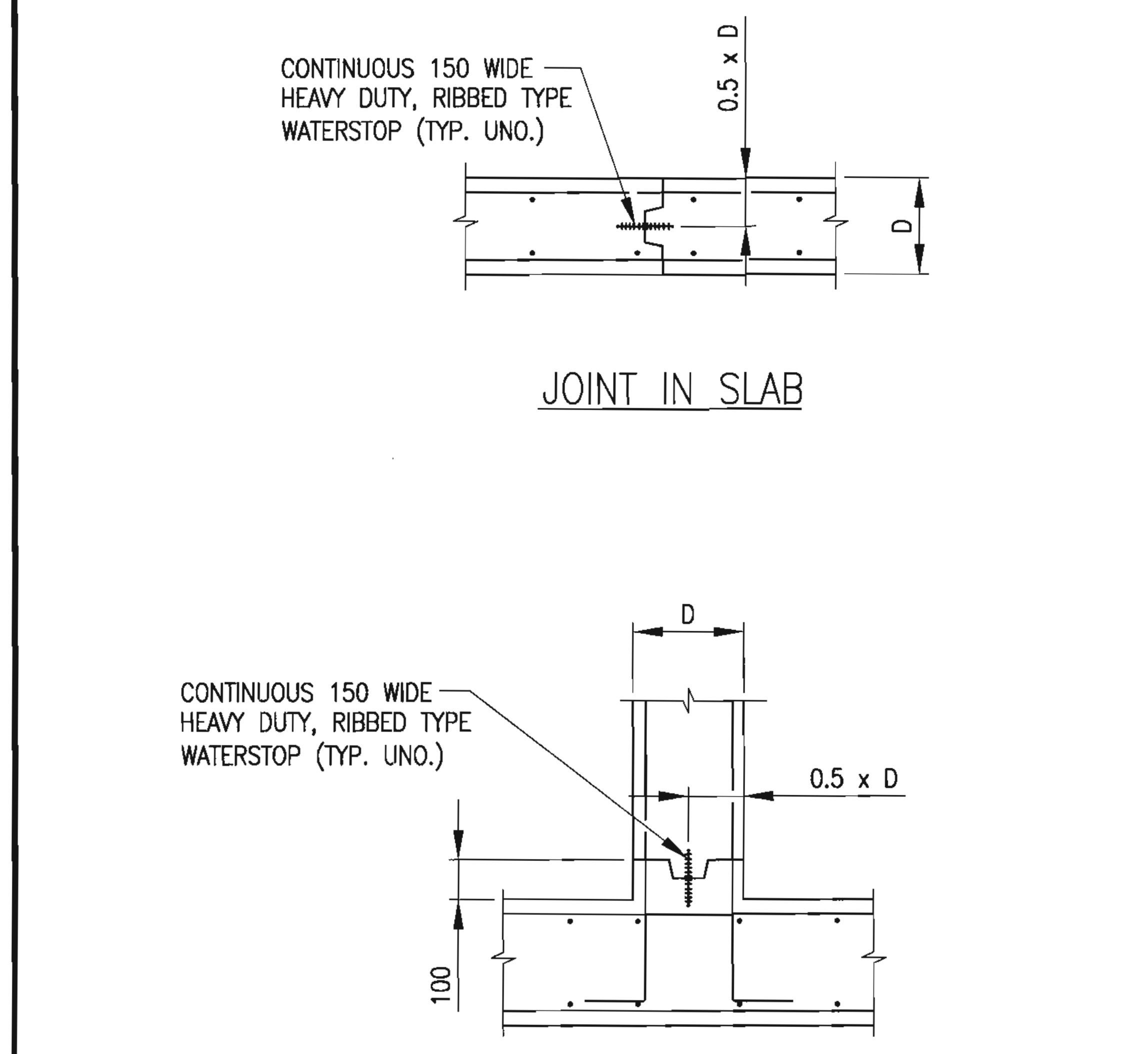
1 CONSTRUCTION JOINT / CONTROL JOINT



ISOLATION JOINTS

EXPANSION JOINTS

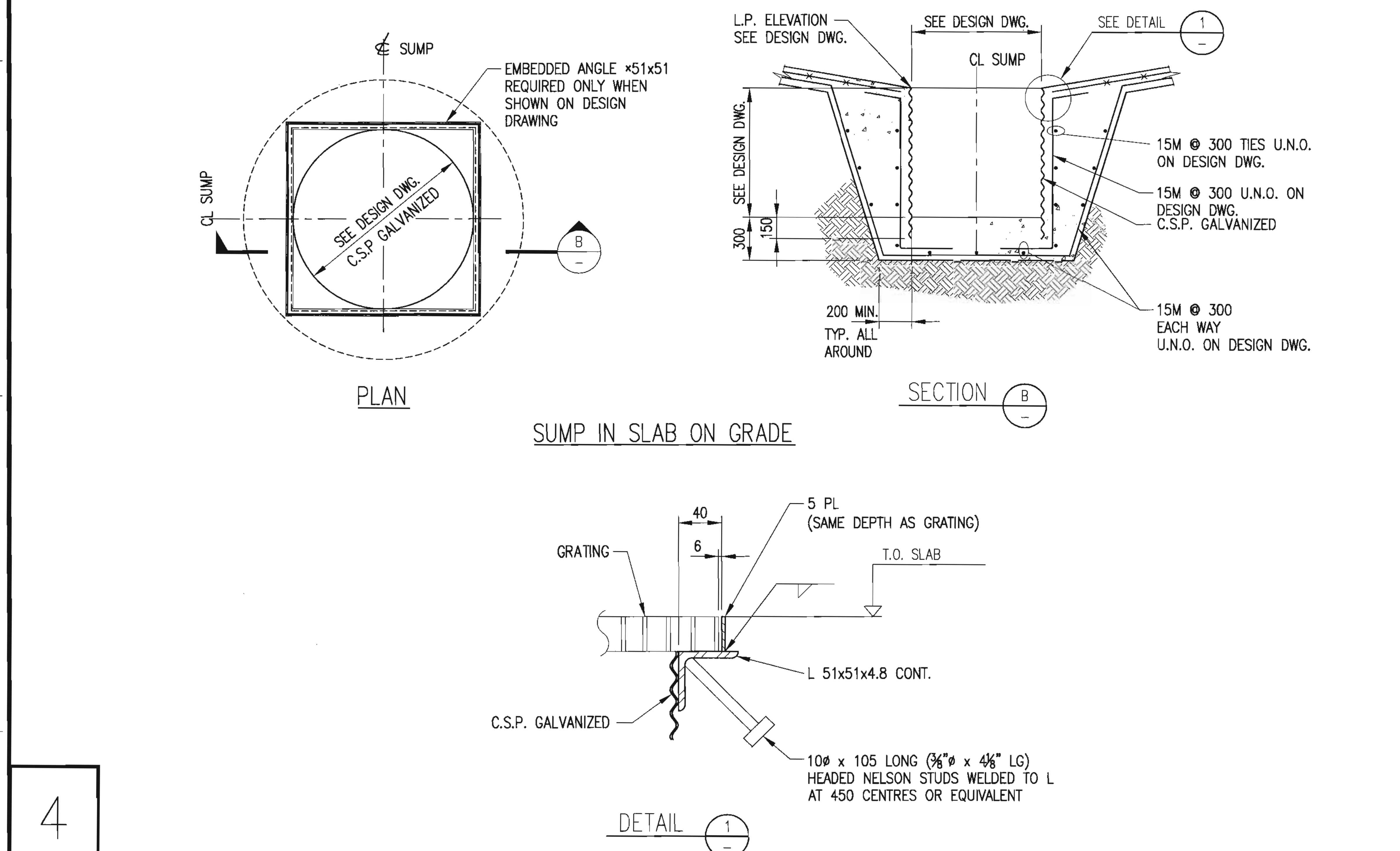
2 EXPANSION JOINT / ISOLATION JOINT



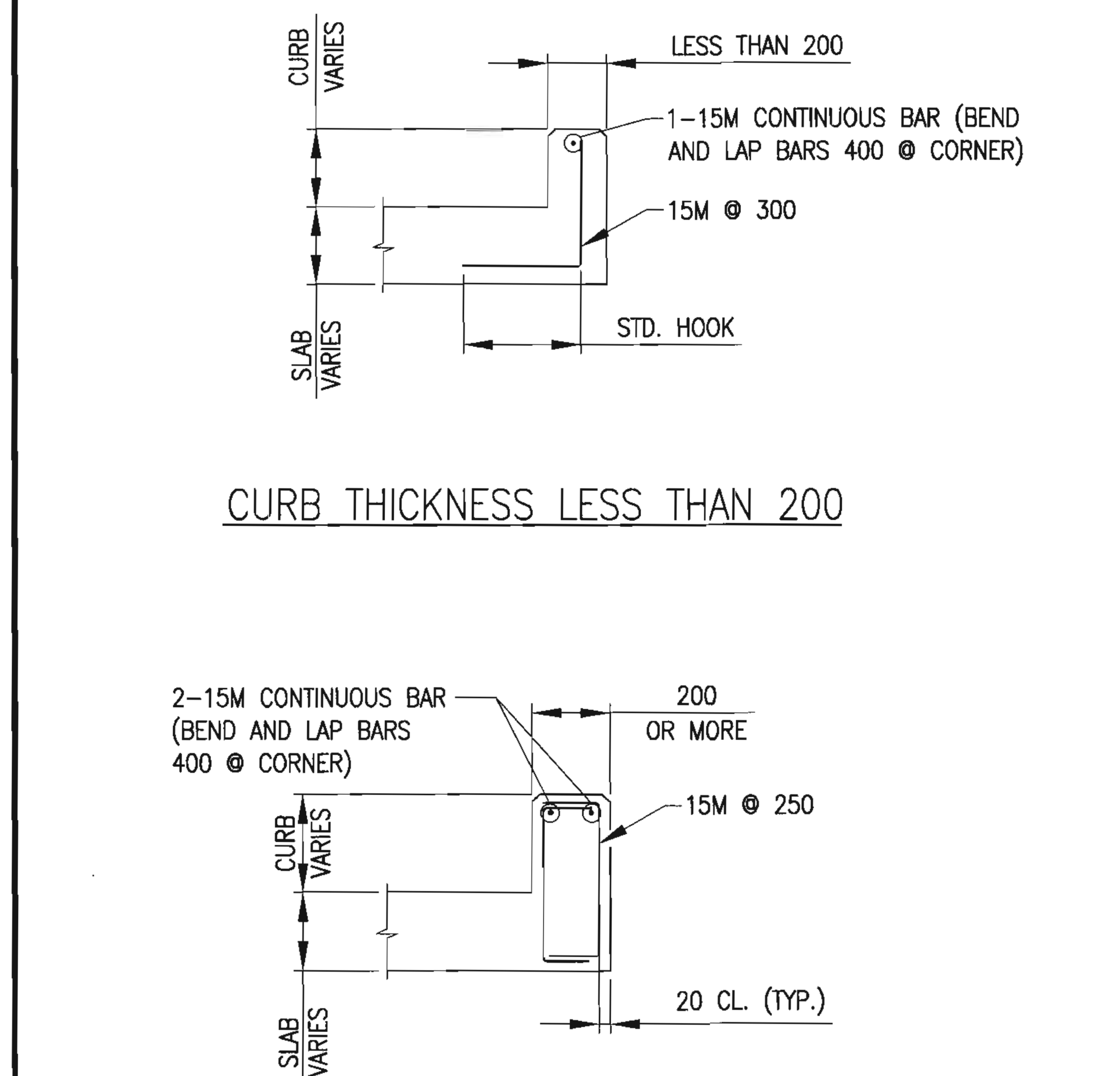
3 WATERTIGHT JOINT

NOTATION AND ABBREVIATIONS

ADD'L	ADDITIONAL	kPa	KILOPASCALS (kN/m²)
ALT.	ALTERNATE	LG.	LONG
ABR.	ALTERNATE BAR REVERSED	LLH	LONG LEG HORIZONTAL
@	AT	LLV	LONG LEG VERTICAL
B/B	BACK TO BACK	L.P.	LOW POINT
℞ OR BL	BAYLINE	MAX.	MAXIMUM
BOT.	BOTTOM	MPa	MEGAPASCALS (N/mm²)
B1	LOWEST OF BOTTOM LAYERS	MIN.	MINIMUM
B2	SECOND LOWEST OF BOTTOM LAYERS	M.C.	MOMENT CONNECTION
		N.F.	NEAR FACE
℄	CENTERLINE	NOM.	NOMINAL
C/C	CENTER TO CENTER	N/S	NEAR SIDE
CHPL.	CHECKER PLATE	O.D.	OUTSIDE DIAMETER
CL.	CLEAR DIMENSION	OPG.	OPENING
C/W	COMPLETE WITH	PED.	PEDESTAL
CONC.	CONCRETE	PL	PLATE
DIAG.	DIAGONAL	RAD.	RADIUS
ø	DIAMETER	REF.	REFERENCE
DWG.	DRAWING	REINF.	REINFORCING
E.F.	EACH FACE	STD.	STANDARD
E.W.	EACH WAY	STIFF.	STIFFENER
EL.	ELEVATION	T	TOP
F/S	FAR SIDE	t	TONNE (1000 kg)
FB	FLAT BAR	T1	HIGHEST OF TOP LAYERS
F.F.	FAR FACE	T2	SECOND HIGHEST OF TOP LAYERS
FL.	FLOOR	T.O.C.	TOP OF CONCRETE
F.D.	FLOOR DRAIN	T.O.S.	TOP OF STEEL
FTG.	FOOTING	TYP.	TYPICAL
FND.	FOUNDATION	U.N.O.	UNLESS NOTED OTHERWISE
GRT'G	GRATING	U/S	UNDER SIDE
HORIZ.	HORIZONTAL	VERT.	VERTICAL
H.P.	HIGH POINT	W.P.	WORK POINT
I.D.	INSIDE DIAMETER		



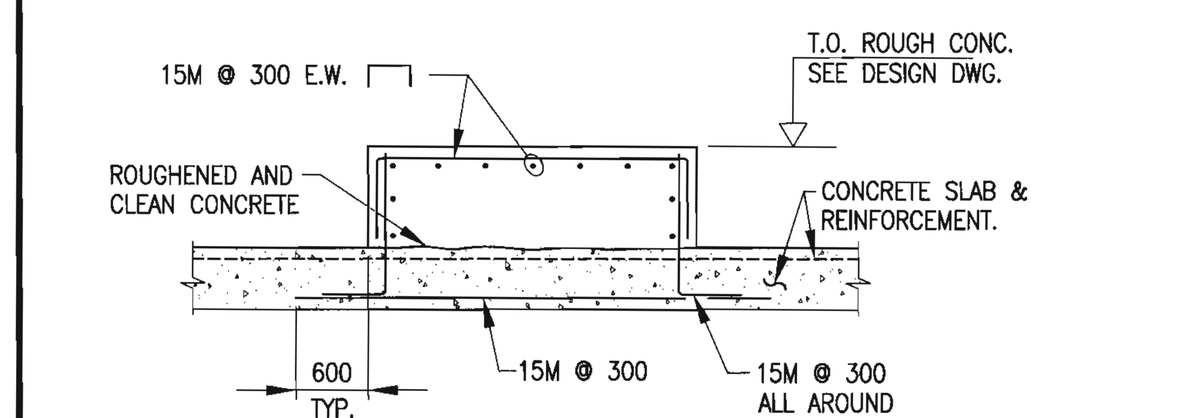
4 SUMP IN SLAB ON GRADE



CURB THICKNESS LESS THAN 200

CURB THICKNESS 200 OR MORE

5 TYP. CURB REINFORCEMENT



PAD TYPE 1

PAD TYPE 2

6 EQUIPMENT PAD DETAIL

WARDROP A TETRATECH COMPANY
PEOPLE, PASSION, PERFORMANCE. TRUSTED GLOBALLY
REFERENCE No. 095360100–DWG–S0002

DWG. NO.	REFERENCE DRAWINGS

PROFESSIONAL ENGINEER YUKON TERRITORY S.F. NG Aug 12, 09

CLIENT / PROJ.MAN. / PROJ.ENG. / PROCESS / ELECTR. / INSTR. / PIPING / MECH. / STRUCT. / SERVICES / ARCH. / LAYOUT

REV. No.	ISSUE No.	DESCRIPTION	DATE	BY
0	1	ISSUED FOR CONSTRUCTION	Aug 12, 09	K

SECTION:	CONCRETE	
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DRAWN BY:	MRK	14APR09
CHECK. BY:	SEP	12AUG09
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YUKON TERRITORY
ALEXCO
WARDROP Engineering Inc.

TITLE
BELLEKENO PROJECT
OVERALL GENERAL NOTES
CONCRETE – SHEET 2

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
A0015002.DWG	09539601.00	A00–15–002	0

11:18 09/07/09

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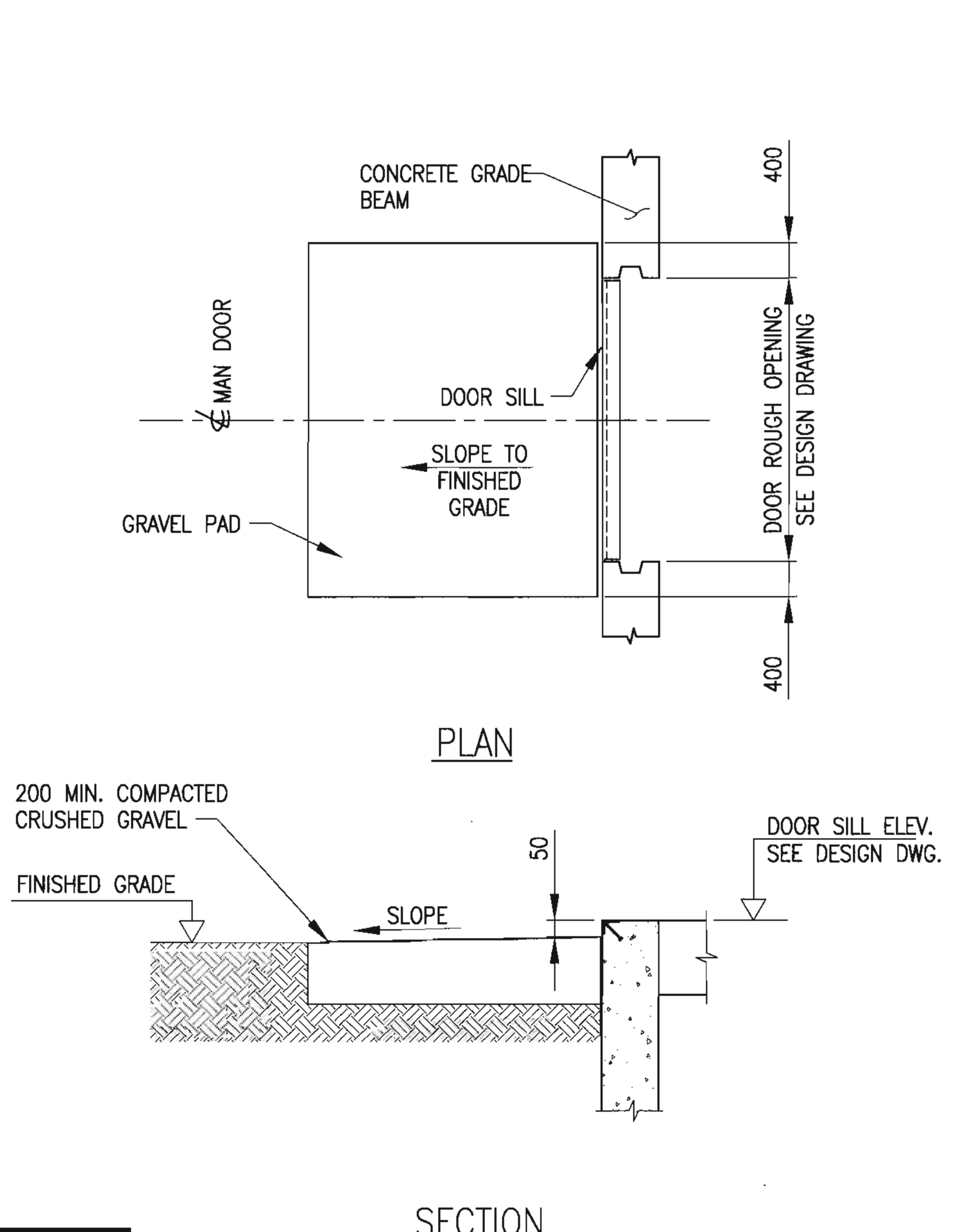
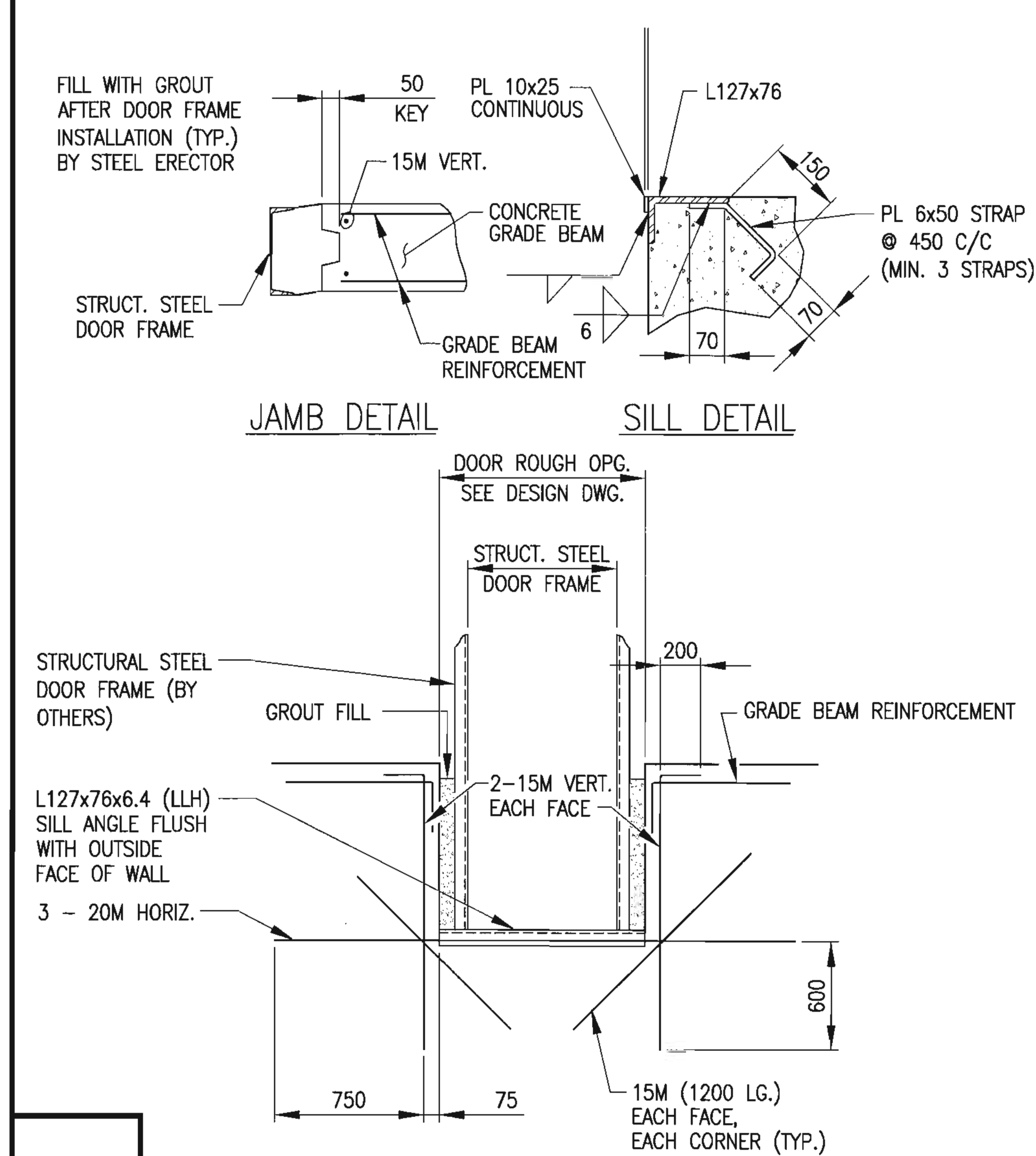


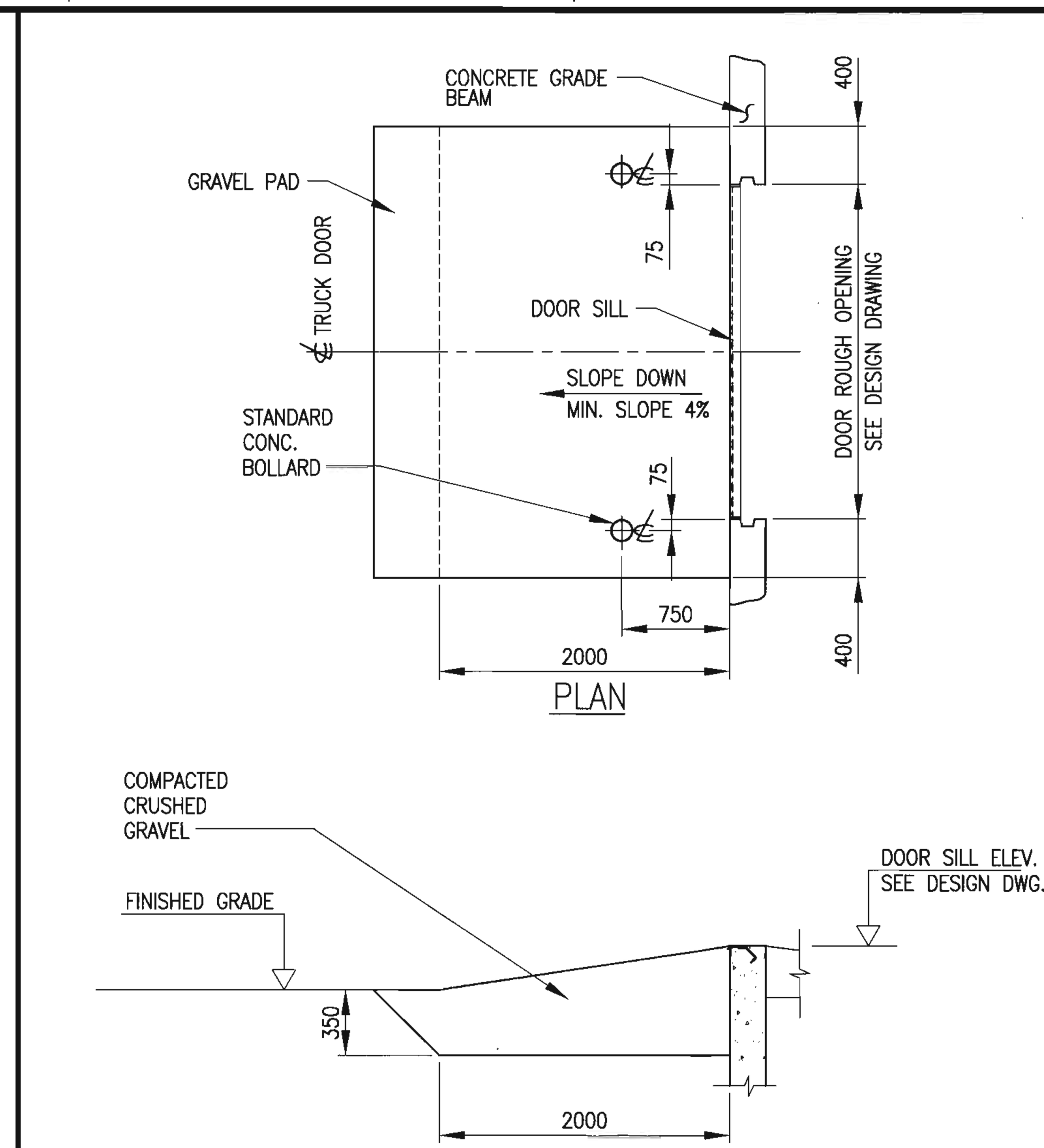
7

MANDOOR PAD DETAIL



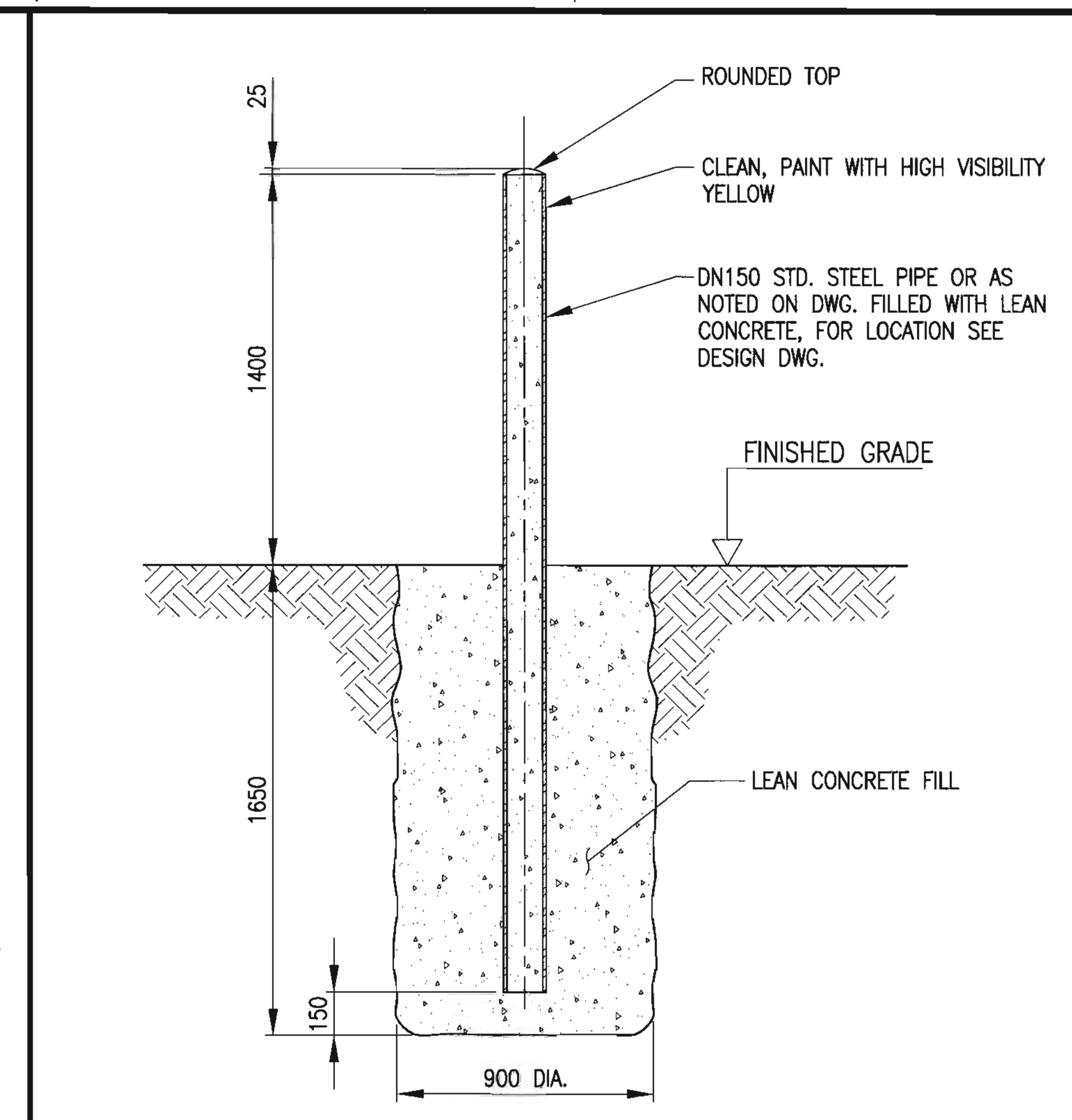
8

DOOR OPENING DETAIL



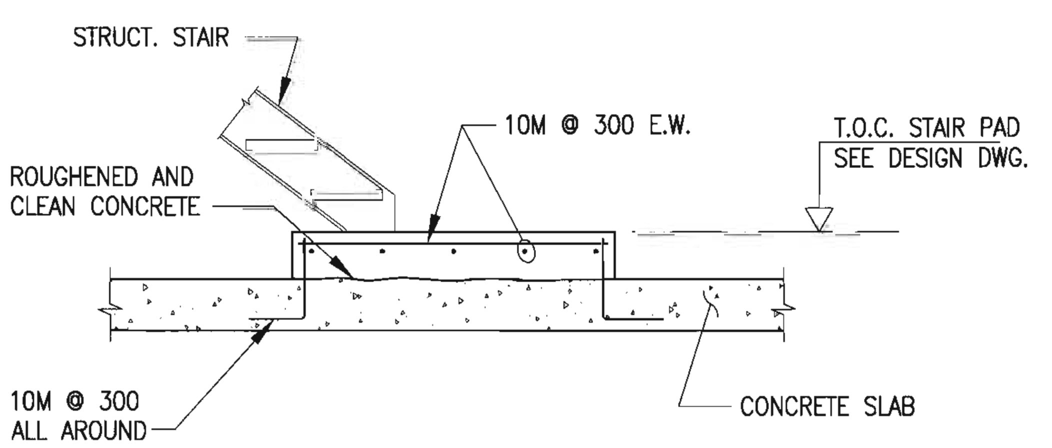
9

TRUCK DOOR RAMP WITH CONCRETE BOLLARD STD. DETAIL



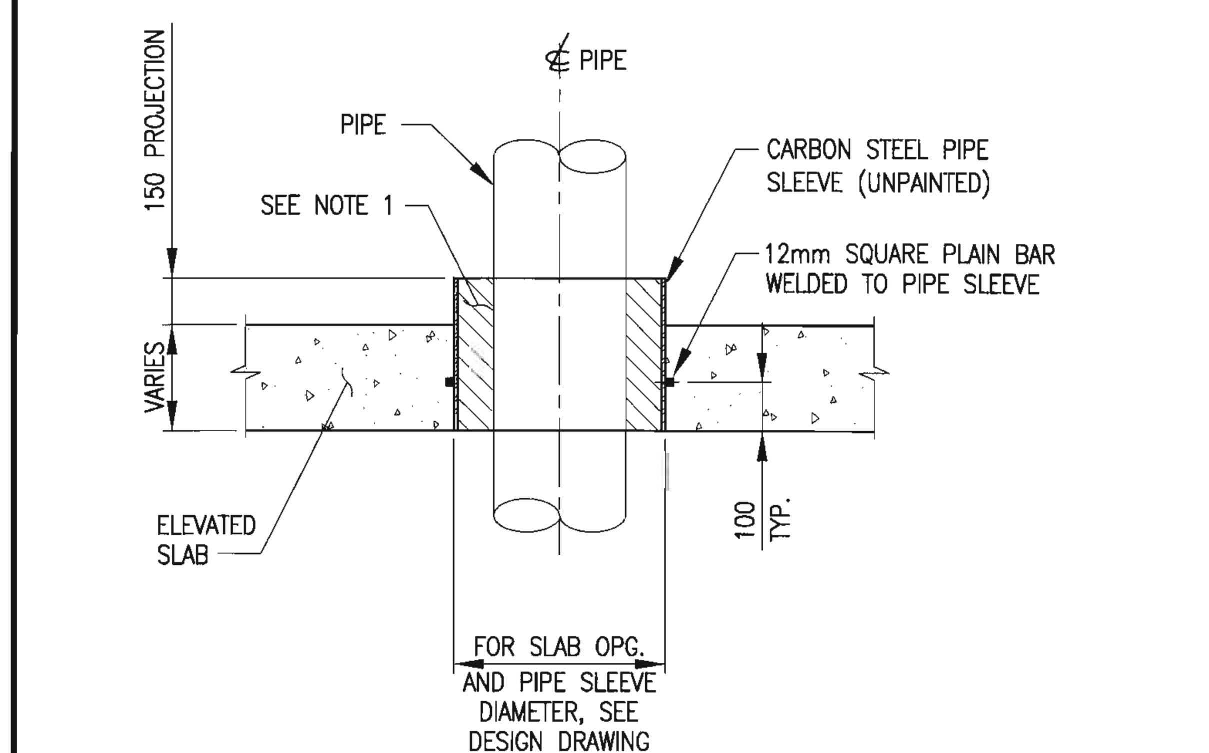
STANDARD CONCRETE BOLLARD

10



INTERIOR STAIR PAD DETAIL

11



NOTE:

1. WHERE SPECIFIED, OPENING SHALL BE SEALED WITH TWO COMPONENT NON-COMBUSTIBLE SILICONE RTV FOAM BY DOW CORNING OR APPROVED EQUIVALENT.

12

SLEEVED PIPE THROUGH ELEVATED SLAB

WARDROP A TETRA TECH COMPANY — PEOPLE. PASSION. PERFORMANCE. TRUSTED GLOBALLY

REFERENCE No. 095360100–DWG–S0003

DWG. NO.	REFERENCE DRAWINGS

PROFESSIONAL ENGINEER — YUKON TERRITORY — S.F. NG — Aug 12, 09

REV. No.	ISSUE No.	DESCRIPTION	DATE	BY
0	1	ISSUED FOR CONSTRUCTION	Aug 12, 09	

CLIENT, PROJ. MGR., PROCESS, ELECTR., INSTR., PIPING, MECH., STRUCT., SERVICES, ARCH., LAYOUT

SECTION:	CONCRETE	
SCALE:	NONE	DATE
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YUKON TERRITORY

ALEXCO

WARDROP Engineering Inc.

TITLE

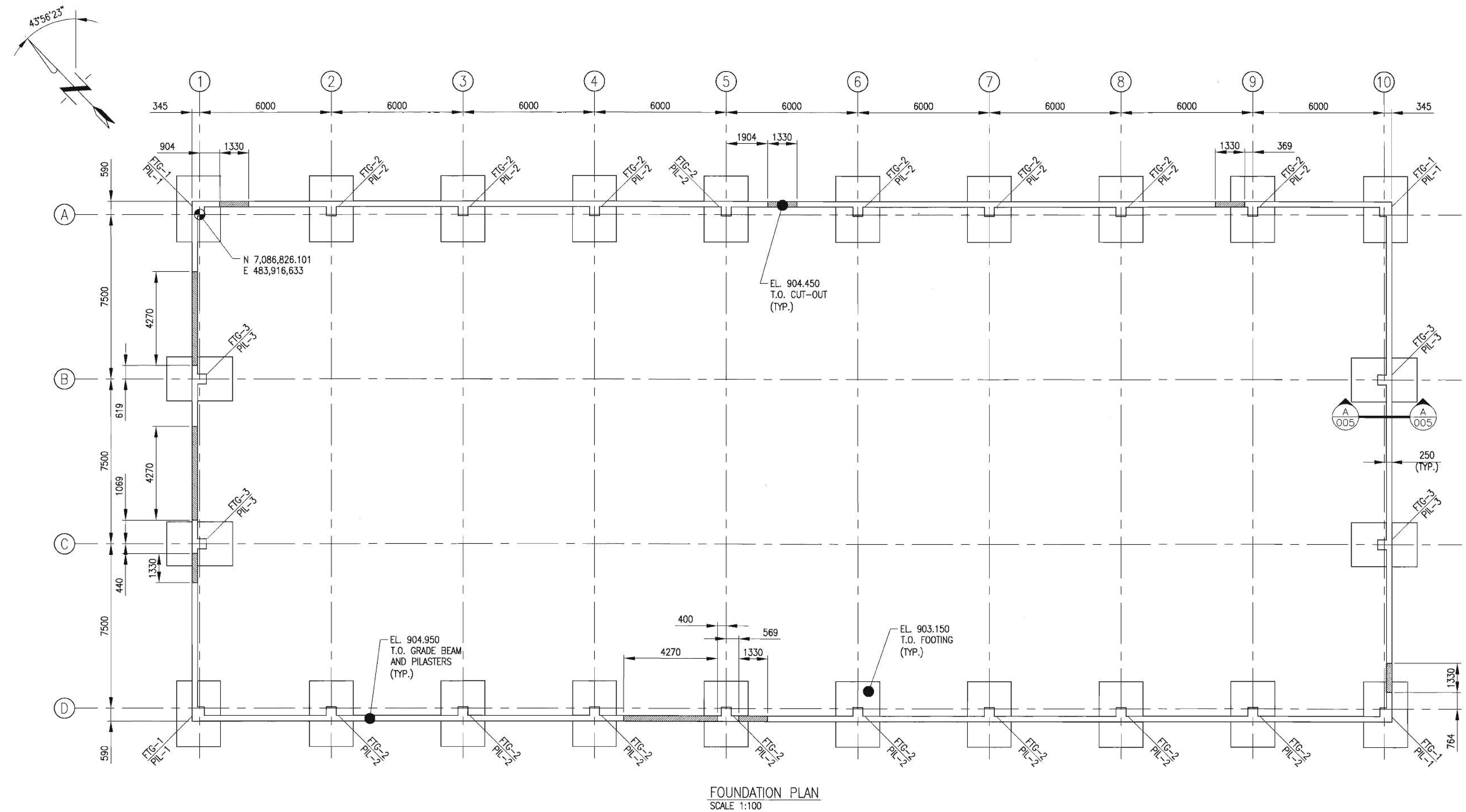
BELLEKENO PROJECT

OVERALL GENERAL NOTES
CONCRETE – SHEET 3

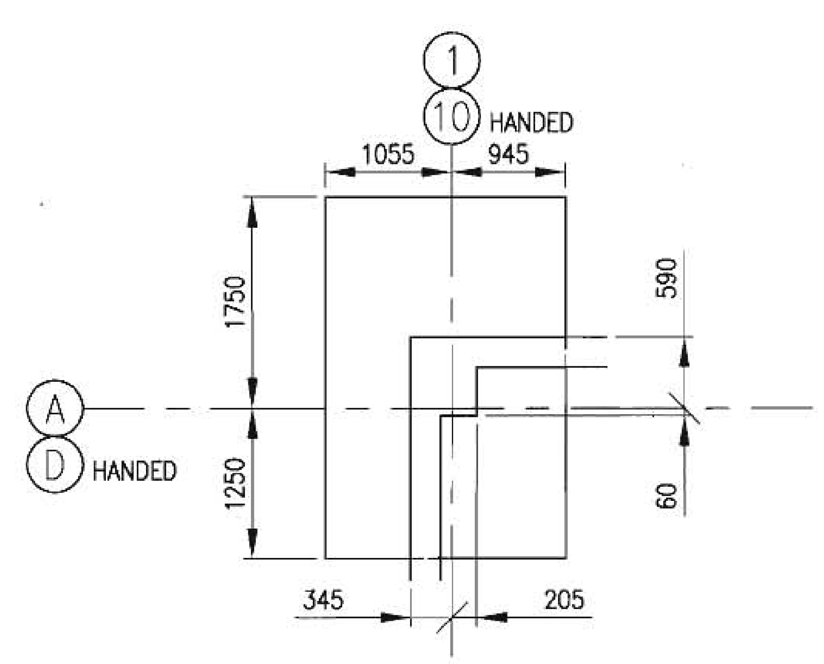
FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
A0015003.DWG	09539601.00	A00–15–003	0

U:\A–G\ALEXCO RESOURCE CORP – 5396\09539601.00 – BELLEKENO PROJECT (UPDATED PEA)\15–CONC\DWG\A0015003.DWG

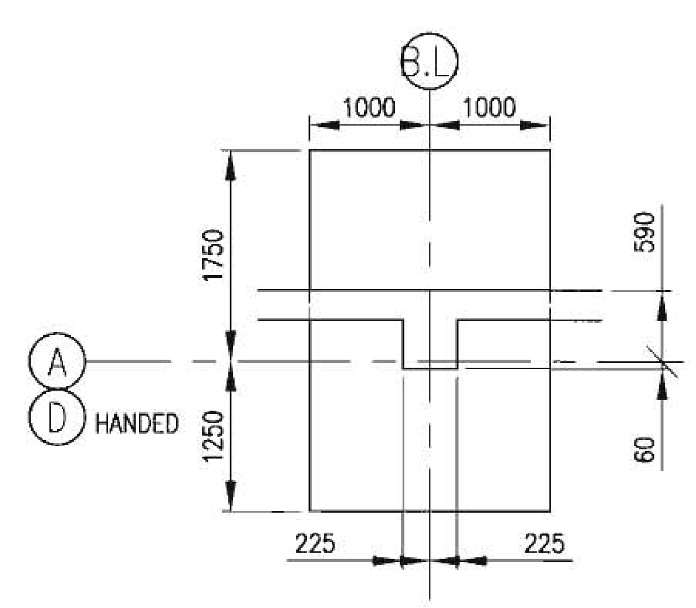
09/07/09 11:18



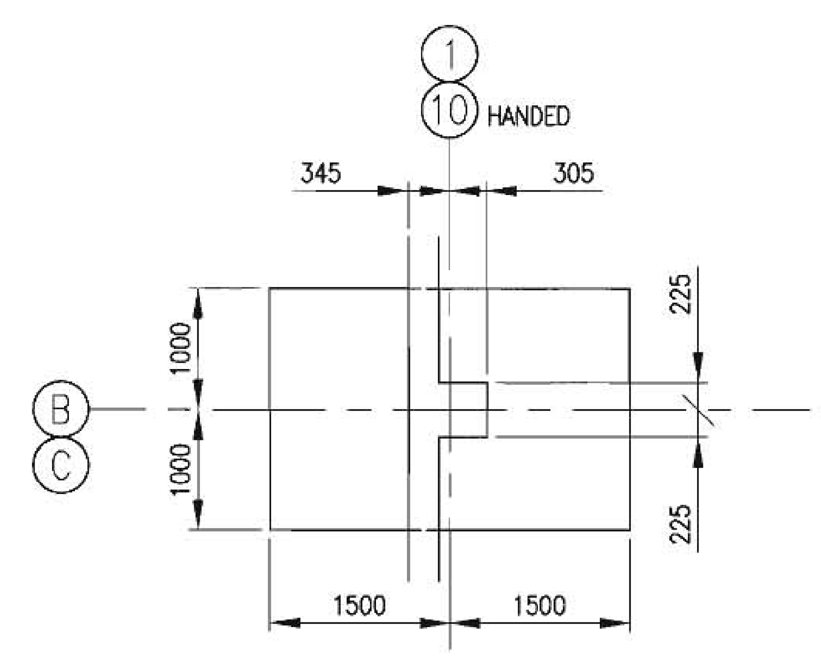
FOUNDATION PLAN
SCALE 1:100



FOOTING TYPE FTG-1
SCALE 1:50
4 LOCATIONS



FOOTING TYPE FTG-2
SCALE 1:50
16 LOCATIONS



FOOTING TYPE FTG-3
SCALE 1:50
4 LOCATIONS

NOTES

1. FOR GENERAL NOTES AND STANDARD DETAILS SEE DRAWINGS A00-15-001 TO A00-15-003 INCLUSIVE.
2. MINIMUM ALLOWABLE SOIL BEARING PRESSURE 250 kPa.
3. ALL BEARING SURFACES FOR FOUNDATION SHALL BE BACKFILLED AND COMPACTED IN ACCORDANCE WITH EBA'S TECHNICAL MEMO REF. FILE : W14101178.002, DATED 23 JULY 2009.

LEGEND

FTG-# – FOOTING TYPE

PIL-# – PILASTER TYPE (SEE DRAWING E00-15-005)

CUT-OUT INDICATION

2 0 2 4 6 8M
SCALE: 1:100

1 0 1 2 3 4M
SCALE: 1:50

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REFERENCE No. 095360100-DWG-S0004

DWG. NO.	REFERENCE DRAWINGS
E00-15-005	MILL BUILDING – CONC. – PILASTER PLANS, SECTIONS AND DETAILS
A00-15-003	OVERALL GENERAL NOTES – CONCRETE SHEET 3
A00-15-002	OVERALL GENERAL NOTES – CONCRETE SHEET 2
A00-15-001	OVERALL GENERAL NOTES – CONCRETE SHEET 1

PROFESSIONAL ENGINEER YUKON TERRITORY S.F. NG
Aug 12, 09

CLIENT PROJ.MAN. PROJ.ENG. PROCESS ELECTR. INSTR. PIPING MECH. STRUCT. SERVICES ARCH. LAYOUT

REV. No.	ISSUE No.	DESCRIPTION	DATE	BY
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SECTION: CONCRETE		
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DRAWN BY:	MRK	13APR09
CHECK. BY:	SEP	12AUG09
APP. BY:		12 AUG 09

YUKON TERRITORY

ALEXCO

WARDROP Engineering Inc.

TITLE

BELLEKENO PROJECT

MILL BUILDING
CONCRETE
FOUNDATION PLAN

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
E0015001.DWG	09539601.00	E00-15-001	0

A1

11:17 08/07/09

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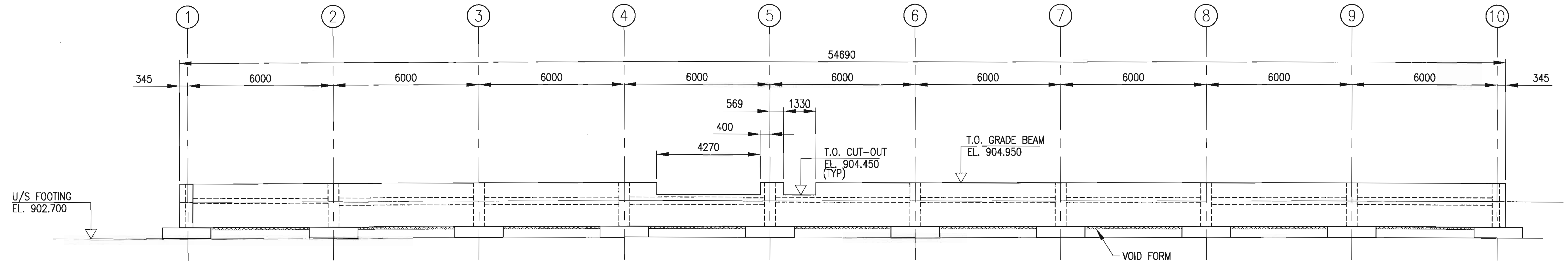
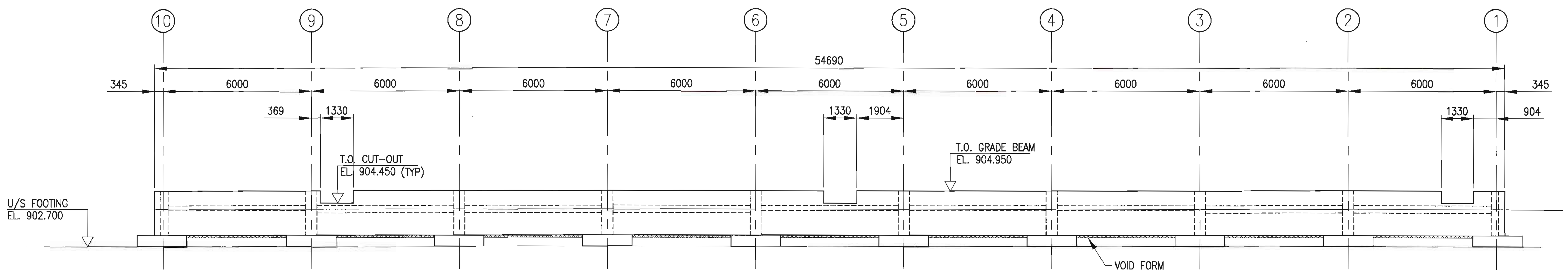
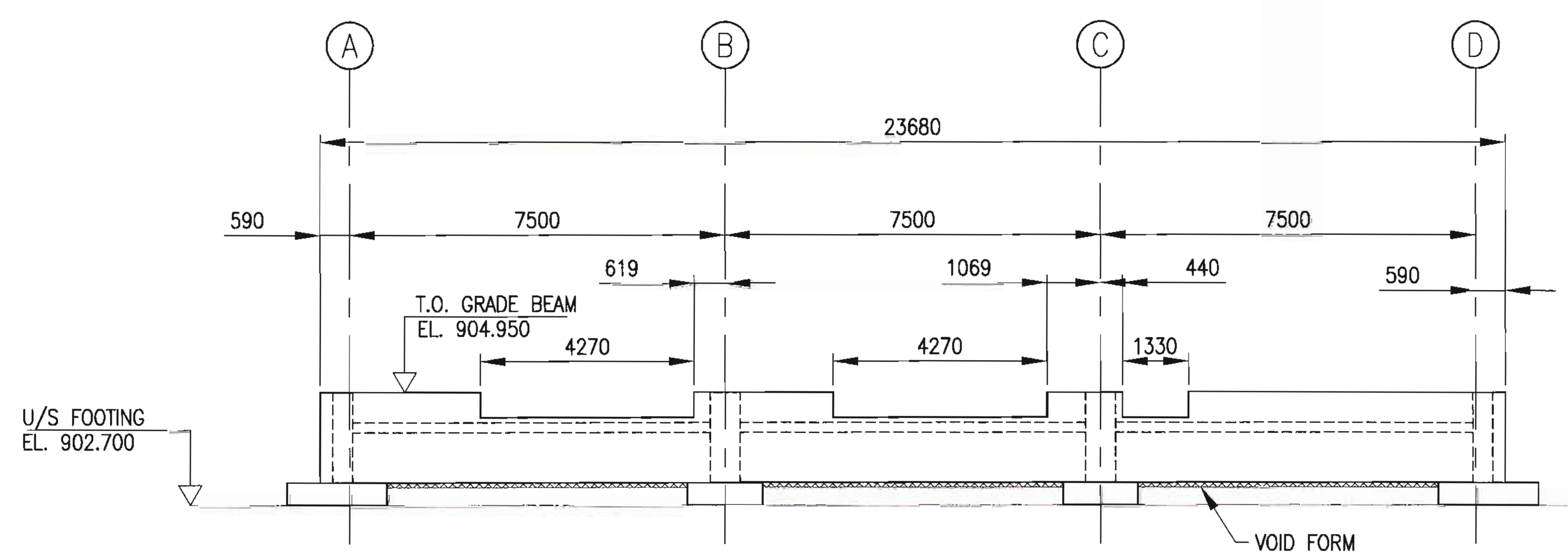


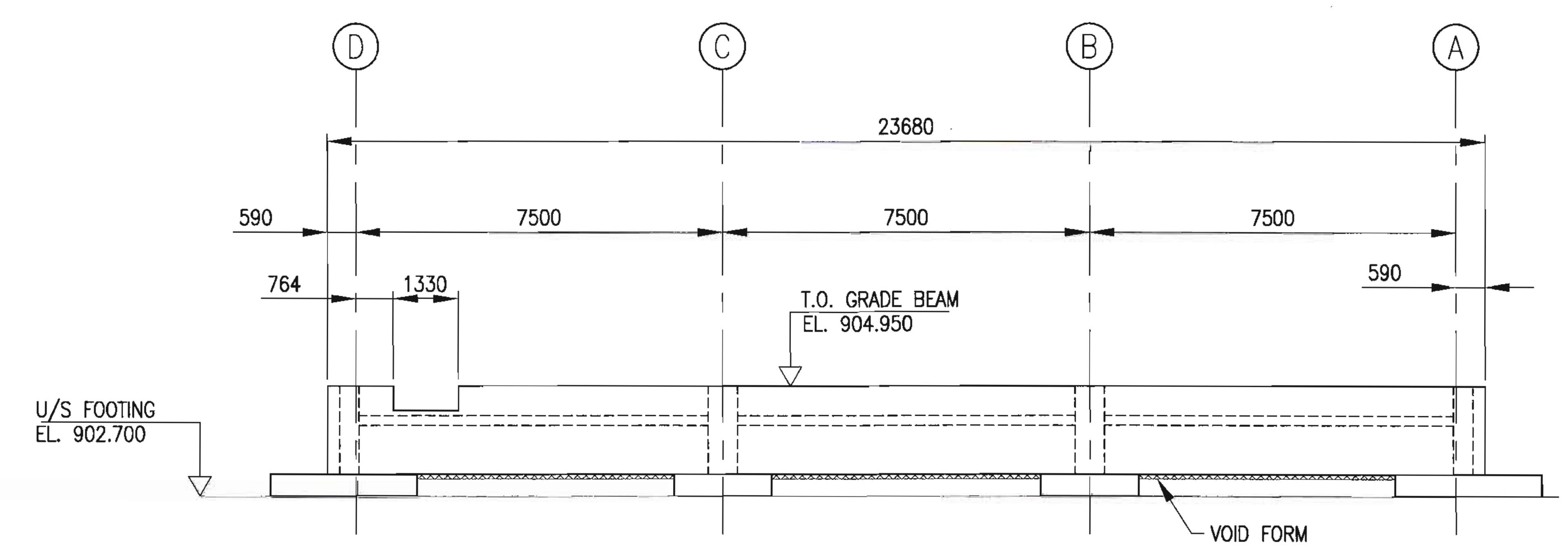
ELEVATION ALONG GRIDLINE 'D'
SCALE 1:100
(LOOKING NORTH)



ELEVATION ALONG GRIDLINE 'A'
SCALE 1:100
(LOOKING SOUTH)



ELEVATION ALONG GRIDLINE 1
SCALE 1:100
(LOOKING EAST)



ELEVATION ALONG GRIDLINE 10
SCALE 1:100
(LOOKING WEST)

NOTES

1. FOR GENERAL NOTES AND STANDARD DETAILS SEE DRAWINGS A00-15-001 TO A00-15-003 INCLUSIVE.

2 0 2 4 6 8M
SCALE: 1:100

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A TETRATECH COMPANY
PEOPLE, PASSION, PERFORMANCE. TRUSTED GLOBALLY

REFERENCE No. 0953960100-DWG-S0006

DWG. NO.	REFERENCE DRAWINGS
E00-15-005	MILL BUILDING - CONC. - PILASTER PLANS, SECTIONS AND DETAILS
E00-15-001	MILL BUILDING - CONCRETE - FOUNDATION PLAN

PROFESSIONAL ENGINEER
YUKON TERRITORY
S.F. NG
Aug 12, 09

CLIENT PROJ.MNG PROCESS ELECTR. INSTR. PIPING MECH. STRUCT. SERVICES ARCH. LAYOUT

REV. No.	ISSUE No.	DESCRIPTION	DATE	BY
0	1	ISSUED FOR CONSTRUCTION	Aug 12/09	

SECTION:	CONCRETE	
SCALE:	1:100	DATE
DESIGN. BY:	ATM	08APR09
DRAWN BY:	MRK	13APR09
CHECK. BY:	SEP	12AUG09
APP. BY:		12AUG09

YUKON TERRITORY

ALEXCO

WARDROP Engineering Inc.

TITLE
BELLEKENO PROJECT
MILL BUILDING
CONCRETE
ELEVATIONS

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
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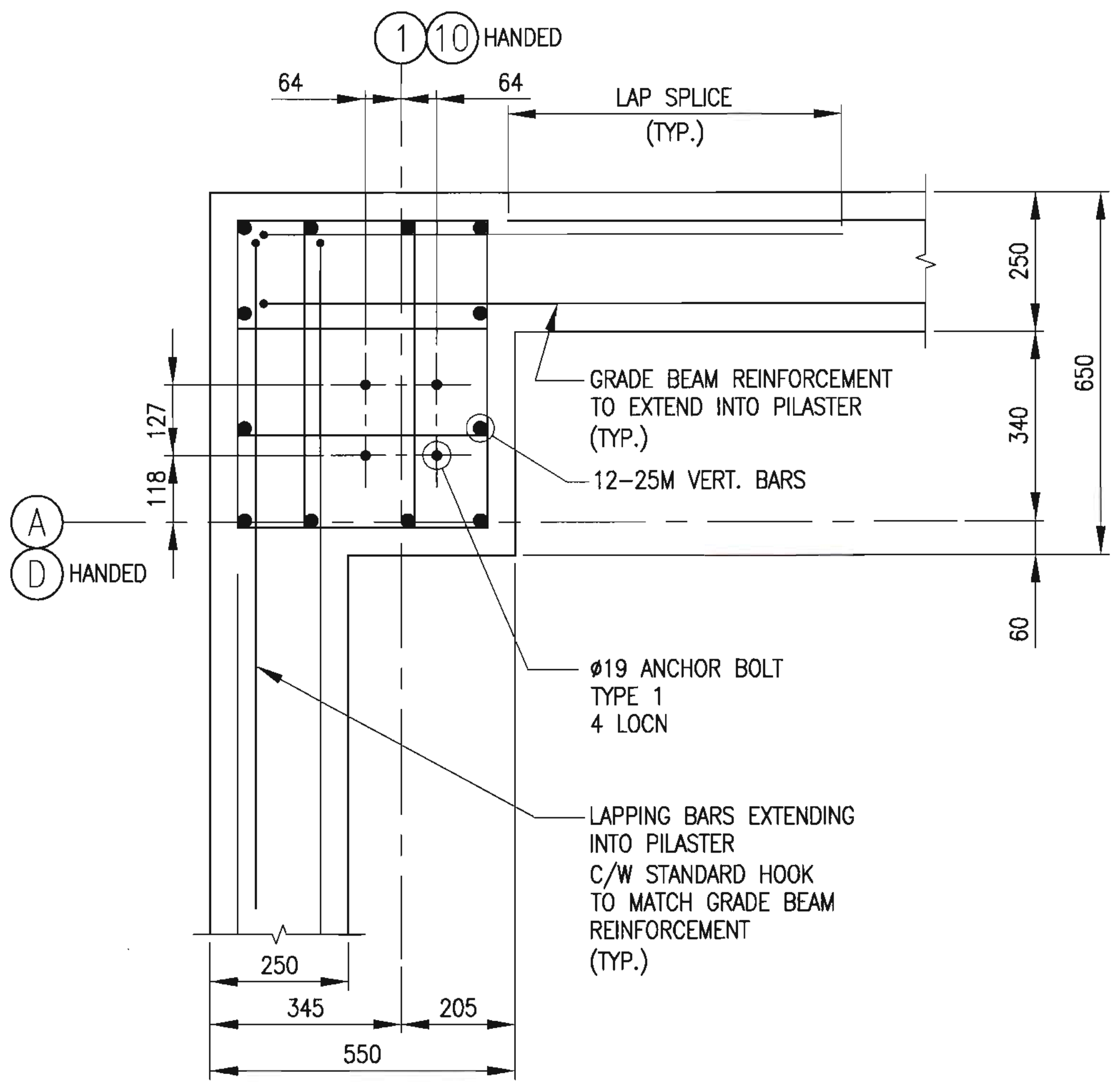

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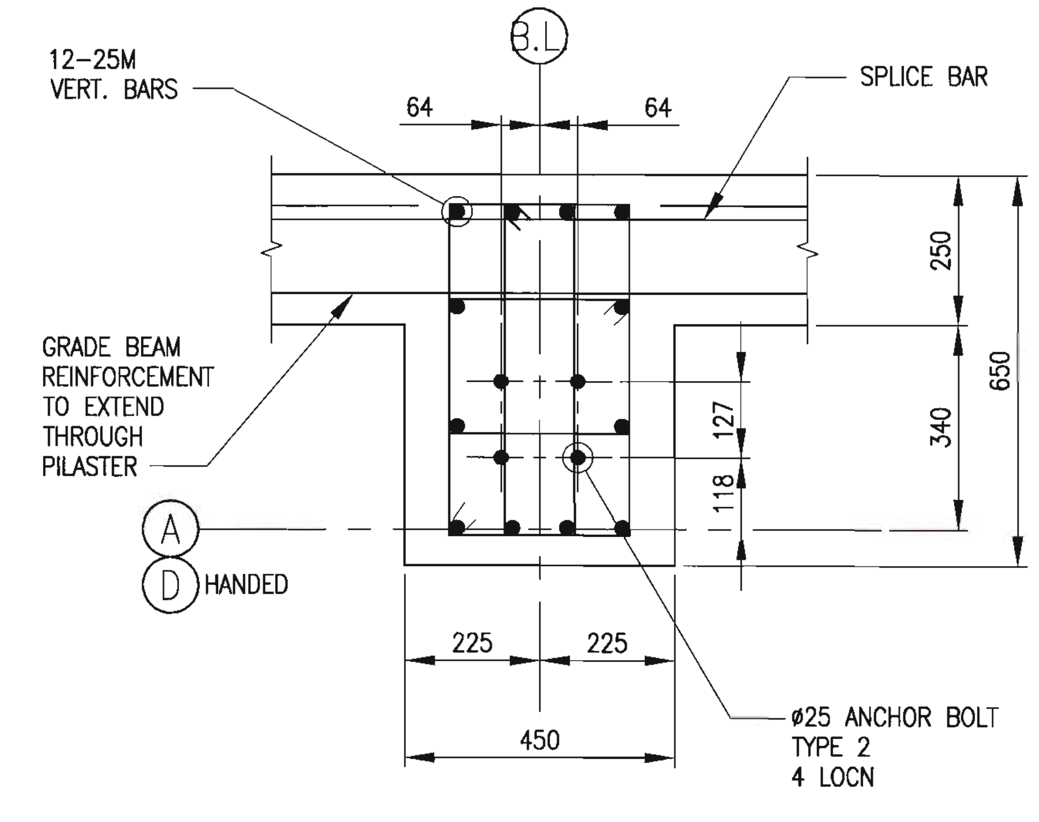

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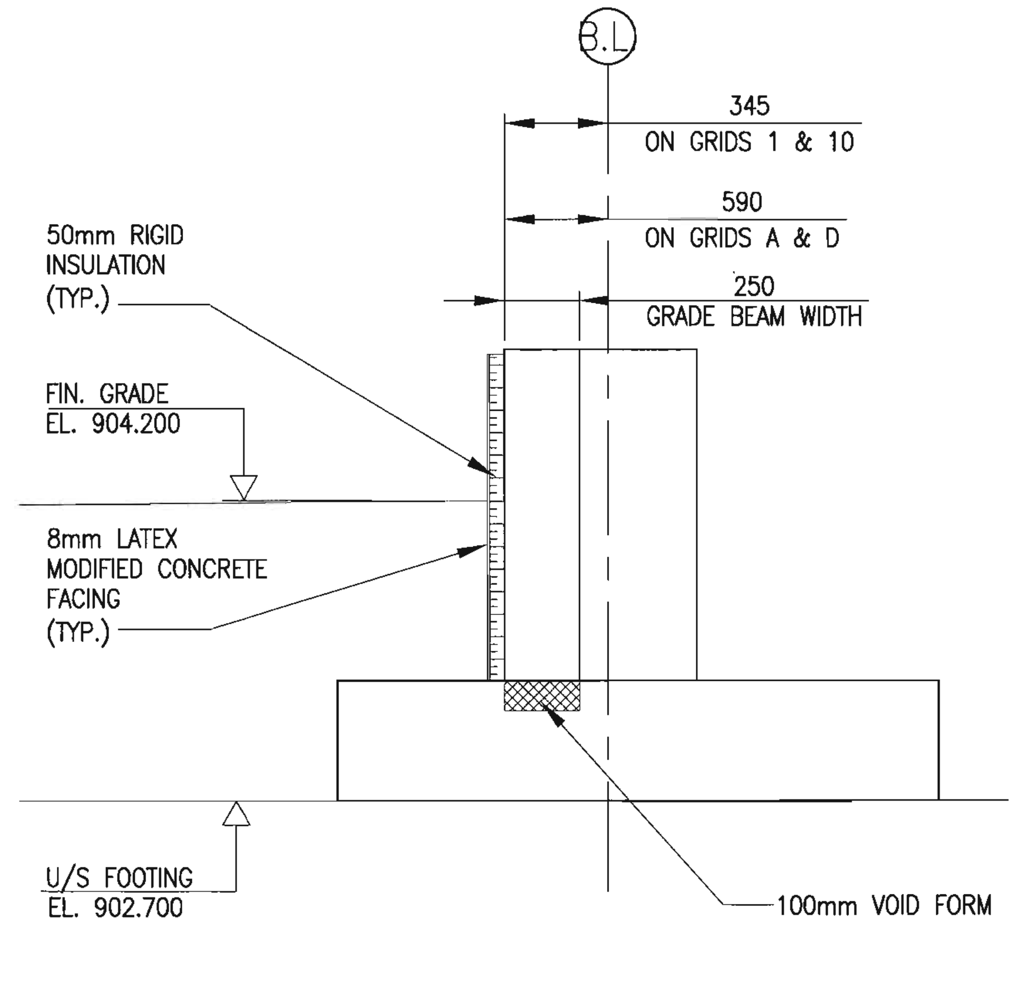

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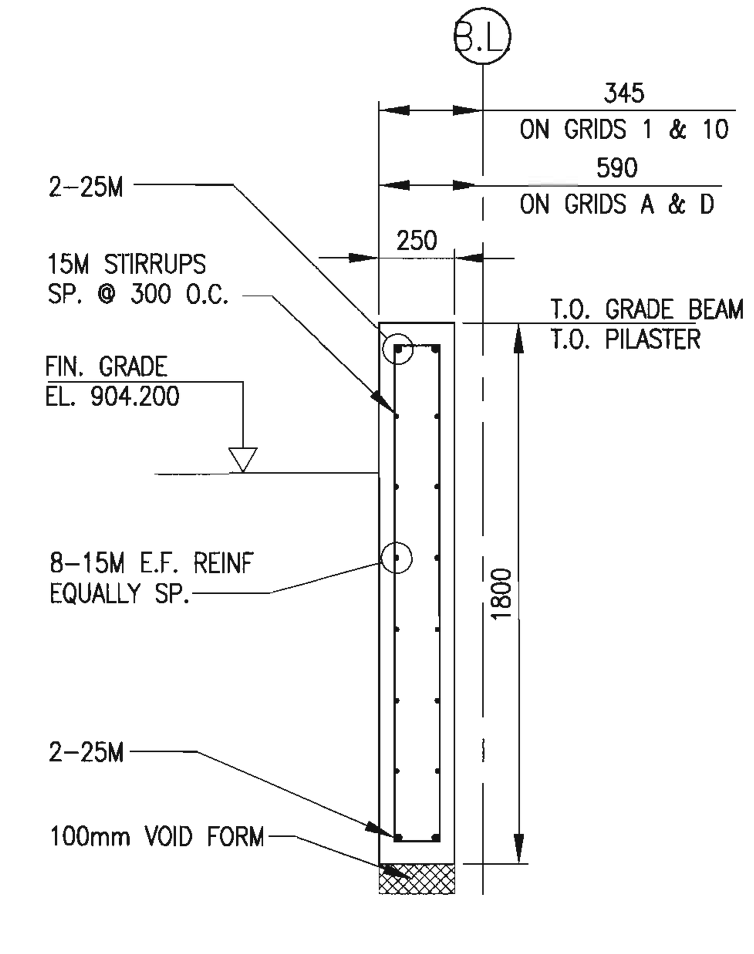

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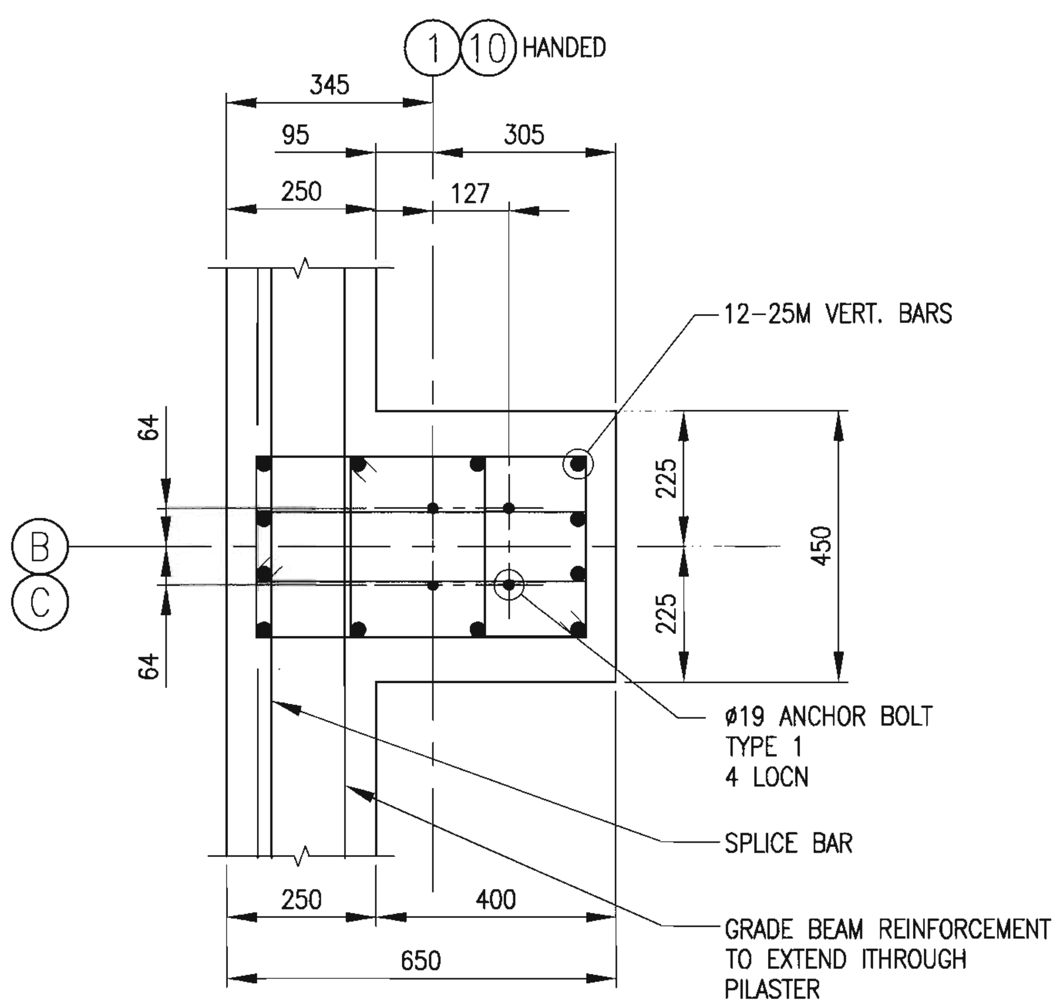
INSULATION NOT SHOWN FOR CLARITY

NOTES

1. FOR GENERAL NOTES AND STANDARD DETAILS SEE DRAWINGS A00–15–001 TO A00–15–003 INCLUSIVE.



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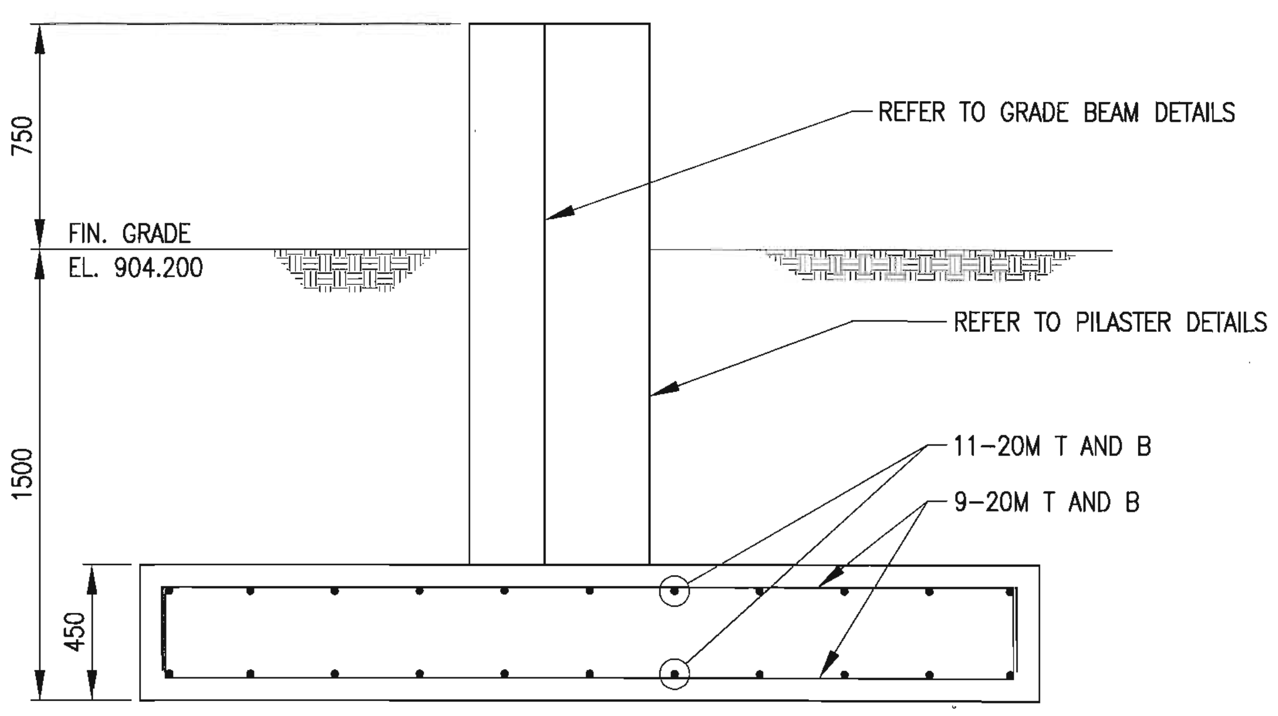

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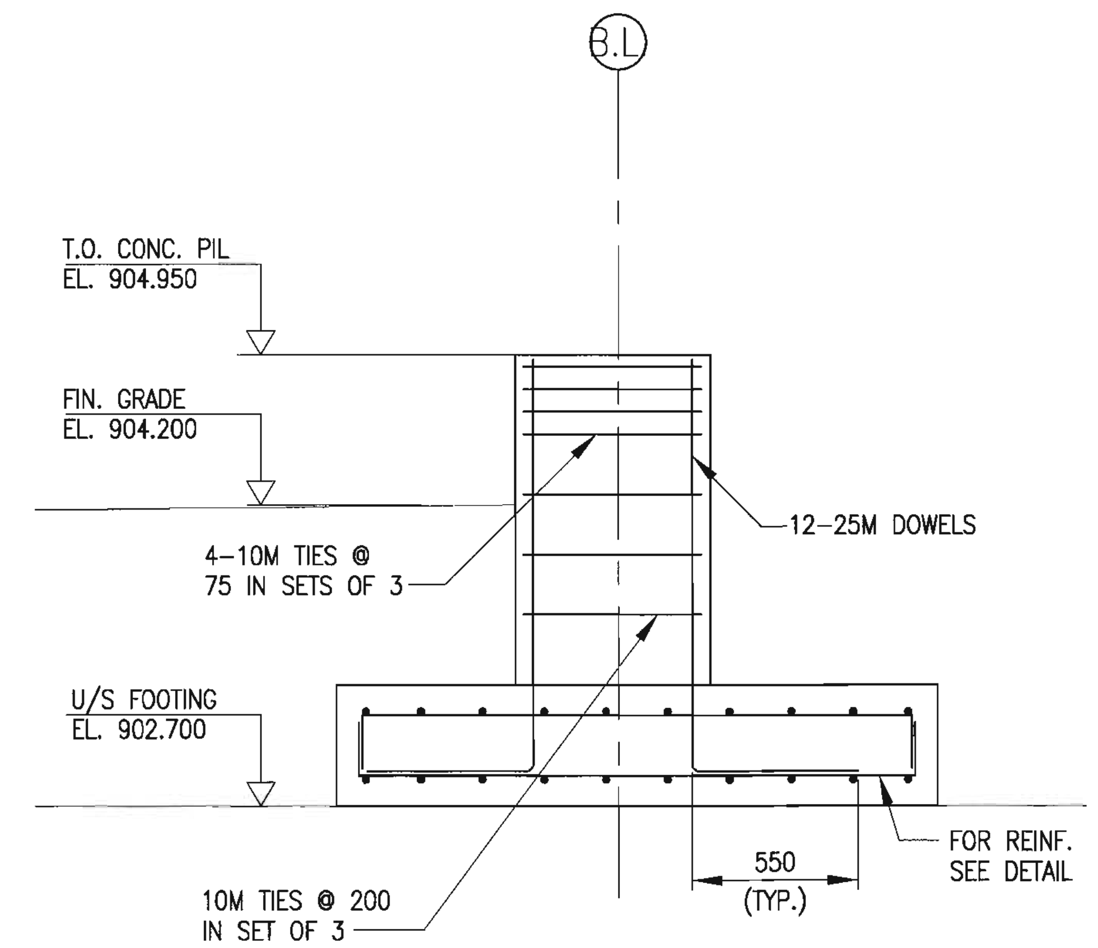

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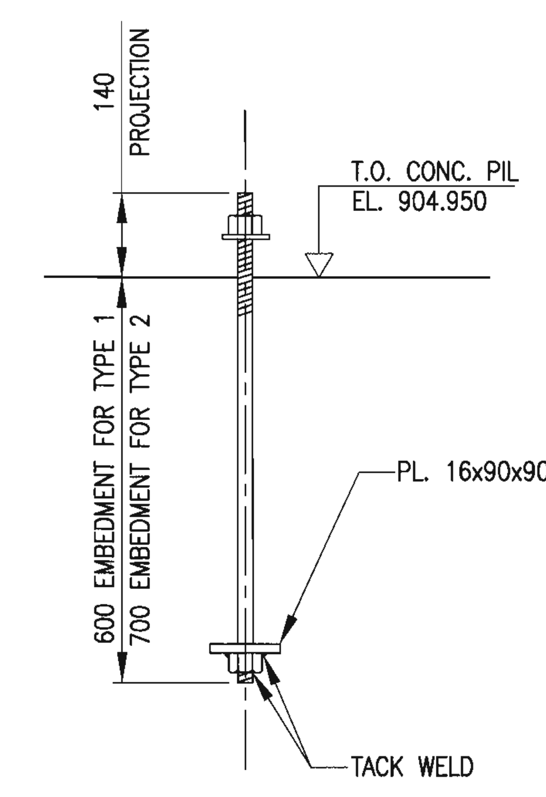

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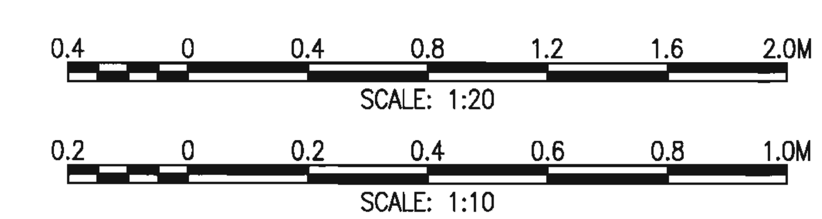

WARDROP A TETRA TECH COMPANY — PEOPLE, PASSION, PERFORMANCE. TRUSTED GLOBALLY

REFERENCE No. 0953960100–DWG–S0018

DWG. NO.	REFERENCE DRAWINGS
E00–15–001	MILL BUILDING – CONCRETE – FOUNDATION PLAN

PROFESSIONAL ENGINEER — YUKON TERRITORY — S.F. NG — Aug 12,09

REV. No.	ISSUE No.	DESCRIPTION	DATE	BY
0	1	ISSUED FOR CONSTRUCTION	Aug 12,09	

CLIENT / PROJ.MAN. / PROCESS / PROJ.ENG. / ELECTR. / INSTR. / PIPING / MECH. / STRUCT. / SERVICES / ARCH. / LAYOUT

SECTION:	CONCRETE	
SCALE:	1:20 U.N.O.	DATE
DESIGN. BY:	CMK	29JUL09
DRAWN BY:	MRK	30JUL09
CHECK. BY:	SEP	12AUG09
APP. BY:		12AUG09

YUKON TERRITORY

ALEXCO

WARDROP Engineering Inc.

TITLE

BELLEKENO PROJECT

MILL BUILDING
CONCRETE
PILASTER PLANS AND SECTIONS

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
E0015005.DWG	09539601.00	E00–15–005	0

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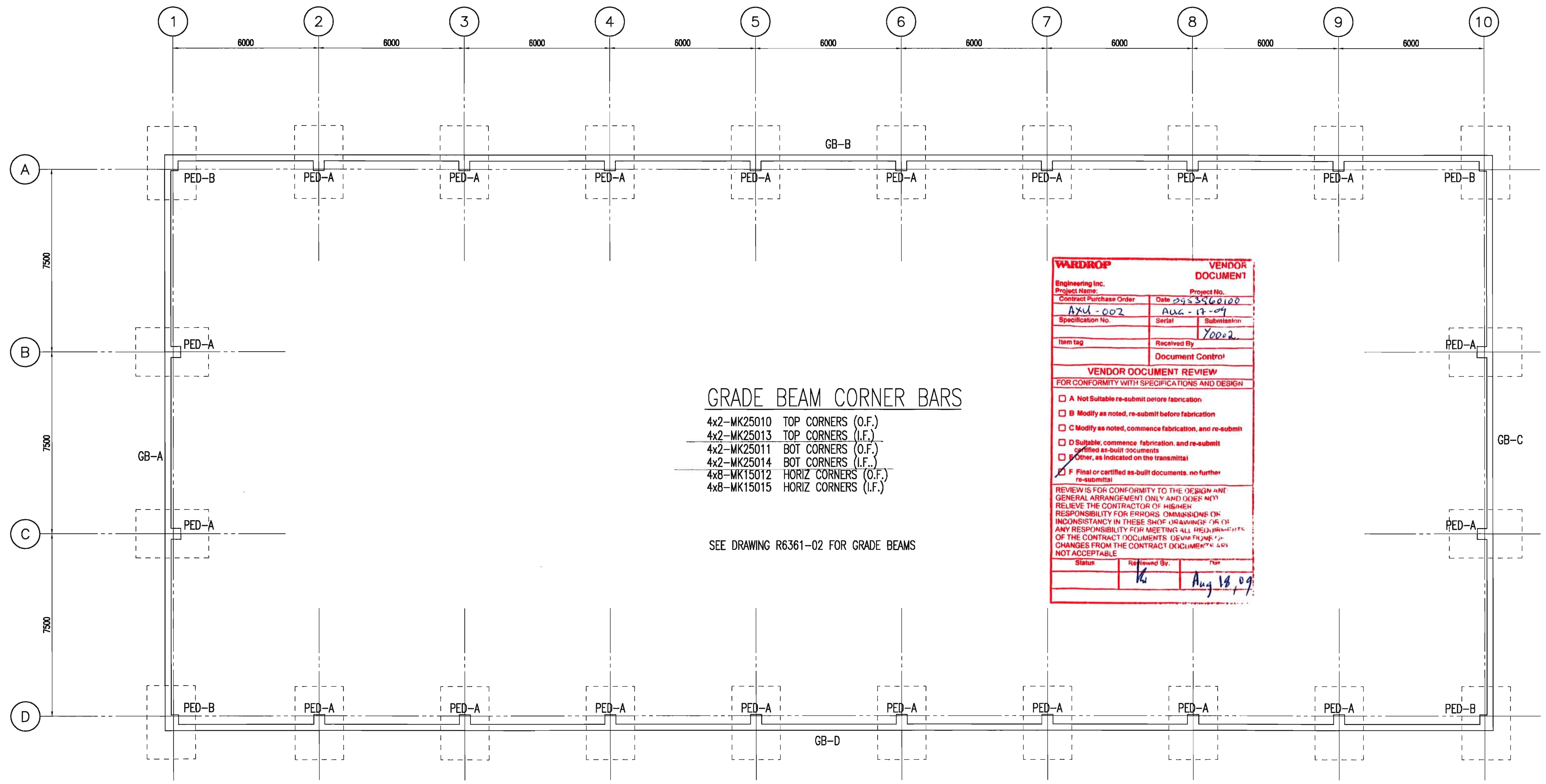
09/07/09 11:17



GRADE BEAM CORNER BARS

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4x2–MK25013 TOP CORNERS (I.F.)
4x2–MK25011 BOT CORNERS (O.F.)
4x2–MK25014 BOT CORNERS (I.F.)
4x8–MK15012 HORIZ CORNERS (O.F.)
4x8–MK15015 HORIZ CORNERS (I.F.)

SEE DRAWING R6361-02 FOR GRADE BEAMS

WARDROP Engineering Inc. — VENDOR DOCUMENT

Project Name:	Project No.
Contract Purchase Order: AXU-002	Date 0953960100 AUG-17-09
Specification No.	Serial / Submission: Y0002.
Item tag	Received By: Document Control

VENDOR DOCUMENT REVIEW

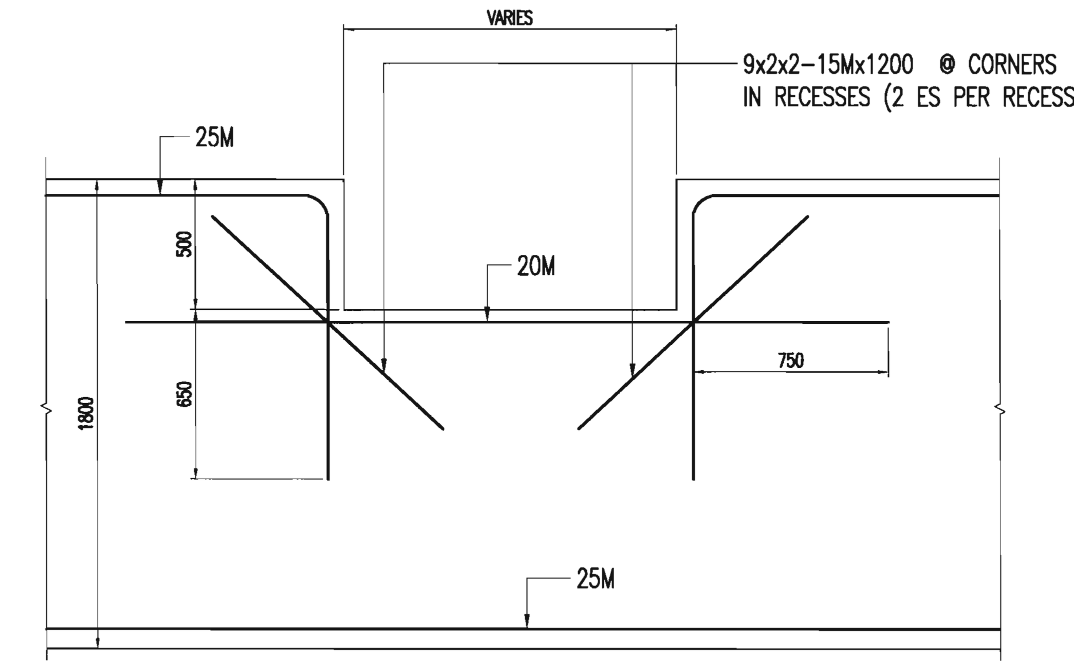
FOR CONFORMITY WITH SPECIFICATIONS AND DESIGN

- ☐ A Not Suitable re-submit before fabrication
- ☐ B Modify as noted, re-submit before fabrication
- ☐ C Modify as noted, commence fabrication, and re-submit
- ☐ D Suitable, commence fabrication, and re-submit certified as-built documents
- ☐ E Other, as indicated on the transmittal
- ☑ F Final or certified as-built documents, no further re-submittal

REVIEW IS FOR CONFORMITY TO THE DESIGN AND GENERAL ARRANGEMENT ONLY AND DOES NOT RELIEVE THE CONTRACTOR OF HIS/HER RESPONSIBILITY FOR ERRORS, OMMISSIONS OR INCONSISTANCY IN THESE SHOP DRAWINGS OR OF ANY RESPONSIBILITY FOR MEETING ALL REQUIREMENTS OF THE CONTRACT DOCUMENTS. DEVIATIONS OR CHANGES FROM THE CONTRACT DOCUMENTS ARE NOT ACCEPTABLE

Status	Reviewed By	Date
	K	Aug 18, 09

FOUNDATION PLAN



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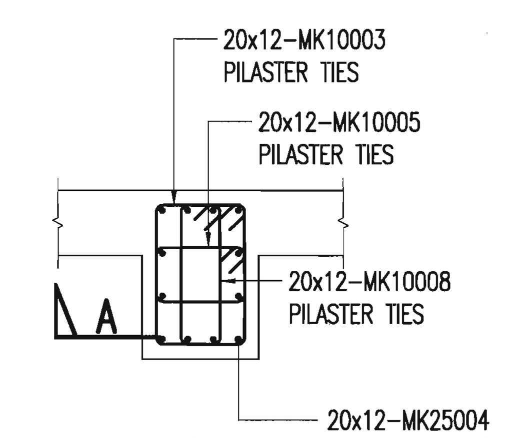

PED–A

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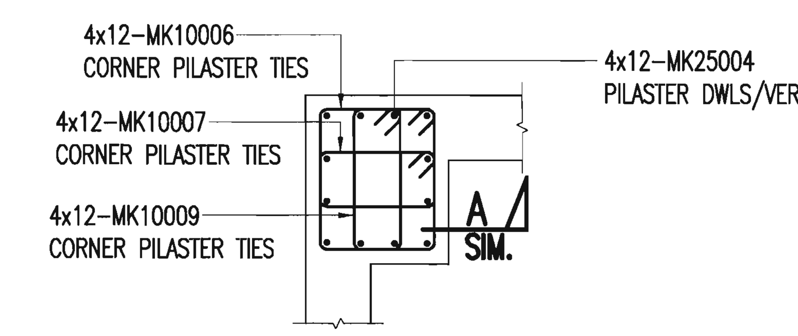

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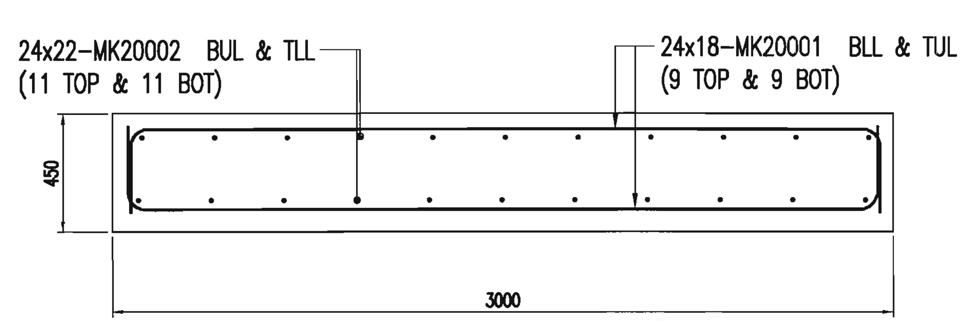


PAD FOOTING SECTION

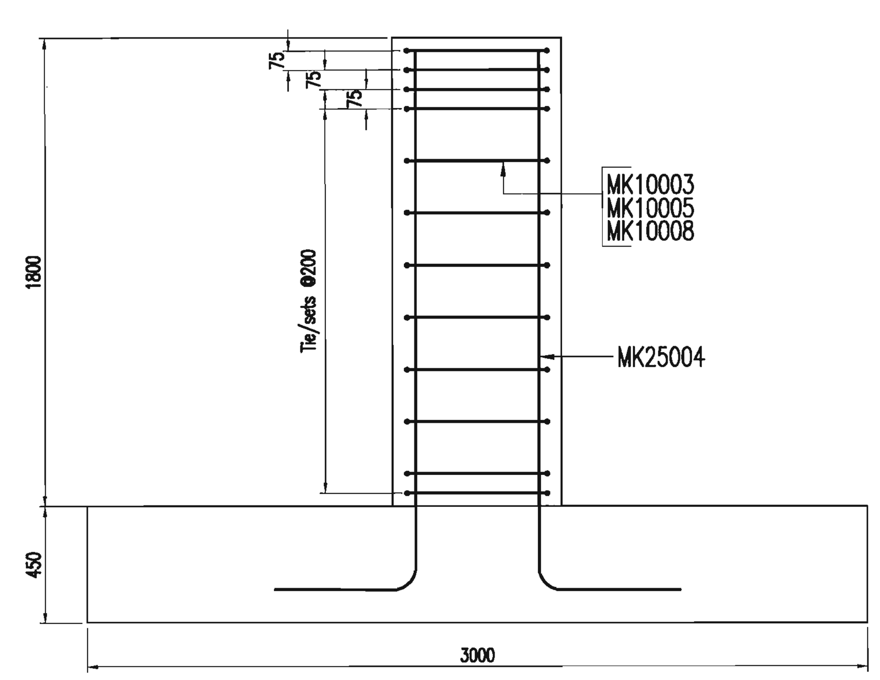
(24 REQUIRED)

TYPICAL LAP SPLICES

TOP SPLICES	BOTTOM SPLICES
10M = 520	10M = 400
15M = 780	15M = 600
20M = 1040	20M = 800
25M = 1430	25M = 1100

CONCRETE COVER

CONC. CAST AGAINST & EXPOSED TO EARTH:	75mm
CONC. EXPOSED TO GROUND OR WEATHER:	40mm for 15m or smaller 50mm for 20M or larger

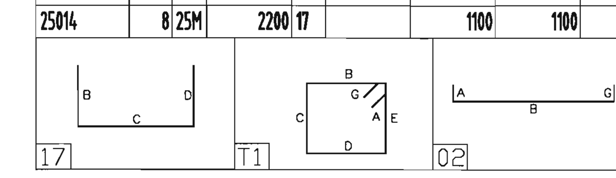


SECTION A

(TYPICAL PAD FTG/PEDESTAL ELEVATION)

BENDING DETAILS. FOR RUN: – 6361–001

Bar Mark	Qty	Size	Total length	Type	'A'	'B'	'C'	'D'	'E'	'F'	'G'	'H'	'J'	'K'	'O'	'R'
10003	240	10M	2000	T1	100	350	550	350	550		100	70				
10005	240	10M	1340	T1	100	350	220	350	220		100	70				
10006	48	10M	2200	T1	100	450	550	450	550		100	70				
10007	48	10M	1540	T1	100	450	220	450	220		100	70				
10008	240	10M	1620	T1	100	160	550	160	550		100	70				
10009	48	10M	1680	T1	100	190	550	190	550		100	70				
15012	32	15M	2760	17		1380	1380									
15015	32	15M	1560	17		780	780									
20001	432	20M	3550	17		320	2900	320								
20002	528	20M	2510	17		300	1900	300								
25004	288	25M	2630	2	550	2080										
25010	8	25M	4060	17		2030	2030									
25011	8	25M	3400	17		1700	1700									
25013	8	25M	2860	17		1430	1430									
25014	8	25M	2200	17		1100	1100									



No.	Description	Date	By
1	Revised	14/08/09	NMH

Revisions and Issue Record

The full intent and purpose of this drawing is the placing of reinforcing steel bars ONLY. It is NOT to be used as a means of communication between the Architect, Engineer, Contractor or any other Sub-trades.

THIS DRAWING IS NOT TO BE SCALED.

HarrisRebar — HARRIS STEEL SERVICES LIMITED
6613 – 44th STREET, LEDUC, ALBERTA T9E 7E5
TEL. (780) 986-7055 FAX. (708) 986-9011

Project: BELLEKENO PROJECT MILL BUILDING

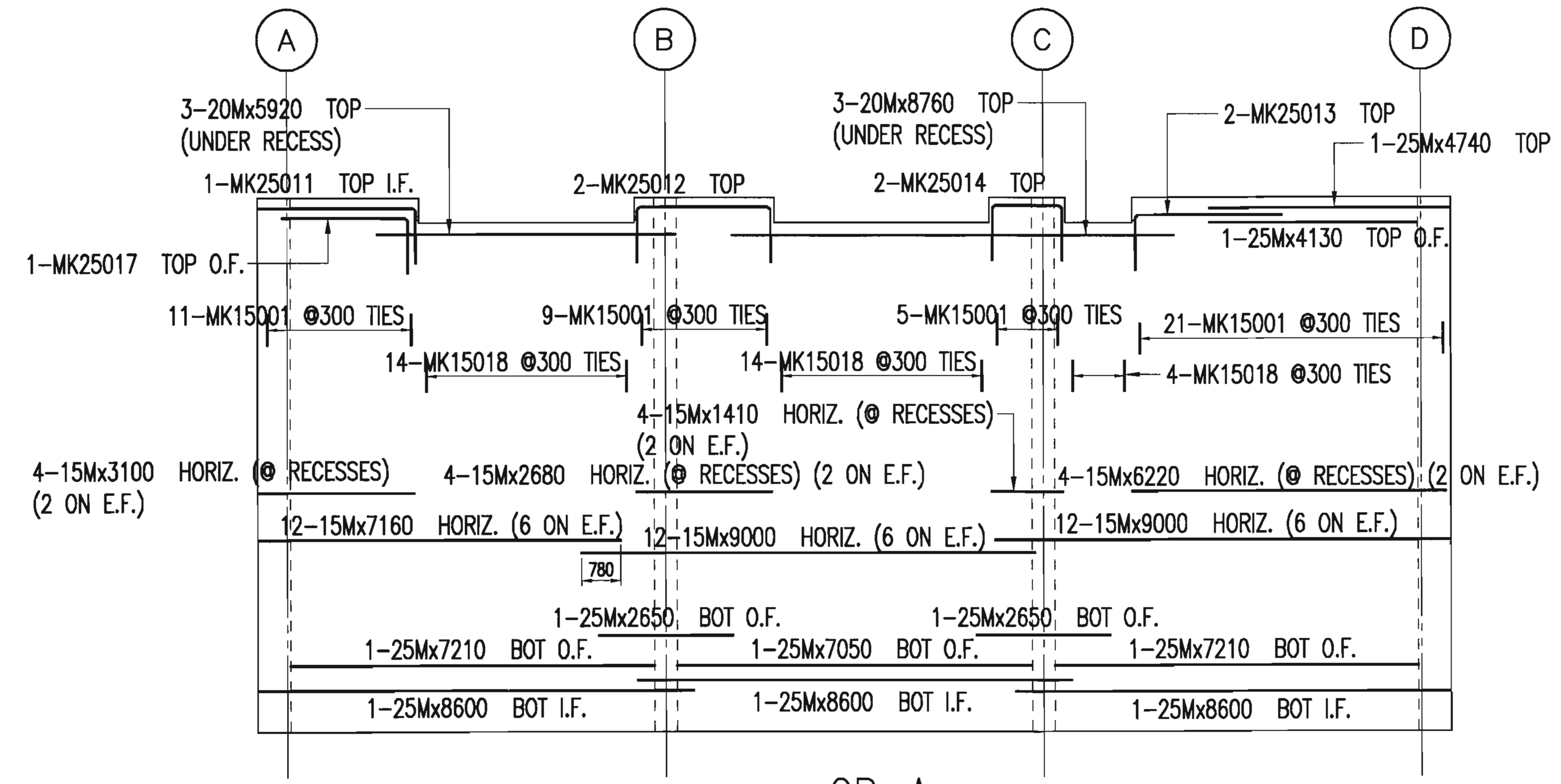
Drawing: PAD FOOTINGS & PEDESTALS

Contractor:

Customer: ALEXCO RESOURCE CORP.

Refer to Run No:

Date	Drawn	Chkd.	Contract No.	Dwg. No.
14/AUG/2009	OA	NMH	813R6361	R6361–01



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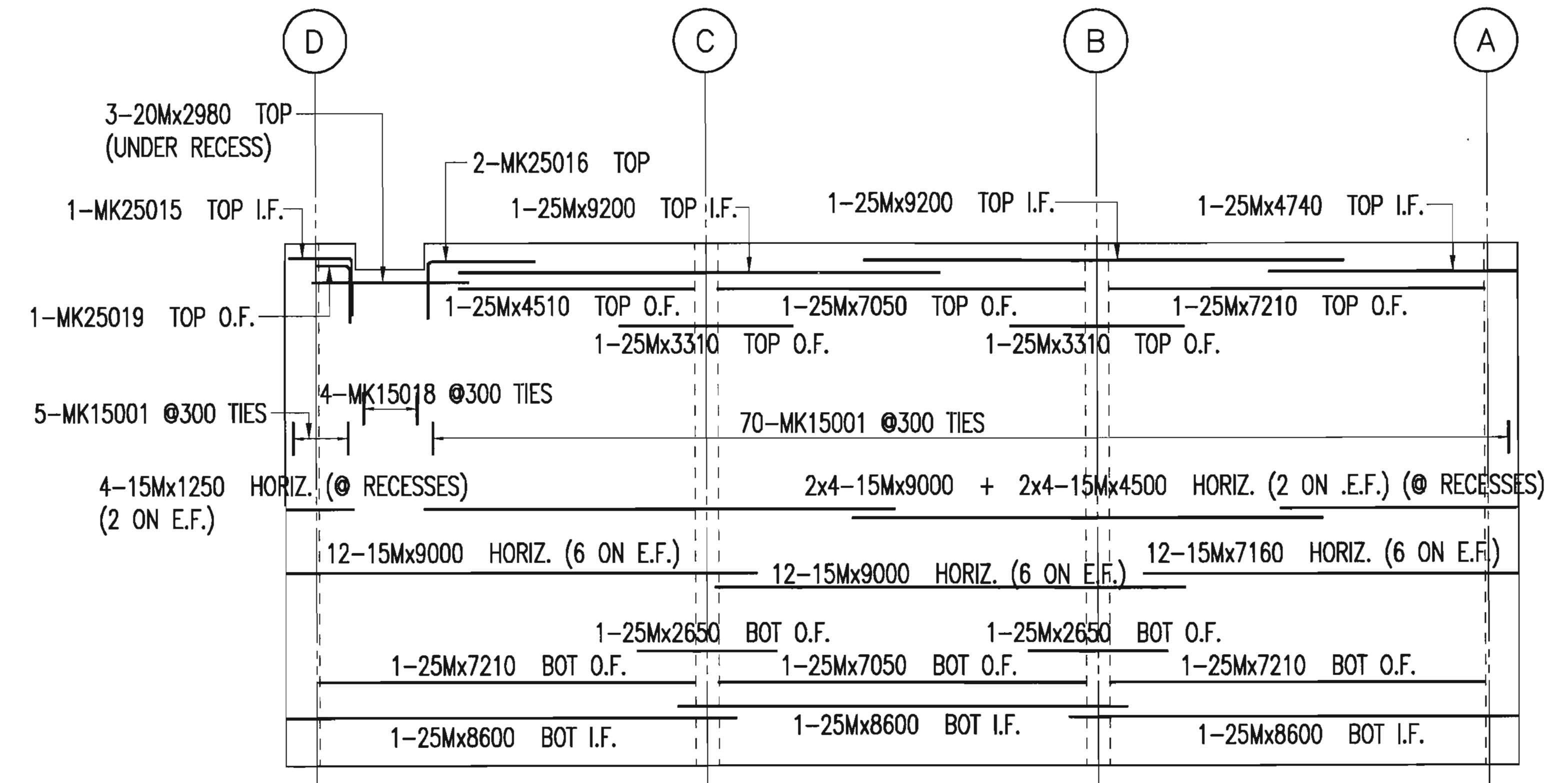


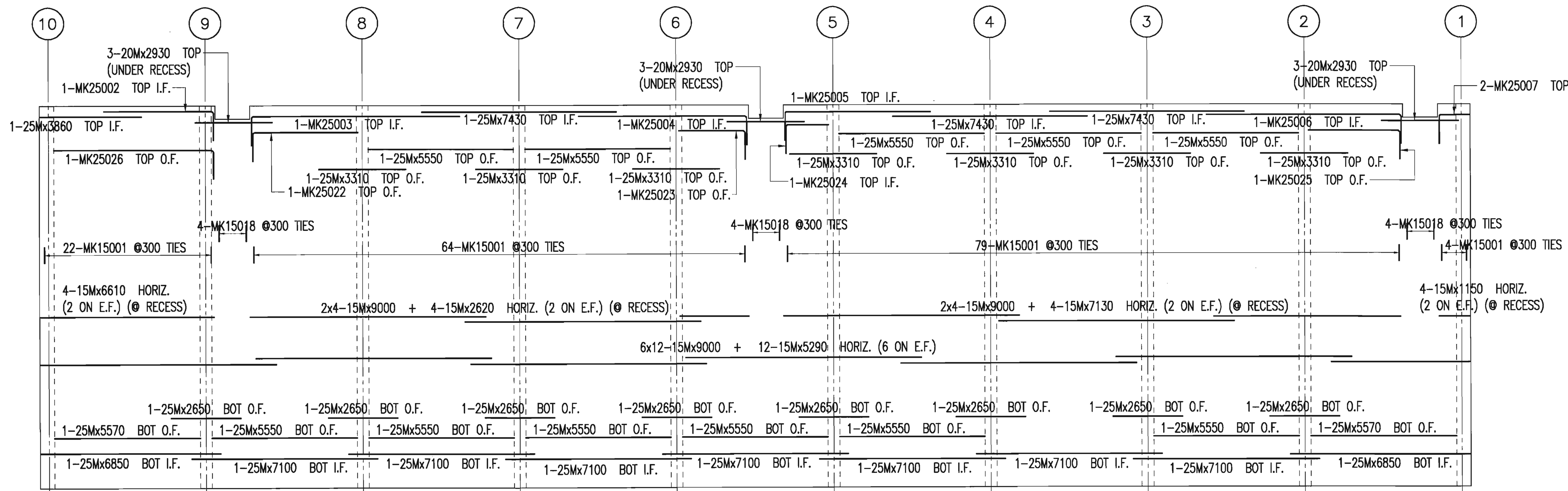
GB-C

TYPICAL LAP SPLICES

TOP SPLICES	BOTTOM SPLICES
10M = 520	10M = 400
15M = 780	15M = 600
20M = 1040	20M = 800
25M = 1430	25M = 1100

CONCRETE COVER

CONC. CAST AGAINST & EXPOSED TO EARTH:	75mm
CONC. EXPOSED TO GROUND OR WEATHER:	40mm for 15m or smaller 50mm for 20M or larger



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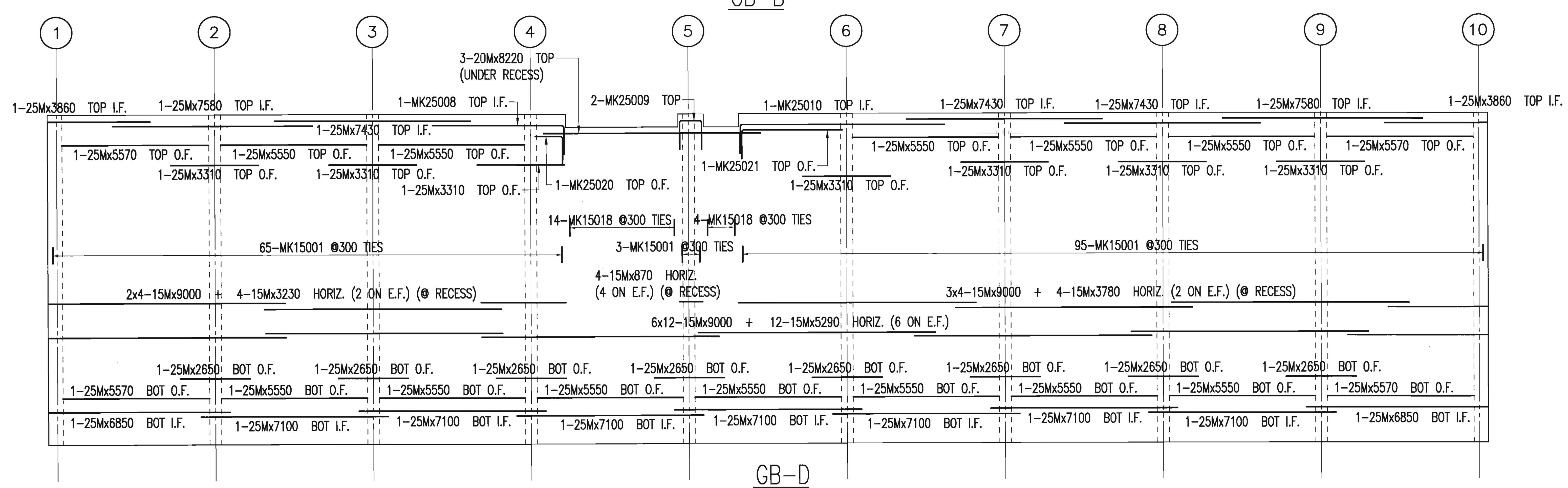

GB-D

BENDING DETAILS. FOR RUN: – 6361-002

Bar Mark	Qty	Size	Total length	Type	'A'	'B'	'C'	'D'	'E'	'F'	'G'	'H'	'J'	'K'	'O'	'R'
15001	453	15M	3920	T2	140	150	1670	150	1670		140					
15018	66	15M	2920	T2	140	150	1170	150	1170		140					
25002	1	25M	5290	17		1100	4190									
25003	1	25M	9070	17		1100	7970									
25004	1	25M	7530	17		6430	1100									
25005	1	25M	6670	17		5570	1100									
25006	1	25M	8530	17		7430	1100									
25007	2	25M	2250	17		1150	1100									
25008	1	25M	6090	17		4990	1100									
25009	2	25M	3070	17		1100	870	1100								
25010	1	25M	8870	17		7770	1100									
25011	1	25M	4200	17		3100	1100									
25012	2	25M	4880	17		1100	2680	1100								
25013	2	25M	4020	17		2920	1100									
25014	2	25M	3610	17		1100	1410	1100								
25015	1	25M	2310	17		1210	1100									
25016	2	25M	3150	17		2050	1100									
25017	1	25M	3600	17		2500	1100									
25019	1	25M	1750	17		650	1100									
25020	1	25M	2150	17		1050	1100									
25021	1	25M	4930	17		3830	1100									
25022	1	25M	5130	17		4030	1100									
25023	1	25M	3640	17		2540	1100									
25024	1	25M	2730	17		1630	1100									
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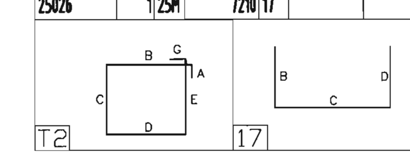
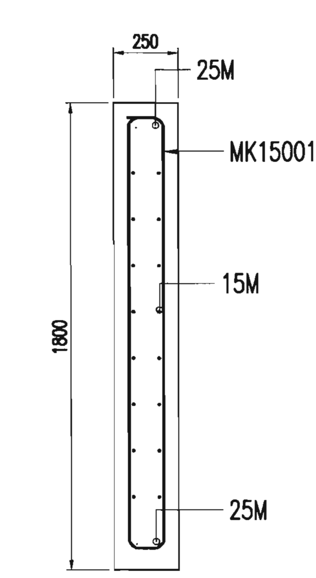


T2 17



TYPICAL GB SECTION

No.	Description	Date	By
1	Revised	14/08/09	NMH

Revisions and Issue Record

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THIS DRAWING IS NOT TO BE SCALED.

HarrisRebar
HARRIS STEEL SERVICES LIMITED
6613 – 44th STREET
LEDUC
ALBERTA T9E 7E5
TEL. (780) 986–7055
FAX. (708) 986–9011

Project: BELLEKENO PROJECT
MILL BUILDING

Drawing: GRADE BEAMS

Contractor:

Customer: ALEXCO RESOURCE CORP.

Refer to Run No: 6361–002

Date	Drawn	Chkd.	Contract No.	Dwg. No.
13/AUG/2009	OA	NMH	813R6361	R6361–02

APPENDIX B

ALEXCO

ALEXCO KENO HILL MINING CORP.

WASTE ROCK MANAGEMENT PLAN

QML-0009

BELLEKENO MINE DEVELOPMENT

KENO HILL SILVER DISTRICT

YUKON

November 2009

Prepared by:

ACCESS
CONSULTING GROUP

www.accessconsulting.ca

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1.0 BELLEKENO MINE WASTE ROCK MANAGEMENT

1.1 INTRODUCTION

The Bellekeno Advanced Underground Exploration and Development Program, assessed under YESAB project number 2008-0039, presented a comprehensive Waste Rock Management Plan (WRMP) for the estimated 248,000 tonnes of waste rock to be excavated over 5 years. In addition to the WRMP assessed under YESAB project number 2008-0039, an additional Waste Rock Testing Plan, Mine Wall Sampling Plan, were submitted to the Yukon Water Board and Government of Yukon, Mining Land Use Department, under Sections 24 and 25 of Water Licence QZ07-078. These plans provided additional detail regarding geochemical and ABA testing of waste rock and mine walls exposed during excavation, and their essence incorporated into this plan. Under Section 23 of Water Licence QZ07-078, a Waste Rock Physical Inspection Plan was submitted. Additional supporting studies on Acid Rock Drainage/Metal Leachate (ARD/ML) controlling and correlating factors, and geoenvironmental characterization of the Bellekeno Zone were undertaken by Altura Environmental Consulting of Whitehorse, Yukon. These documents are attached as Attachments A and B.

During Bellekeno Mine development, an estimated additional 500,000 tonnes of waste rock may be excavated over the 5 year mine life. This additional waste rock is expected to be similar in lithology and AML/non-AML character to that encountered thus far during the Advanced Underground Exploration and Development Program. Thus, the Bellekeno Mine Waste Rock Management Plan is based on similar data, methodologies, and assumptions as were used in the Advanced Underground Exploration and Development Program developed under YESAB project number 2008-0039, including the Waste Rock Testing Program and Mine Wall Sampling Programs submitted for Water Licence QZ07-078.

1.2 PURPOSE OF PLAN

This plan outlines practices for management of waste rock to be excavated during the Bellekeno Mine Development, to be undertaken commencing in 2009 by Alexco.

The plan is intended to ensure that appropriate management procedures are followed during excavation activities in order to minimize impacts of stored rock to land and water resources. Monitoring following excavation activities is intended to assess the effectiveness of the management measures, ensure that adaptive management approaches are implemented and to ensure that appropriate information is obtained by Alexco to assist in closure planning.

1.3 SCOPE OF PLAN

Aspects included in this Plan are:

- Definition of rock categories based on potential for reactivity (specifically, acid generation and/or metal leaching);
- Estimation of quantities of each category to be excavated during the project;
- Operational categorization of excavated rock;
- Geochemical and ABA confirmatory testing;
- Mine wall geochemical and ABA testing;
- Control measures as required to mitigate effects of potential acid generation and/or metal leaching;
- Monitoring and physical inspection activities for waste rock storage areas;
- Reporting of waste rock management activities;
- Geotechnical design of waste rock storage areas and;
- Non-AML waste rock disposal area risks and mitigations.

1.4 ROCK CHARACTERIZATION

1.4.1 Summary of Rock Characterization

Studies conducted throughout the Keno Hill camp and specifically within the Bellekeno zone, provide a foundation for correlating and understanding the weathering behaviour or ‘geoenvironmental’ tendencies of rock in the Keno area. Attachment A and Attachment B provide full details of these geoenvironmental evaluations.

1.4.2 Study Overview

The geoenvironmental evaluations to support the Bellekeno Waste Rock Management Plan (WRMP) consisted of data analysis and integration of four specific data components:

1) site-wide studies on weathered rock (47 samples);
2) acid base accounting of 2006-2007 Bellekeno drill core (71 samples);
3) Bellekeno drillhole multi-element and lithology database (6,478 samples), and
4) mineralogy and alteration logging data on acid base accounting samples.

An overall flowchart of data review and synthesis as well as principal results are presented in Figure 1. Specifically, the studies have been used to derive the following components for the waste rock management plan:

1) AML geochemical screening criteria;
2) estimated proportions of potentially AML and Non-AML material by rock type for Bellekeno; and
3) field criteria for differentiating potentially AML and Non-AML rock during excavation activities.

1.4.3 Summary of Results

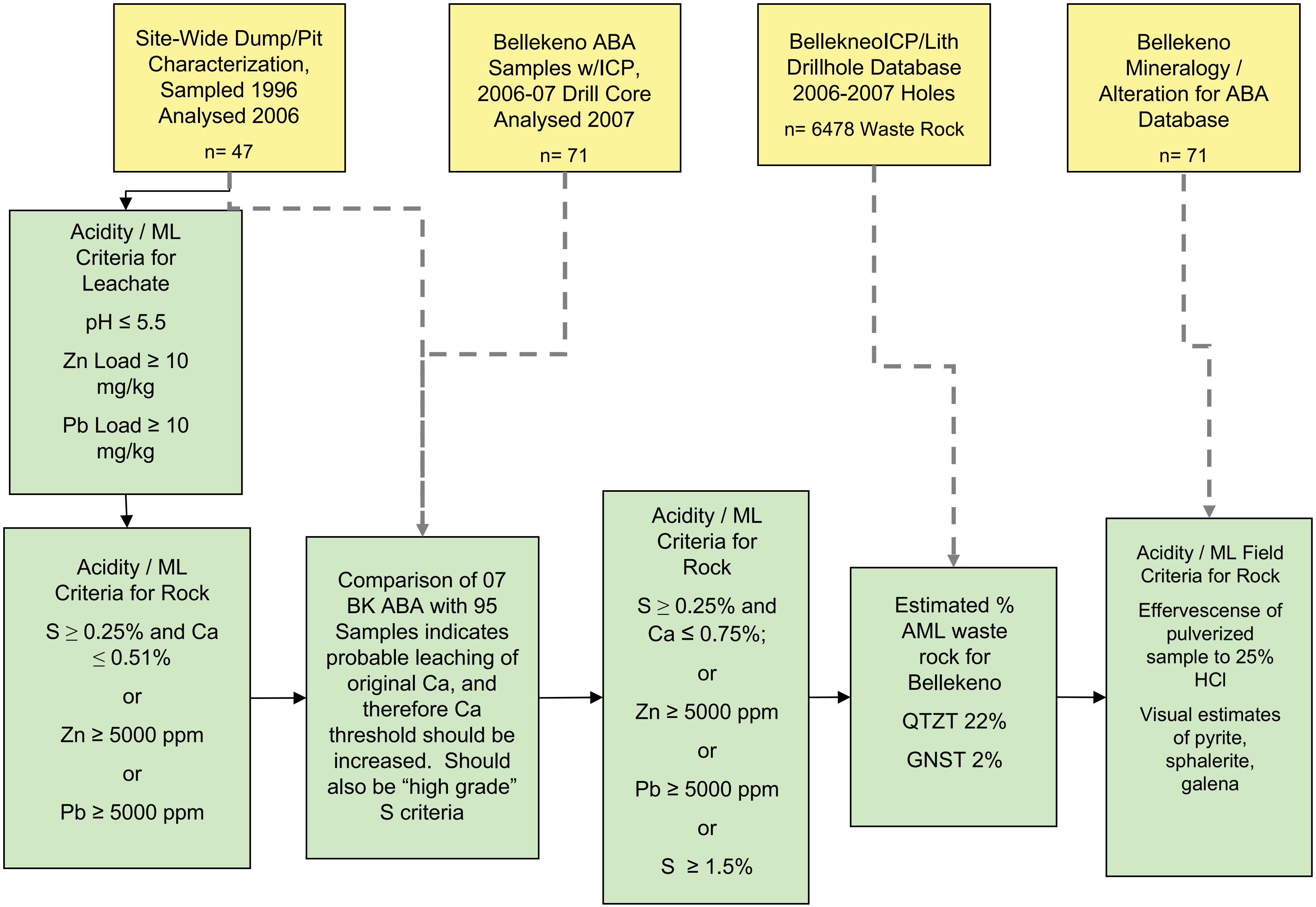
See Table 1 (located in Section 1.4.5 below) for a summary of waste rock management categories and physical and geochemical screening criteria, as well as usages and storage methods.

1.4.4 Potentially-AML Waste Rock Geochemical Screening Criteria

Recommended geochemical screening criteria for identification of potentially-AML Bellekeno rock are as follows:

a) Ca% ≤ 0.75% and $S_{via\ ICP}$ ≥ 0.25 %;
b) or $S_{via\ ICP}$ ≥ 1.50%;
c) or Pb ≥ 5000 ppm; and
d) or Zn ≥ 5000 ppm.

Figure 6-9 Bellekeno Waste Rock Characterization Study – Components and Key Results



1.4.5 Estimated Proportions of AML and Non-AML Rock for Bellekeno

Applying the geochemical screening criteria to the 6,478-sample waste rock drillhole database, Table 1 shows the proportions of potentially-AML rock identified for each lithology.

Table 1 Proportion of Samples Filtered as Potentially-AML in Bellekeno Waste Rock Drillhole Database

Lithology				
Description	**Code**	**Number of Samples in Database**	**Number of Samples Screened as Potentially-AML**	**Percentage of Samples Screened as Potentially-AML**
Chloritic Schist	CHSCH	222	27	**12%**
Calcareous Quartzite	CQTZT	505	54	**11%**
Greenstone	GNST	567	10	**2%**
Graphitic Schist	GSCH	870	562	**65%**
Quartzite	QTZT	3293	719	**22%**
Schist, Undifferentiated	SCH	775	299	**39%**
Sericitic Schist	SSCH	205	37	**18%**

As can be seen from Table 1, the most abundant lithologies at Bellekeno are quartzite and calcareous quartzite (intercalated with minor graphitic schist) with some greenstone, chlorite schist and sericite schist. These data were used to predict proportions of AML and non-AML rock which was excavated during the advanced underground development and exploration program and is also used as a predictor for the currently proposed mine development and operations.

1.4.6 Waste Rock Field Screening Criteria

One of the fundamental parts of the Bellekeno Mine Waste Rock Management Program is field screening of waste rock. Field screening criteria for identifying potentially-AML rock have been developed as follows:

a) Slight or no effervescence of pulverized sample with 25% HCl (e.g. presence of none or only a few bubbles), and visual estimated pyrite >0.5%, or;

b) Any sample with one or more of the following:

    i. visual estimated sphalerite >0.75%;
    ii. visual estimated galena >0.5%;
    iii. visual estimated pyrite >2%;
    iv. any vein material not deemed to be in "Mineralized" category; and
    v. paste pH ≤ 6.0.

1.4.7 Rock Management During Operations

Table 2 summarizes key characteristics of the rock management categories:

1) Potentially-AML Waste Rock;
2) Non-AML Waste Rock;
3) Mineralized Rock

Included for each category are environmental characteristics, use and storage specifications, geochemical criteria, and field screening criteria.

Table 2 Waste Rock Management Categories

	Potentially-AML Waste Rock	Non-AML Waste Rock	Mineralized Rock
Environmental Characteristics	Potentially acid-generating and/or metal leaching	Non- acid-generating and non-metal leaching	Ag, Pb, and Zn grades of economic interest. May contain minerals with potential for net acidity and/or metal leaching
Uses and Storage	Not suitable for general construction purposes. To be stored temporarily at the lined Bellekeno P-AML WRSF and returned underground at closure. Equivalently designed permanent facilities may be constructed near Bellekeno 625, should the need arise.	May be used for general construction purposes	May be stockpiled temporarily on concrete lined pad at Bellekeno 625 or at the Flame and Moth mill site, then either milled or sent to potentially-AML storage facility
Geochemical Criteria	1. Ca% ≤ 0.75% and S_{ICP} ≥ 0.25 % 2. or S_{ICP} ≥ 1.50 % 3. or Pb ≥ 5000 ppm 4. or Zn ≥ 5000 ppm	All waste rock samples not meeting AML criteria, namely: a) S_{ICP} < 0.25 % b) or Ca% > 0.75% and S_{ICP} < 1.50 % c) and Pb < 5000 ppm d) and Zn < 5000 ppm	a) Ag ≥ 100 ppm b) or Pb ≥ 10000 ppm c) or Zn ≥ 10000 ppm
Field Screening Criteria	a) Slight or no effervescence of pulverized sample with 25% HCl (e.g. presence of none or only a few bubbles), and visual estimated pyrite >0.5%, or; b) Any sample with one or more of the following: i. visual estimated sphalerite >0.75% ii. visual estimated galena >0.5% iii. visual estimated pyrite >2% iv. any Vein material not deemed to be in "Mineralized" category v. paste pH ≤ 6.0	All waste rock samples not meeting AML criteria, namely: a) Virtually no visible pyrite under magnification, or if some sulphides present: i. Steady effervescence of pulverized sample with 25% HCl (continuous stream of bubbles and visual estimated pyrite <2% b) and visual estimated sphalerite <0.75% c) and visual estimated galena <0.5% d) paste pH >6	Visual estimation of galena, sphalerite and sulphosalt minerals followed by confirmatory assay.

1.4.8 Overview of Proposed Rock Excavation & Waste Rock Management

1.4.8.1 Rock Management Categories

Waste rock excavated from the Bellekeno underground operations can be categorized into the following categories:

- Non-AML: Rock of non-economic grade, expected to be comprised of over 85% Central Quartzite unit (quartzite typically intercalated with minor amounts of schist), and less than 15% Greenstone. As presented in Section 1.2, the majority of the waste rock excavated is expected to be non-AML; rock field-classified as non-AML will be stored in designated locations on site.
- Potentially-AML Waste Rock and Mineralized Waste Rock of no Economic Interest: Rocks field-classified as potentially-AML (mainly pyrite rich graphitic schist) will be stored in designated lined potentially-AML waste rock storage facilities. In addition to potentially-AML wall rocks, some vein material especially along the margins of zoned veins contain mostly gangue minerals such as siderite, pyrite and quartz but do not contain economic amounts of Ag, Zn, or Pb minerals and therefore are of no economic interest. Due to their increased likelihood for acidic or metal leaching, all such mineralized non-economic rock is considered to be potentially-AML and will be stored in potentially-AML waste rock storage facilities.
- Mineralized Rock of Economic Interest: Vein material which contains significant Ag, Zn or Pb minerals but is not obviously economic may be temporarily stockpiled at the mine site or mill site on lined contained pads. Confirmatory assay will determine whether this rock is milled, or is sent to the potentially-AML waste rock storage facility or hauled back underground. This material will be temporarily stockpiled for a maximum of 30 days.

1.4.8.2 Estimated Rock Quantities for Bellekeno Mine Development

In addition to waste rock excavation as part of the Bellekeno Advanced Underground Exploration and Development Program, an estimated maximum of an additional 500,000 tonnes of rock may be excavated over the 5 year mine life. Preliminary calculations by SRK Consulting for the mine plan indicate the total amount of waste rock to be excavated during Bellekeno Mine development and operations to be approximately 350,000 tonnes. However, the conservative outside limit of 500,000 tonnes has been used for planning purposes, including sizing of the WRDA. It is estimated that this tonnage will be divided fairly evenly at approximately 100,000 tonnes annually over the projected 5 year mine life (see Table 2). This tonnage is expected to include 369,750 tonnes of non-AML waste rock, suitable for general site construction purposes, and 130,250 tonnes of potentially-AML waste rock.

Table 3 Waste Rock Tonnage Estimates and AML Classification

Basic Rock Type	Total estimated tonnage (metric tonnes)	Percentage of Unit Estimated to be characterized as potentially-AML producing	Tonnes potentially-AML (approx)	Fate of potentially-AML Material	Tonnes non-AML (for general site construction purposes)
Greenstone	10,000	2%	300	Bellekeno Waste Rock Containment Facility or equivalent location on surface or underground	9,700
Schist	15,000	40%	6,000		9,000
Quartzite	65,000	15%	9,750		55,250
mineralized waste (gangue) material	10,000	100%	10,000		0
Annual Total	**100,000**		**26,050**		**73,950**
Life of Mine Total (5 Yr)	**500,000**		**130,250**		**369,750**

Rock types and potentially-AML/Non-AML distributions in Table 2 are based on the Bellekeno Waste Rock Database (Table 1, and Attachment A) and also on data obtained during the ongoing Advanced Underground Exploration and Development Program. The results of these data suggest that the quantity of AML rock predicted by the Geoenvironmental Characterization Study and cover hole drilling may have overestimated the quantity of potentially-AML during decline development. For example, although Alexco anticipated 25% of the total waste rock to be potentially-AML during the Advanced Underground Exploration and Development Program, during actual Bellekeno East Decline development, less than 5% potentially-AML rock was encountered.

Compared with the Advanced Underground Exploration and Development Program, Bellekeno Mine Development is expected to encounter more near vein material, which is more likely to be potentially-AML. Because of this, the conservative estimate of 25% potentially-AML is retained. The approximately 6,500 samples used in the Bellekeno geoenvironmental characterization report (Attachment B) are centralized over the Bellekeno vein zone, and thus more likely to accurately reflect the actual potentially-AML waste rock which will be encountered during mine development.

1.4.8.3 Waste Rock Management

Upon AML/non-AML determination (see Section 1.2 for details), directions will be given to the surface crew for hauling and use of the waste rock as follows.

<u>Non-AML Waste Rock</u>

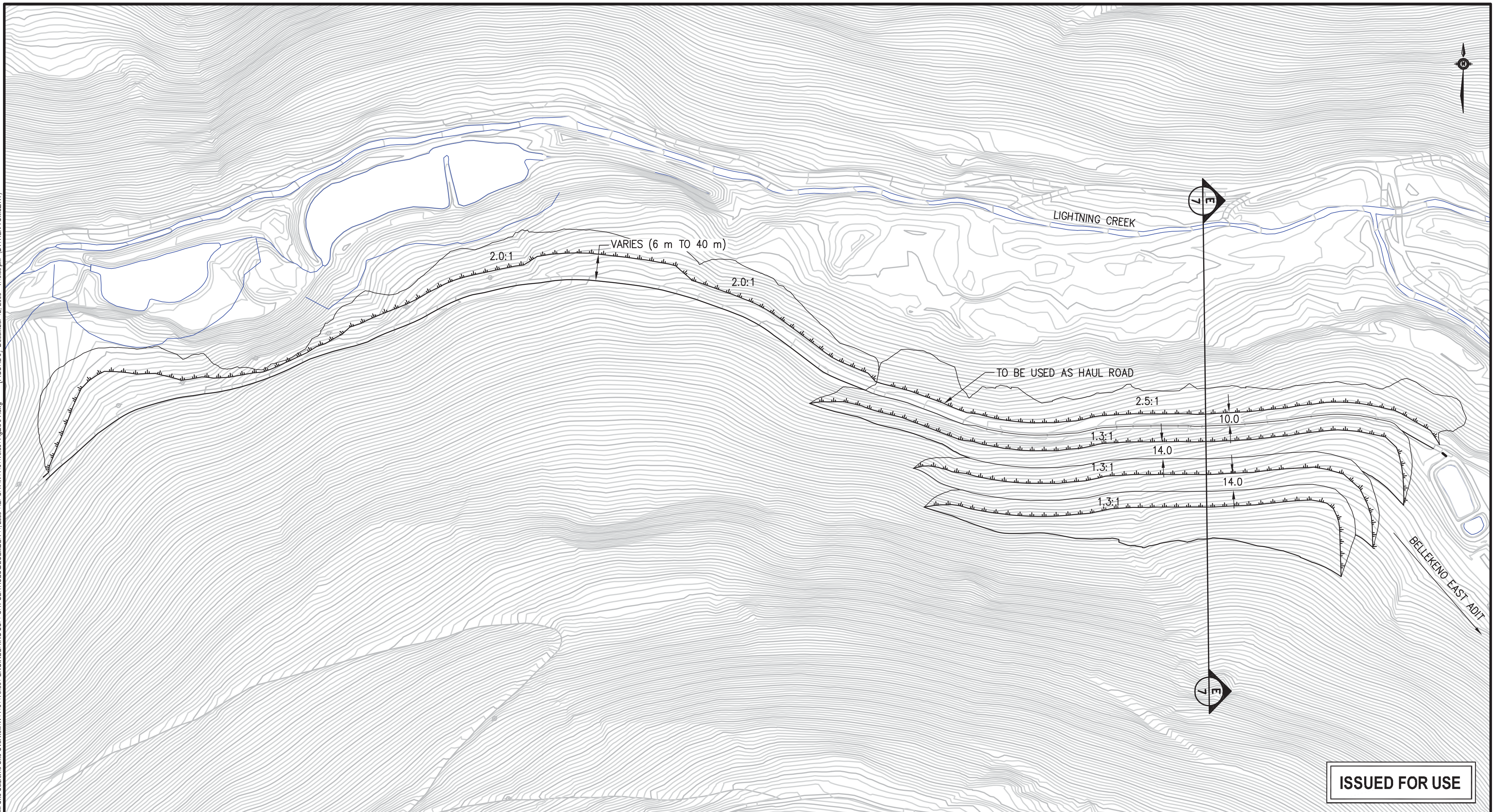
Rock that is not potentially acidic or metal leaching, or "non-AML" will be used for general construction including repairs and surface capping of the existing 'power line road' that runs along the north slope of Sourdough Hill, above the left limit of Lightning Creek and possibly as fill and construction for the mill and ancillary facilities. Additional non-AML waste rock will be deposited along the northeast flank of Sourdough Hill, northwest of the current Bellekeno 625 waste rock storage areas. See Figure 2 and Figure 3 below from EBA Engineering Consultants Ltd. (EBA) for conceptual design of waste rock storage areas.

The following description and Table 4 summarizing risks and associated mitigations of the non-AML WRDA have been extracted from EBA's report to Alexco on Conceptual Tailings and Waste Rock Management Plans, Bellekeno Project near Keno City, Yukon.

> "*The waste rock will be hauled from the Bellekeno adit directly to the WRDA. The WRDA will be constructed as a wrap around dump, so the lower benches will be constructed first. The lowest bench will follow the existing road alignment and have a slope to the existing ground surface of 2.5H:1V. The waste rock will be dumped in 10 m benches and allowed to fall to the bench below it at the natural angle of repose of the rock. The stability of the pile was checked using Geostudio 2007 – SlopeW module. The factors of safety calculated for the waste WRDA and the guidelines set forth by the BC Mine Waste Rock Pile Research Committee (1991) are summarized in Table 4]. The WRDA will not need re-contouring at closure as the long-term stability of the pile should meet the guidelines. Waste rock piles in the area have been standing at the natural angle of repose without significant stability problems for over 30 years*."

Table 4 Non-AML WRDA Risk and Mitigation Summary

Risk	Design Constraint	Mitigation	Discussion
Deep seated slope failure	Minimum FS = 1.3 (static); 1.0 (pseudo-static 1:500 year event)	Waste rock pile is designed to the applicable guidelines.	Probability of exceedance of the design seismic event is 10% in 50 years.
Surface slope failure	Minimum FS = 1.1 (static)	Waste rock pile is designed to the applicable guidelines.	Surface failures can be repaired without major effort.
Sediment transport	Setback distance of 30 m from water bodies	Pile location minimizes sediment from being transported into adjacent streams.	Sediment picked up by surface runoff can filter out in natural vegetation in the area prior to discharging into receiving water bodies.
Toe liquefaction	Consider liquefaction during conceptual design	The foundation soils not susceptible to liquefaction in frozen state.	Review of liquefaction potential will be conducted for unfrozen soils in detailed design.
Snow and ice buried during pile construction	Operational issue	Operational procedures will be developed to minimize this.	Buried snow and ice can affect the stability and capacity of the facility.
Contaminated waste rock	Operational issue	Waste rock containing contaminant will not be placed in waste rock pile.	Contaminated rock will be placed in the previously constructed contaminated waste rock facility.



WASTE ROCK VOLUME = 200,000 m³

NOTE:
BASE PLAN PROVIDED BY
ALEXCO RESOURCE CANADA CORP.

0 100
Scale: 1: 3,000 (metres)

CLIENT
ALEXCO

EBA Engineering Consultants Ltd.

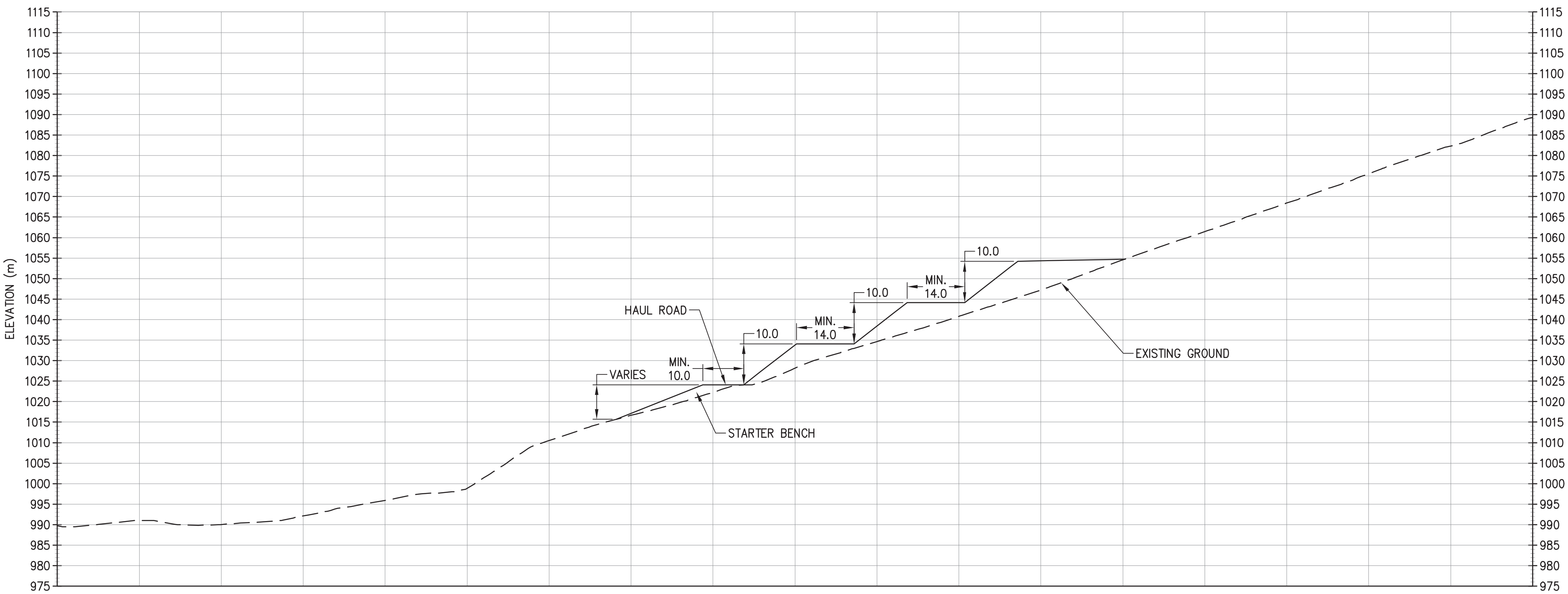
ENGINEERING SUPPORT SERVICES
BELLEKENO MINE PROJECT, YUKON

BELLEKENO NON-AML WASTE ROCK MANAGEMENT AREA

PROJECT NO.	DWN	CKD	REV
W14101178.001	KJT	CJD	1
OFFICE	DATE		
EBA-WHSE	DECEMBER 11, 2008		

Figure 2-2

Q:\Whitehorse\Data\0201\drawings\Keno\W14101178 Mill Site Search\3 Site Overview\W14101178.001 ENGINEERING SUPPORT SERVICES\DECEMBER 11, 2008 REPORT\W14101178.001 Figure 6-7.dwg [FIGURE 6] December 12, 2008 - 4:10:55 pm (BY: KEN TOMCZYK)



E/6 WASTE ROCK PILE PROFILE
SCALE 1:1,000

0 50
Scale: 1: 1,000 (metres)

ISSUED FOR USE

NOTE
1. ALL UNITS IN METRES UNLESS OTHERWISE NOTED
2. BASE PLAN PROVIDED BY ALEXCO RESOURCE CANADA CORP.

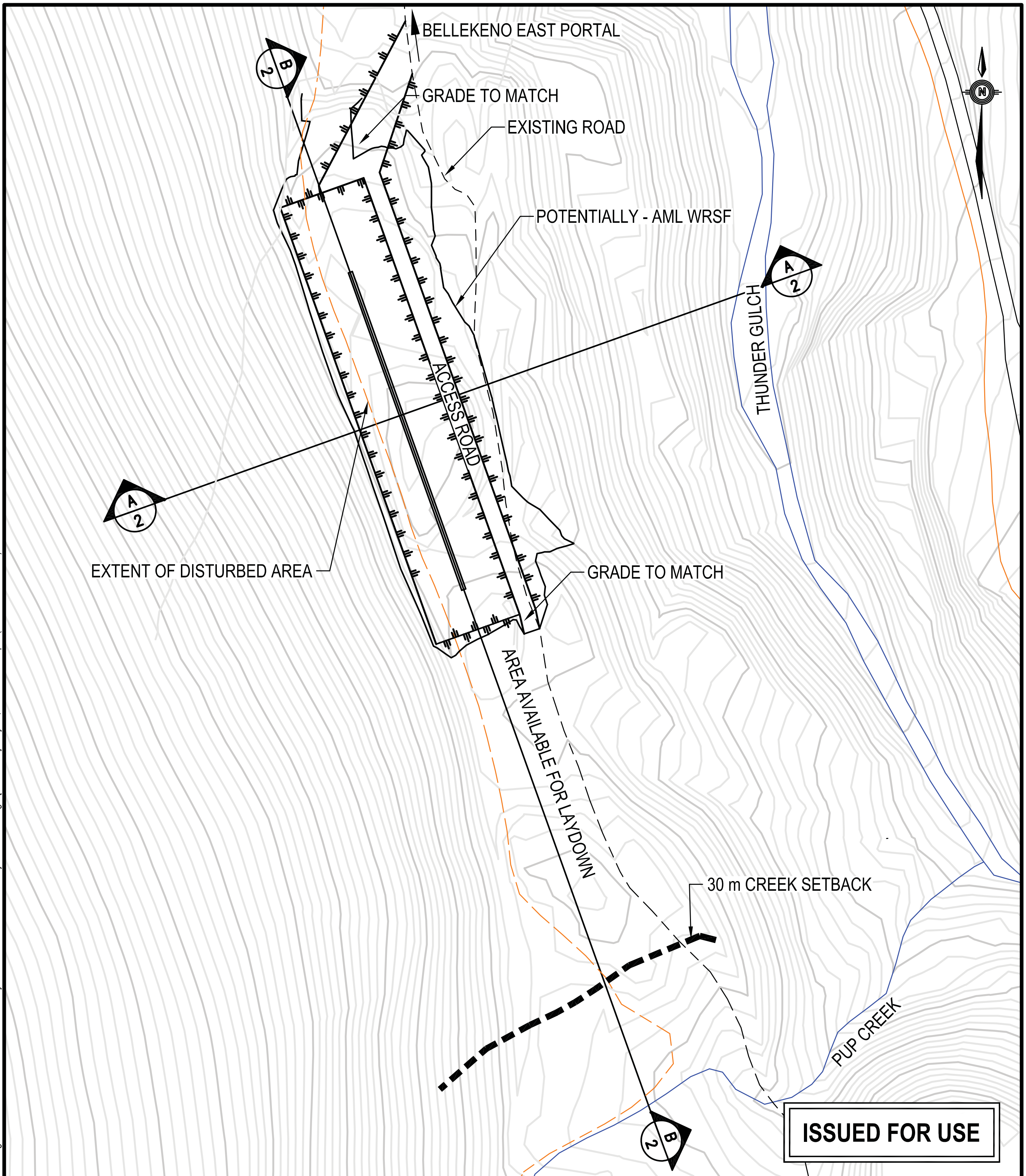
CLIENT
ALEXCO

EBA Engineering Consultants Ltd.

ENGINEERING SUPPORT SERVICES
BELLEKENO MINE PROJECT, YUKON

NON AML WASTE ROCK MANAGEMENT AREA SECTION

PROJECT NO.	DWN	CKD	REV	
W14101178.001	KJT	CJD	1	Figure 2-3
OFFICE	DATE			
EBA-WHSE	DECEMBER 11, 2008			



ISSUED FOR USE

CLIENT

ALEXCO

EBA Engineering Consultants Ltd.

TEMPORARY WASTE CONTAINMENT FACILITY
BELLEKENO EAST SITE

Temporary P-AML Waste Rock Storage Facility

PROJECT NO.	DWN	CKD	REV
W14101142.001	KJT	CJD	0
OFFICE	DATE		
EBA-WHSE	July 30, 2009		

Figure 2-4

O:\Keno\W14101142 Onek Waste Containment Facility - Design\001 - Bellekeno P-AML Waste Facility\Bellekeno East P-AML Facility-20090727.dwg [FIGURE 1] July 30, 2009 - 2:12:57 pm (BY: CHRIS DIXON)

Potentially-AML Waste Rock

Preliminary mine plan design by SRK Consulting indicates that approximately 25,000 tonnes of potentially-AML waste rock could be accommodated underground as backfill. Rock that is considered potentially-AML is currently stored in a temporary facility at the Bellekeno East portal. This temporary potentially-AML rock storage facility has been built according to Typical Waste Containment Facility Design specifications, and the site location has been inspected and approved by a geotechnical engineer licensed to practice in the Yukon, and approved by Government of Yukon under LQ00240.

The approved Typical Waste Containment Facility Design has a geosynthetic liner to allow for collection of drainage and is surface graded to divert any water flow around the storage area. The HDPE liner is covered by a 0.3 m protective sand and gravel overliner/drainage layer to permit rock dumping by truck or loader. Sumps are built into the low points of these storage facilities to allow for collection of any drainage or meteoric accumulation, which is conveyed to the Bellekeno 625 treatment facility. Upon closure, this waste rock will be rehandled back underground.

Additional, permanent WRSFs for potentially-AML waste rock will be constructed to accommodate approximately 100,000 tonnes at locations on top of constructed benches of the waste rock disposal area in accordance with the approved engineered designs.

During operations, all waste rock will be immediately classified and moved to the appropriate disposal area or storage facility depending on type, thereby negating the need for a temporary waste rock classification area.

1.4.9 Waste Rock Screening

Samples for both field screening and compositing for further geochemical and ABA confirmatory testwork are collected using the Face Sampling Method, which is used in all new mine working developments. This method was proposed in Section 2.5.1 of the Project Proposal for the Bellekeno Advanced Underground Exploration and Development Program, assessed under YESAB project number 2008-0039 and has been subsequently refined and put into practice over the 2008 season. This method ensures accurate, representative characterization of each blast round and allows field screening tests to be performed in a timely manner so that waste rock can be most efficiently treated according to the waste rock management categories (Table 2).

1.4.10 Face Sampling Method

The Face Sampling Method (summarized in Figure 5) has been developed into the following procedure:

First, the site geologist marks up the heading and center line of the development drive. The geologist demarks the side walls and back heights to be taken, then assesses the rock face by spray painting the boundaries between each lithology and paints the sample number of each lithology on the face. Next, the geologist makes a pencil sketch and takes a photograph of the face. The geologist then samples each lithology and visually estimates each lithology/sample for sulphide and carbonate content and records the data on the Face Sampling Form (see Figure 6).

After being collected, the samples then are taken to the geology field laboratory located at Bellekeno 625 where they are dried using a convection dryer, then crushed and pulverized by a geologist or lab technician. The pulverized samples are subjected to a fizz rating test and paste pH measurement.

Fig 6-10

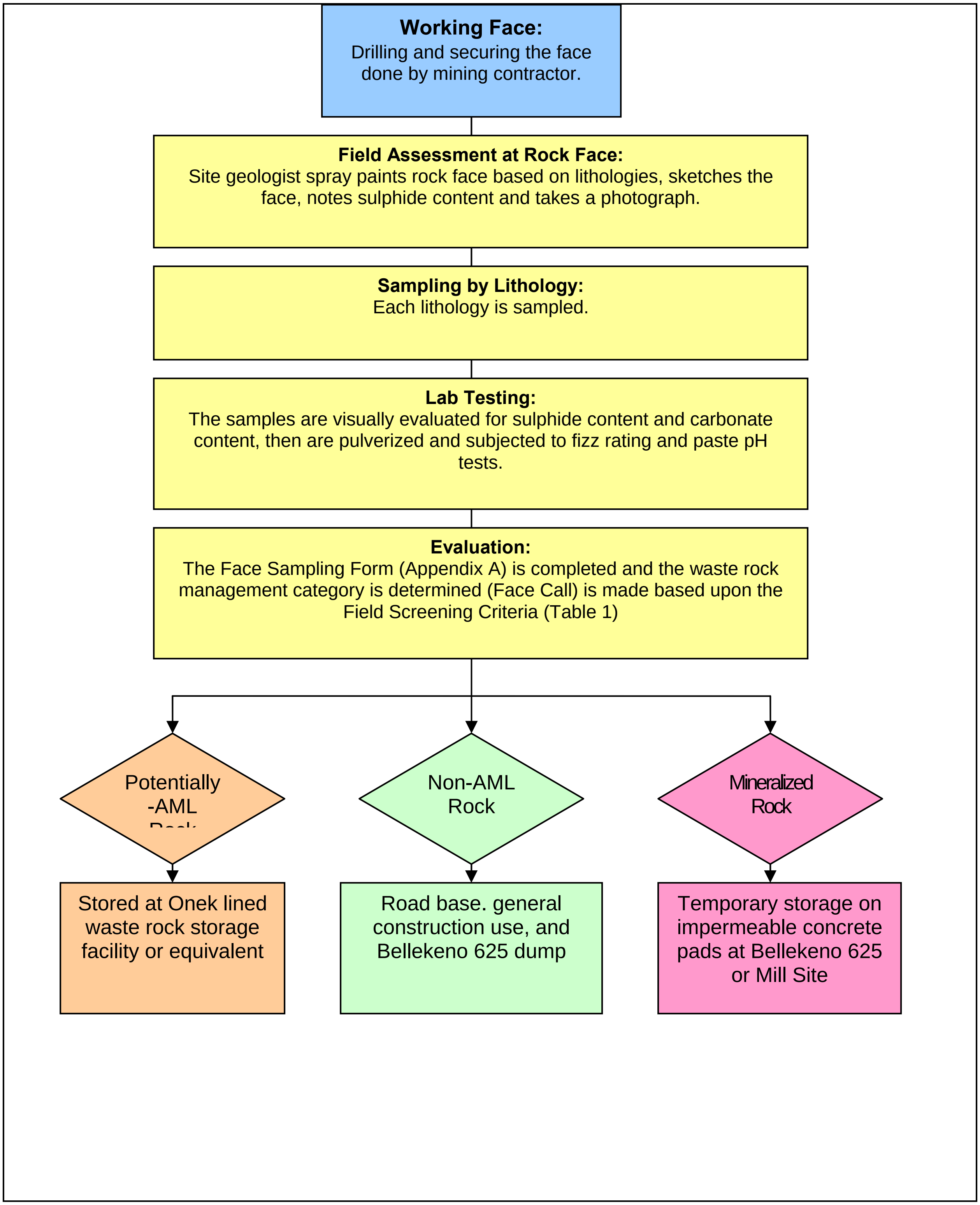

Working Face:
Drilling and securing the face done by mining contractor.
Field Assessment at Rock Face:
Site geologist spray paints rock face based on lithologies, sketches the face, notes sulphide content and takes a photograph.
Sampling by Lithology:
Each lithology is sampled.
Lab Testing:
The samples are visually evaluated for sulphide content and carbonate content, then are pulverized and subjected to fizz rating and paste pH tests.
Evaluation:
The Face Sampling Form (Appendix A) is completed and the waste rock management category is determined (Face Call) is made based upon the Field Screening Criteria (Table 1)
Potentially -AML
Non-AML Rock
Mineralized Rock
Stored at Onek lined waste rock storage facility or equivalent
Road base. general construction use, and Bellekeno 625 dump
Temporary storage on impermeable concrete pads at Bellekeno 625 or Mill Site

Figure 6 Example of Face Sampling Form

ALEXCO RESOURCE CORP. KENO HILL PROJECT
FACE SAMLPING FORM

Mine: BK 625 Geologist: T.M / M.W. Date: 28-Oct-08

Development: SW B-PASS 625 Production: Waste Sample Type: CHIP

Face Location	Spad #	Dist. (m)	Direction	Face Dimensions	Width (m)	Height (m)	Length (m)
	P27	7.3m	SW		2.4	2.4	

Face Name: P27-SW-7.3m

		Lab Testing		Visual Estimate				
Sample#	Primary Lithology	Paste pH	Fizz Rating	%Pyrite	%Sphal.	%Galena	%CaCO3	Area(m²)
E607498	CQTZT	9.65	4	0	0	0	>0.75	2.48
499	GSCH 50%, CQTZT 50%	9.11	4	0.25	0	0	>0.75	0.80
500	CQTZT	9.56	4	0	0	0	>0.75	3.04

Notes: FAULT ON L.H.S. SINISTRAL OFFSET - 0.35 m. 15cm THICK GOUGE ALONG FAULT. MUCK AS ROAD BASE
CQTZT units both have strongly developed jointsets w/ mod-heavy limonite staining. No visible Py on freshly broken CQTZT. Minor Py in GSCH band.

ABA Classification:

1

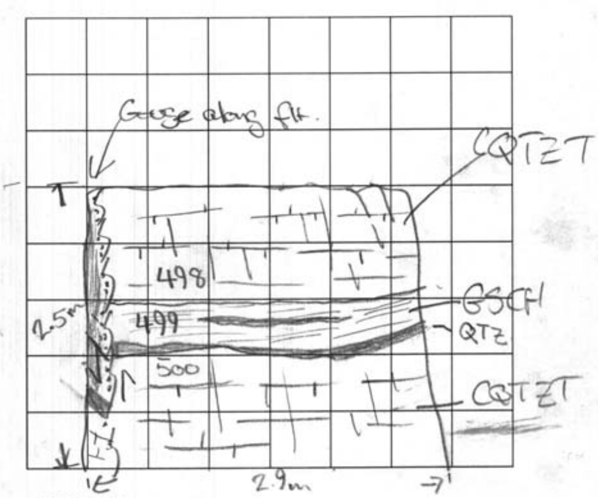


PHOTO ID:

1.4.11 Evaluation and AML/non-AML Designation

The results of all screening criteria are evaluated according to the criteria presented in Section 1.4.1 and summarized in Table 2, and the entire round is designated to the appropriate waste rock management category (more commonly referred to as the "face call" or ABA classification, with 1 being non-AML, 2 being potentially-AML). A special case may occur when a given blast round contains a complex mixture of lithologies including both non-AML and potentially-AML units. If overall less than 30% of the working face is deemed as potentially-AML, and the remainder of the face consists of rock with a high neutralization potential (such as calcareous quartzite), the geologist *may* assign the entire blast round as non-AML. The rationale here is that upon blasting and transport, the rocks from all units are mixed and the small portion of potentially-AML rocks would be overwhelmed by the net neutralizing potential non-AML units, and bulk chemistry of the round would be non-AML. As an example, consider the following 240 tonne blast round which contains 30% graphitic schist (1.75% S, 1% Ca) intercalated with 70% calcareous quartzite (0.25% S, 2.8% Ca). This is an extreme example, as 1.75% sulfur is well above the 95th percentile for graphite schist analyses presented in the *Geoenvironmental Characterization, Bellekeno* in Attachment B. In contrast, Ca = 2.8% for the calcareous quartzite is the *average* value of calcareous quartzite samples from analyses used in Attachment B. Thus, upon blasting and transport the 240-tonne muck pile of mixed lithology has a bulk chemical composition of the following:

For Sulfur	1.75%*0.3	For Ca	1%*0.3
	+0.25%*0.7		+2.8%*0.7
	0.7%		2.26%

The bulk composition of this blast round falls well within the non-AML criteria of having S ≤ 1.5% and Ca ≥ 0.75%. Translating the geochemical data into the more industry standard NP:MPA ratio using the relationship derived in the Geoenvironmental Characterization, Bellekeno (Attachment B), NP = 25.76[%Ca] + 7.537 and MPA = %S*31.25. Using these relationships, the preceding example would have a NP:MPA ratio of 3.0, which meets the 3:1 ratio above which samples are inferred to be unlikely to produce net acidity with no further testwork or study.

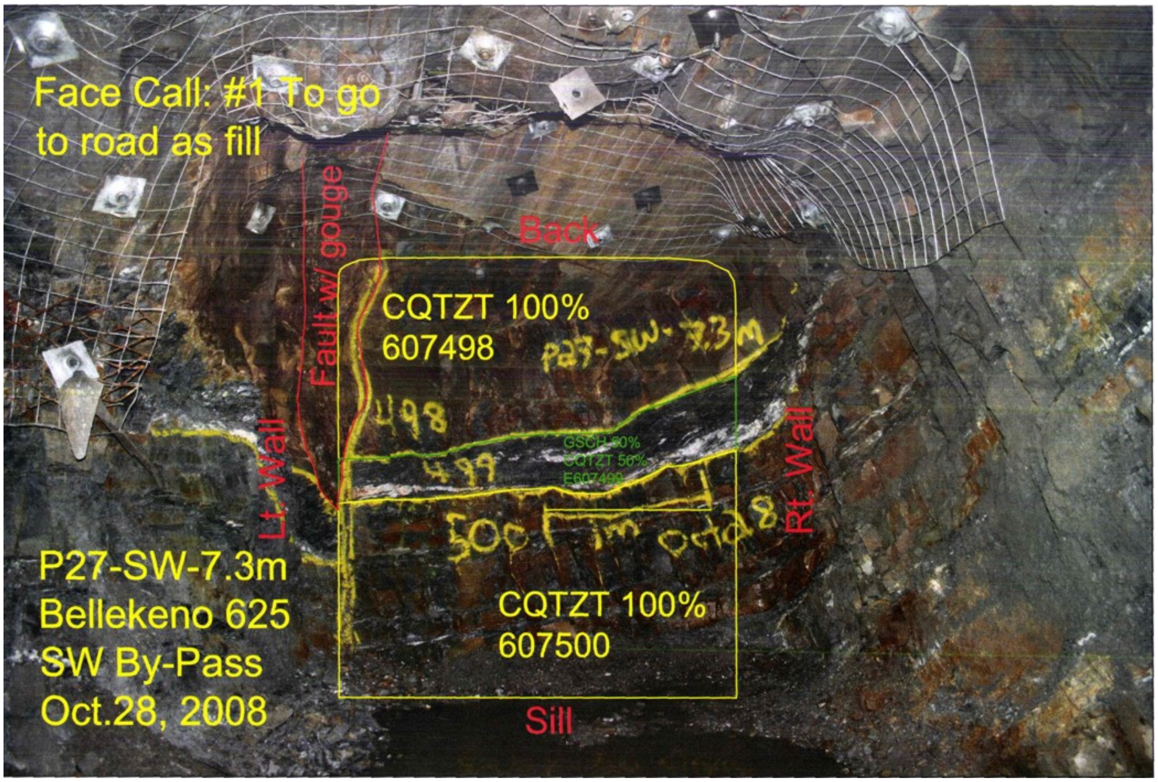
Some discretionary decisions on the part of the geologist are necessary; for example in a case of 20% of the working face comprised of a highly sulphidic zone in an otherwise benign working face, the geologist may opt to designate the entire round as AML due to the high concentration of AML potential in a small zone. It is also important to note that this scenario in which the blast face contains up to 30% potentially-AML rock is relatively uncommon, and in all cases, testing and determination is made on a conservative basis, meaning that the site geologist will only allow these potentially-AML containing blast rounds to be classified as non-AML if the remainder of the blast face is determined to have ample neutralization potential.

1.4.12 Confirmatory Geochemical and ABA Testing

Geochemical and ABA testing of waste rock forms an important component of the waste rock management program. The purpose of this testing is to provide additional verification of the effectiveness of the field screening criteria.

After initial field screening, samples are composited to ensure that they are representative of the blast rounds from which they are taken. First, samples from each face are combined based on their respective tonnages, which are calculated based on their areas on the digitized face photo (see Figure 7). These areas are multiplied by the length of the blast round to produce volumes. The volumes are then multiplied by average density according to their lithology to produce the tonnage represented by each sample. Sample composites are first made of each blast round (face), and are weighted according to their calculated tonnages. Additional compositing is done on these composite blast round samples depending on the analytical method and schedule, which is presented below. Where a number of blast rounds are composited, they are weighted to reflect the tonnage of each respective round.

Figure 7 Face Photo of Bellekeno 625 By-Pass Showing Sampling According to Lithology and Calculated Sample Areas



1.4.13 Confirmatory Testing Sampling Frequency and Schedule

Acid base accounting (ABA) and inductively coupled plasma (ICP) sampling frequencies are done at a minimum of 1 ABA sample per 10,000 tonnes and 1 ICP analysis per 1,000 tonnes in non-AML waste rock. In potentially-AML waste rock, the sampling density is increased to 1 ABA sample per 2,000 tonnes and 1 ICP analysis per 500 tonnes. These frequencies were proposed in the Bellekeno Advanced Underground Exploration and Development Program project proposal, and confirmed by Water Licence QZ07-078.

1.4.14 ICP Sampling Frequency

While meeting per tonnage sampling frequency, the more natural sampling unit is based on number of blast rounds (each represented by a face sample composite). This tonnage depends on several variables including the length of the round, the dimension of the heading, and whether or not there is overblast. In the current most active heading (Bellekeno East), ICP sampling has been based upon 3 blast rounds per sample. As of October 8, 2008, the average sample size for the Bellekeno East ICP 3 round composite samples (all non-AML) has been 722.54 tonnes, which is well below the 1,000 tonne maximum for non-AML waste rock. In all headings where ICP sampling frequency is based on number of blast rounds, the sampling will fall within the per tonnage frequency committed to in Section 6.2.4.13. See Table 5 for a proposed sampling schedule in both non-AML and potentially-AML waste rock.

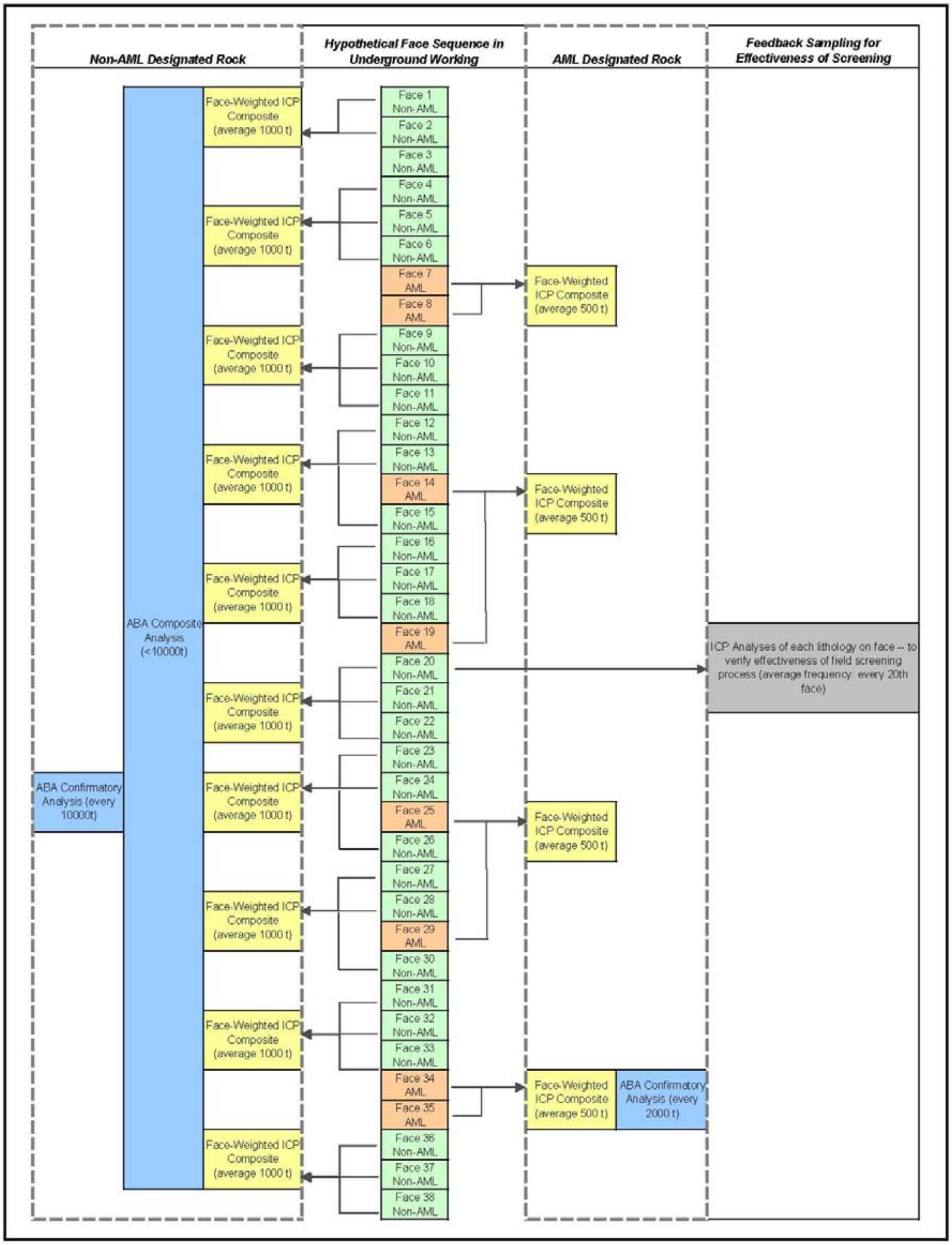
1.4.14.1 ICP Feedback Sampling for Field Screening Methods

In addition to routine, per tonnage frequency ICP composites described in 6.2.3.1, ICP samples will be analyzed for each sample of every 20th face. These results will be used as a feedback for the Face Sampling Method described in Section 6.2.4.10. The need for this provision will likely diminish after a reasonable data set is gathered.

1.4.14.2 ABA Sampling Frequency

Similar to ICP sample composites, ABA sampling will be composited based on the number of blast rounds and in accordance with per tonnage limits in order to be representative of the tonnage as a whole. With respect to the current Bellekeno East decline development, this amounts to approximately 40 blast rounds based on the average result of 240 tonnes per round. Figure 8offers a more conservative approximation of 1 composite ABA sample per 37 blast rounds based upon a 4.6 x 4.6 meter heading. In addition to an ABA composite over the entire tonnage, an additional smaller composite over less than 1,000 tonnes will be taken within each 10,000 tonne composite. This provision is made as an additional check to test for anomalous rock which might otherwise be missed in the large composite sample. Bellekeno underground develop during development and production will involve headings of a variety of sizes (2x2, 3x3 and 4x4 meters) but the general principle of 1 composite ABA sample per 10,000 tonnes and 1 ~ 500 tonne composite will be taken regardless of blast round size.

Fig 6-13


Non-AML Designated Rock
Hypothetical Face Sequence in Underground Working
AML Designated Rock
Feedback Sampling for Effectiveness of Screening
Face-Weighted ICP Composite (average 1000 t)
ABA Composite Analysis (<10000t)
ABA Confirmatory Analysis (every 10000t)
Face 1 Non-AML
Face 2 Non-AML
Face 3 Non-AML
Face 4 Non-AML
Face 5 Non-AML
Face 6 Non-AML
Face 7 AML
Face 8 AML
Face 9 Non-AML
Face 10 Non-AML
Face 11 Non-AML
Face 12 Non-AML
Face 13 Non-AML
Face 14 AML
Face 15 Non-AML
Face 16 Non-AML
Face 17 Non-AML
Face 18 Non-AML
Face 19 AML
Face 20 Non-AML
Face 21 Non-AML
Face 22 Non-AML
Face 23 Non-AML
Face 24 Non-AML
Face 25 AML
Face 26 Non-AML
Face 27 Non-AML
Face 28 Non-AML
Face 29 AML
Face 30 Non-AML
Face 31 Non-AML
Face 32 Non-AML
Face 33 Non-AML
Face 34 AML
Face 35 AML
Face 36 Non-AML
Face 37 Non-AML
Face 38 Non-AML
Face-Weighted ICP Composite (average 500 t)
ABA Confirmatory Analysis (every 2000 t)
ICP Analyses of each lithology on face -- to verify effectiveness of field screening process (average frequency: every 20th face)

It is important to note that the above criteria represents a high sample density. This is in large part driven by the fact that the proposed work is the first rock excavation activity in the district under Alexco's management, and as such it is important to conduct relatively detailed monitoring to develop a sound information base for decision-making and enhancements to future waste rock management strategies. As the understanding increases, such a high sample density will likely no longer be justified.

1.4.15 Time Lag

1.4.15.1 Time Lag between Excavation and Sampling

The time between blasting and exposure of a new face to sampling and the Face Call (waste rock management category designation) for a given round shall not exceed 48 hours; notwithstanding unforeseen and extenuating circumstances such as breakdown of analytical or lab equipment.

1.4.15.2 Time Lag between Excavation and Receipt of Analytical Data

The total time between excavation and receipt of analytical data is dependent on a number of factors. First, the size of the composite sample being tested can extend the length of time between excavation and receipt of data especially for individual blast rounds near the beginning of the composite sample. For example, at a rate of development of two blast rounds per day at approximately 240 tonnes per round would take 21 days to accumulate the rock required to complete a composite ABA sample of 10,000 tonnes. Second, standard laboratory practices for individual analytical packages take varying amounts of time for completion (e.g. ABA analysis takes longer than ICP). In spite of these uncertainties we are able to suggest the following limits of time lag between excavation and receipt of analytical data for ABA and ICP analysis data.

1.4.15.2.1. 1 Time Lag between Excavation and Receipt of ICP Data

The time between blasting and exposure of a new face to receipt of ICP analytical data shall not exceed two months; notwithstanding extenuating circumstances such as breakdown of lab equipment or delays at the analytical laboratory.

1.4.15.2.2 Time Lag between Excavation and Receipt of ABA Data

The time between blasting and exposure of a new face to receipt of ABA analytical data shall not exceed three months; notwithstanding extenuating circumstances such as breakdown of lab equipment, or delays at the analytical laboratory.

1.4.16 Mine Wall Testing

Monitoring in both the excavated areas and the rock storage areas forms an integral and vital component of any waste rock management program, as it determines the effectiveness of the management measures and provides valuable information for waste rock management strategies of future developments and closure measures. Mine wall testing at during the Bellekeno Mine Development will provide additional confirmation of the geochemical character mine walls through multi-element and acid-base accounting analysis.

1.4.17 Mine Wall Sampling for ICP and ABA Analysis

The mine walls will be sampled according to the per meter basis set out in the Bellekeno Advanced Underground Exploration and Development Program Project Proposal and confirmed in Water Licence QZ07-078. On average, one geochemical sample will be taken for each 10 lineal metres of underground working for analysis by routine multi-element ICP, including sulphur. Also on average, one acid base accounting sample will be taken for each 40 lineal metres of workings. The specific sampling method will be determined by the site geologist in order to obtain the most representative result. This provision is necessary because of the lithological complexity of the Keno Hill area and the tendency of ABA and geochemical characteristics of the rocks to vary widely between each lithological unit. Thus the sampling method must vary depending on the direction of the heading and how it cuts the metamorphic layering. For example, a drift or heading which cuts across the lithological layering might be most representatively sampled by doing a continuous chip sampling along the mine working. In a heading which parallels the lithological layering, the most representative sampling method might be vertical rib samples. With each sample taken, details of the sampling method used will be duly recorded. Table 5 shows a hypothetical mine wall sampling schedule.

ICP sample up to 10 m continuous sample	
ICP sample up to 10 m continuous sample	
ICP sample up to 10 m continuous sample	
ICP sample up to 10 m continuous sample	ABA sample over same interval
ICP sample up to 10 m continuous sample	
ICP sample up to 10 m continuous sample	
ICP sample up to 10 m continuous sample	
ICP sample up to 10 m continuous sample	ABA sample over same interval
ICP sample up to 10 m continuous sample	
ICP sample up to 10 m continuous sample	
ICP sample up to 10 m continuous sample	
ICP sample up to 10 m continuous sample	ABA sample over same interval
ICP sample up to 10 m continuous sample	
ICP sample up to 10 m continuous sample	
ICP sample up to 10 m continuous sample	
ICP sample up to 10 m continuous sample	ABA sample over same interval

Table 5 Mine Wall Sampling Schedule

1.4.17.1 ICP samples sizes for mine wall testing

Although the specific sample method will depend on the mine heading, ICP sampling will be composited to a maximum of 10 m per sample.

1.4.17.2 ABA samples sizes for mine wall testing

Although the specific sample method will depend on the mine heading, ABA sampling will be composited to a maximum of 10 m per sample, and will duplicate every fourth ICP sample as confirmatory to the ICP sampling.

1.4.18 **Time Lag**

The confirmatory geochemical and ABA testing plan attempts to minimize the time lag between excavation of waste rock and receipt of analytical results. In contrast, a greater time lag between exposure of mine walls and sampling is deliberately pursued for this Mine Wall Testing Plan. The purpose for this is to allow for some natural oxidation and weathering to take place on the exposed rock in order to gain insight into possible changes in chemical or ABA characteristics of mine walls over time. This plan is designed to give the longest possible time lag between excavation and sampling while meeting the requirement of Section 25.c of Water Licence QZ07-078: "*at a minimum, the annual testing completed will be representative of all new excavation during that given year*".

1.4.18.1 Time Lag between Excavation and Sampling

The time lag between excavation and sampling will be no less than six months and no more than nine months.

1.4.18.2 Time Lag between Excavation and Receipt of Analytical Data

Time lag between excavation and receipt of analytical data will not exceed one year; notwithstanding major delays caused by breakdown of lab equipment or delays at the analytical lab.

1.4.19 Analytical Methods

Samples for both confirmatory testing and mine wall sampling will submitted to a certified laboratory and will be analysed according to the following protocols.

1.4.19.1 ICP Analyses

Samples submitted for ICP analysis will be pulverized and analysed for multi-elements via ICP-AES using either aqua regia, 4-acid, or strong acid digestion. Sulphur will be included in the analytical suite.

1.4.19.2 ABA Analyses

Samples submitted for acid base accounting will be pulverized and analysed via modified acid base accounting methods, including total sulphur via Leco furnace, sulphate via either sodium carbonate leach or HCl digestion, neutralization potential via modified method, total inorganic carbon, and paste pH at a 1:1 solids to water ratio conducted at a certified laboratory.

1.4.20 Waste Rock Monitoring

Programs for ongoing physical and water quality surveillance of waste rock storage facilities through inspections and drainage monitoring have been established as part of the Advanced Exploration Program. Physical surveillance of waste rock storage areas will occur on a weekly basis at the following locations:

- Onek lined potentially-AML waste rock storage facility or equivalents;
- All non-AML waste rock disposal areas including roads between Bellekeno East Portal and Bellekeno 625, the ‘power line road’ that runs along the north slope of Sourdough Hill, above the left limit of Lightning Creek, and the proposed waste rock storage area, and other locations where it is used as fill or construction material.

1.4.21 Physical Inspection Methods

The purpose of the physical inspection is to observe and record sufficient information to permit development of a course of action; repair or rehabilitation if it is required. Specifically:

- physical stability such as settling and excessive erosion (tension cracks, bulges at the toe; on waste rock road surfaces, washouts, rutting and culvert seating);
- evidence of permafrost degradation in any areas of physical disturbance;
- evidence of sulphide oxidation (such as snow melt areas, presence of oxidation products); and
- occurrence of drainage or seeps from rock storage areas. If drainage is noted, flow volume will be estimated and basic field parameters of pH and conductivity recorded. More detailed monitoring will be initiated as required and based on specific results if field monitoring results indicate:
  i. pH significantly declining between measurements or dropping below 7.0, and/or
  ii. conductivity showing a significant increasing trend or conductivity above 2000 µS/cm.

Inspection checklists will be filled out on a weekly basis to ensure structural integrity of mine components and that runoff and discharge is being appropriately managed. The following rating system will be used in the field reporting to evaluate the structural integrity of the areas to be physically inspected:

Excellent	"As New" Condition.
Good	System or element is sound and performing its function; although it shows signs of use and may require some minor repairs, mostly routine.
Fair	System or element is still performing adequately at this time, but needs "priority" and/or "routine" repair to prevent future deterioration and to restore it to good condition. A fair rating will be reported to site manager after the inspection.

Poor System or element cannot be relied upon to continue to perform its original function without "immediate" and/or "priority" repairs. A poor rating will be reported to site manager after the inspection.

If issues are identified during the weekly inspections of waste rock storage areas, the site manager will be informed immediately and the appropriate mitigative measures will be implemented. An inspection by a qualified geotechnical engineer would be undertaken for physical stability if necessary. Additional erosion and sediment controls may need to be implemented as required. Appropriate mitigative measures will be implemented should acidic or metal rich drainage be detected in order to prevent adverse impacts to receiving waters.

If geotechnical inspections are required, they will be carried out during the summer months when the surface and sides of the various rock-fill structures are not obscured by snow.

The lined potentially-AML storage pad areas at Bellekeno 625 will be monitored for drainage volume with field parameters (pH and conductivity) measured on a monthly basis from May to October. Providing there is sufficient water accumulation, a full suite of water quality analyses will be conducted at least twice per year. The sumps will be monitored monthly using a Heron Instruments Dipper-T probe to determine the accumulation amount of water within the storage facility. Periodically, water will be directed to Bellekeno 625 or the Flame and Moth Mill for discharge or treatment prior to discharge if required. Water from any additional potentially-AML waste rock storage facilities will be treated in the same way. Upon closure, these facilities will be covered with an impermeable liner and will not require ongoing maintenance.

1.4.22 Adaptive Management

In addition to measures described above, an Adaptive Management Plan (AMP) will be prepared for the entire development. Alexco has recently updated the AMP for both Care and Maintenance and Advanced Underground Exploration and will update the AMP again to include the scope of operations and mine production to ensure consistency with site wide AMP. This AMP would be a component of the site wide AMP.

1.4.23 Reporting

Documentation of waste rock management activities including operational field screening and segregation and ongoing geochemical monitoring and analyses will be compiled and included in the annual mining land use and water licence annual report.

1.4.24 Closure and Reclamation

Plans for potentially-AML and non-AML waste rock facilities reclamation and closure will be submitted in a Reclamation and Closure Plan, to be submitted in accordance with paragraph 5.1(b) of QML-0009.

1.4.24.1 Waste Rock Management Activities

Proposed waste rock management practices were outlined in the Project Proposal submitted to Yukon Environmental and Socio-Economic Assessment Board (YESAB) on February 6, 2008 in Section 2.5.1, the Waste Rock Management Plan of the Project Proposal and in the Waste Rock Metals and Acid Base Accounting Testing Plan submitted to Yukon Water Board and Government of Yukon, Mining Land Use Department, under Sections 24 and 25 of Water Licence QZ07-078. These guidelines have been successfully put into practice in managing waste rock from Bellekeno East Portal, Bellekeno 625, and other minor underground development headings. This plan augments those presented in the Project Proposal and Water Use License QZ07-078 by reviewing the effectiveness of the current plan.

This Waste Rock Testing Plan Summary will fulfill the following objectives:

- Review the method and effectiveness in which waste rock is sampled and classified using field screening criteria;
- Review all waste rock management data collected to date from the Bellekeno Advanced Stage Underground Development;

- Review the sampling schedule for both ICP and ABA analyses based on a per tonnage basis

1.4.24.2 Bellekeno Underground Development 2008/2009

Underground development at Bellekeno commenced in July of 2008 and continued until April 2009, with the completion of the two major development headings, Bellekeno East Decline and 625 By-pass in December and November 2008 respectively. An estimated total 1000m of development consisting of 719 samples has been excavated and screened using criteria set out in the Waste Rock Management Plan. Figure 9 shows a plan view map of the location of all 2008/2009 development. See Attachment C for raw data.

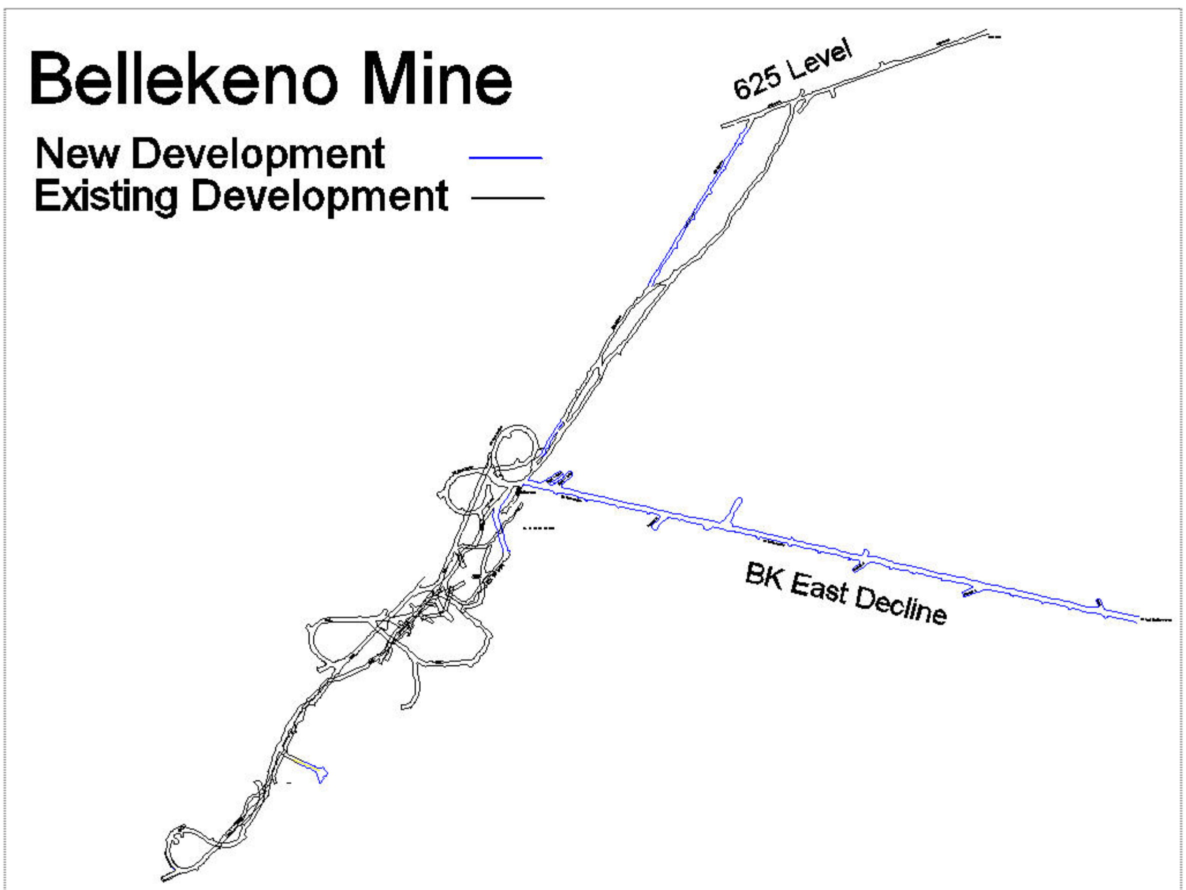


Figure 9 Plan View Showing New Development in the Bellekeno Mine

1.4.24.3 Results

The ARD/ML sampling program has been highly effective but very conservative at recognizing material classified as P-AML rock to date. The field classification is based on essentially two independent variables, the CaCO3 vs. pyrite ratio as a proxy for acid base accounting and the quantity of various sulphides such as sphalerite and galena for metal leaching potential predictability.

1.4.24.4 $CaCO_3$ Prediction

Estimating carbonate has proven extremely difficult in cases where material does not readily react to HCl. An examination of both ALS Chemex ABA Fizz Rating and the correlating $Ca\%_{modified}$ show a wide spread of Ca% values for Fizz Rating recorded and no direct correlation other than the high Ca% outliers all fell into the Fizz Rating 4 group (see Figure 10). Using this data, the Fizz Rating test does not seem to effectively estimate the $CaCO_3$. Back calculation of the ABA sample composite data gives an average Ca% in the form of $CaCO_3$ of 2.23%. Only one composite sample analyzed using ABA had a value of $Ca\%_{modified}$ under the 0.75% (E607369) and this had a S% of 0.22% and a NP:MPA ratio of 4.36, well above the minimum ratio for N-PAML.

Paste pH results in both the initial field screening and in composite ABA testing has not show any correlation between NP:MPA, Ca%, or S%. All values have been significantly higher than the minimum of pH=6.0 for designation as P-AML with an average of 8.37 (Figure 11).

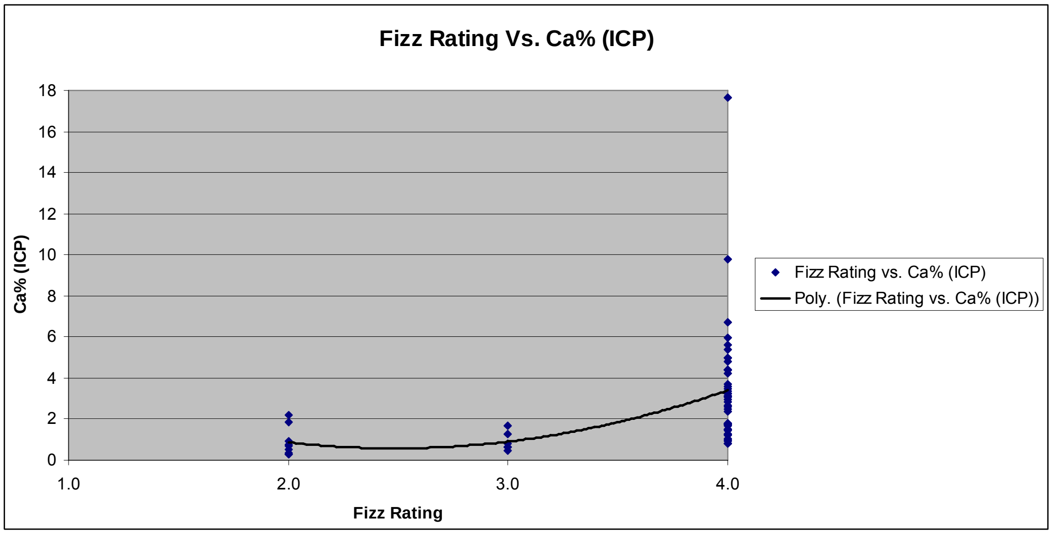


Figure 10 Showing distribution of Ca% in relation to Fizz Rating

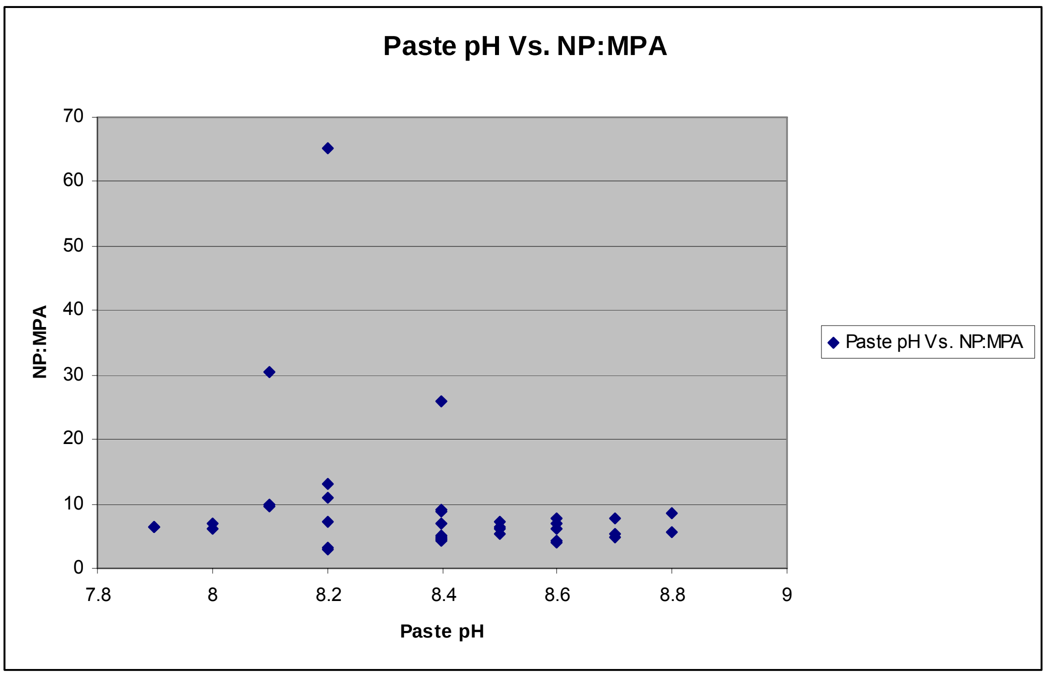


Figure 11 Distribution of Paste pH to NP:MPA ratio

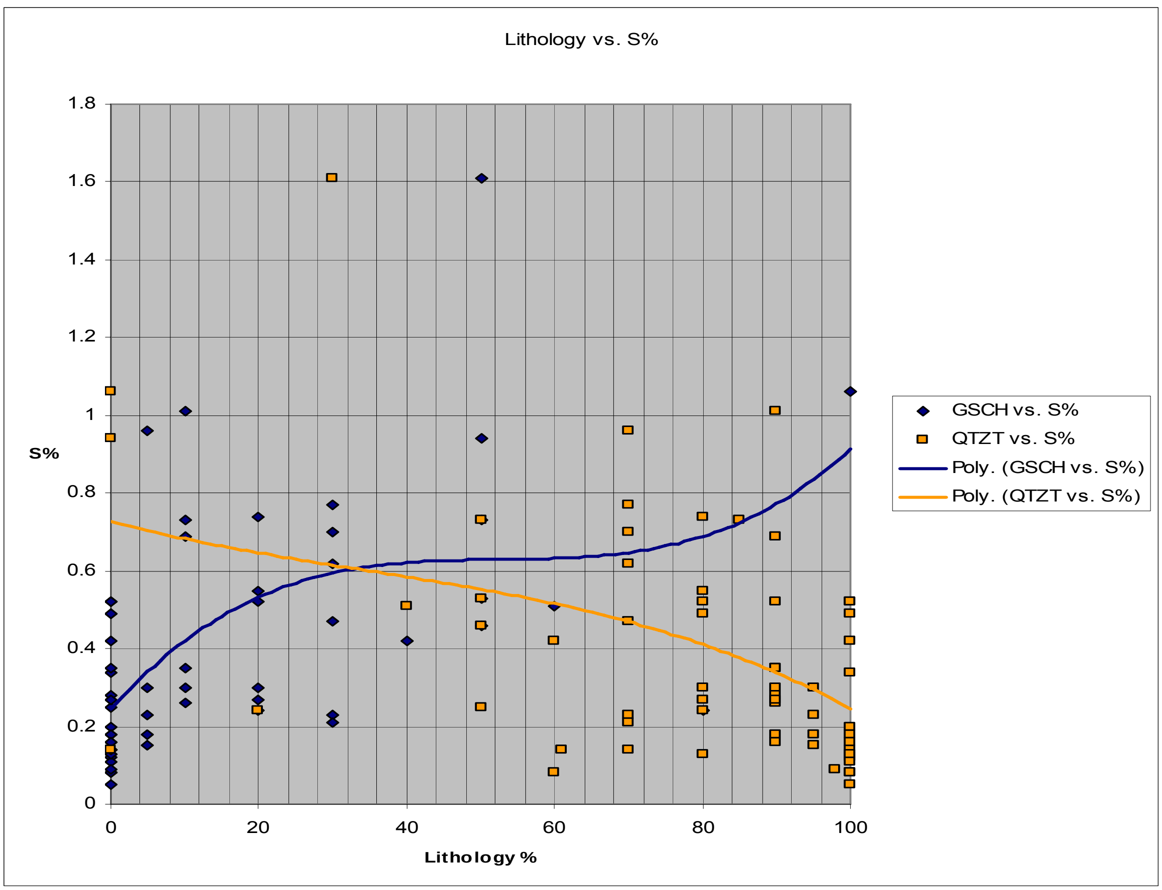
Analysis of Lithology Verification ICP shows no correlation between $Ca\%_{ICP}$ and lithology type.

In general, any reactivity of carbonates with HCl throughout the field screening process has acted as a reasonable lower limit (Ca% <0.75%) for making waste rock designation calls.

1.4.24.5 Pyrite Prediction

The dominant form of sulphide in the excavated material encountered has been Pyrite. Data collected from Lithology Verification samples show a broad trend of sulphide mineralization with Graphitic Schist content and an inverse relationship between sulphide mineralization and QTZT content (Figure 12). In general, recognition of elevated pyrite content during the field screening has been effective but conservative.

Figure 12 Correlation between Lithology and S%

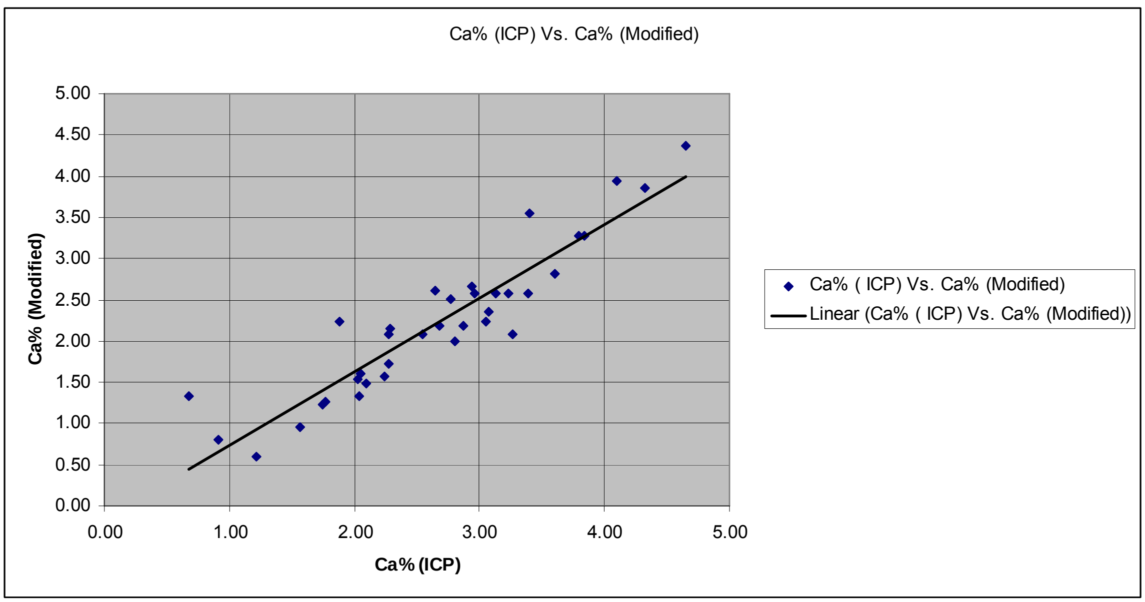


1.4.24.6 ICP Geochemical Screening

ICP geochemical screening has shown that no samples encountered to date have exceeded the maximum values of 5000ppm for both Pb and Zn. Maximum levels encountered during development excluding the Mineralized Vein zones is Pb 558ppm and Zn 1125ppm.

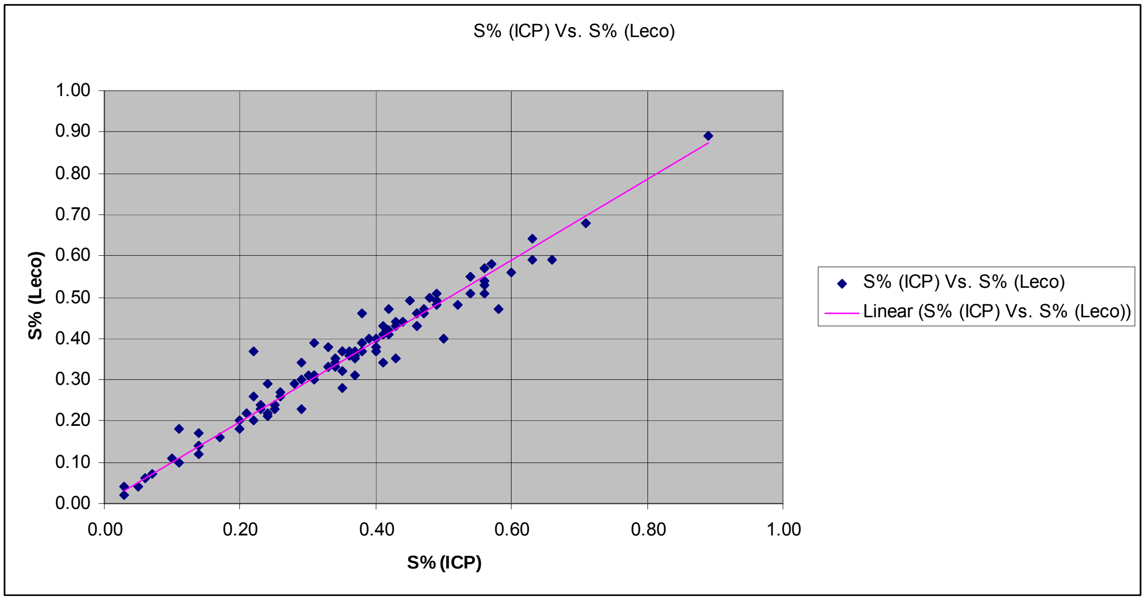
There is a large discrepancy between $Ca\%_{ICP}$ and $Ca\%_{modified}$. The difference is, on average, 0.44% Ca lower (20%) for the modified than the ICP data from the same sample making $Ca\%_{ICP}$ an unreliable proxy for NNP (net neutralizing potential) (Figure 13). The values for Ca obtained from ICP represent total Ca, not the Ca% in the form of $CaCO_3$.

Figure 13 Showing Correlation between Ca% obtained from ICP and ABA



Sulphide estimation using ICP shows a good correlation to Leco furnace with an average difference of 0.0036% in S for 97 samples (see Figure 14).

Figure 14 Showing Good Correlation between S5 Obtained from ICP and Leco Furnace



In general, ICP data has shown that all of the waste rock encountered has extremely low potential for metal leaching of Pb and Zn using the geochemical criteria as outlined in the Bellekeno Underground Waste Rock Management Testing Plan.

1.4.24.7 Acid Base Accounting

Using the Modified ABA analysis, all composite samples to date show no potential for acid rock drainage generation. All samples analyzed have had a NP:MPA ratio greater than 3.

1.4.24.8 Tonnages

Table 6 summarizes the breakdown of waste rock excavated during the Advanced Underground Exploration and Development Program during 2008/2009. The graph below (Figure 15) shows the amount of material classified as Non-AML and P-AML by field screening. Table 6 indicates that 95.3% of current excavated rock is non-AML rock. Material "Daylighted" is material brought to surface and stored at temporary PAG pad at Bellekeno East. The second pie chart (Figure 16) shows that of all the material brought to surface and stored as PAG, only 24% was confirmed by lab analysis as P-AML.

A smaller portion of waste rock was stored underground as P-AML and will stay underground. This material was sampled but not sent out for lab analysis because it was never brought to surface. All water that comes in contact with this material is treated during mine discharge at the Bellekeno 625 treatment site. (Should the need arise to surface this material, all samples have been crushed and prepped, they would only have to be shipped out for lab confirmation before moving material)

Figure 15 Breakdown of Waste Rock Classification from field screening

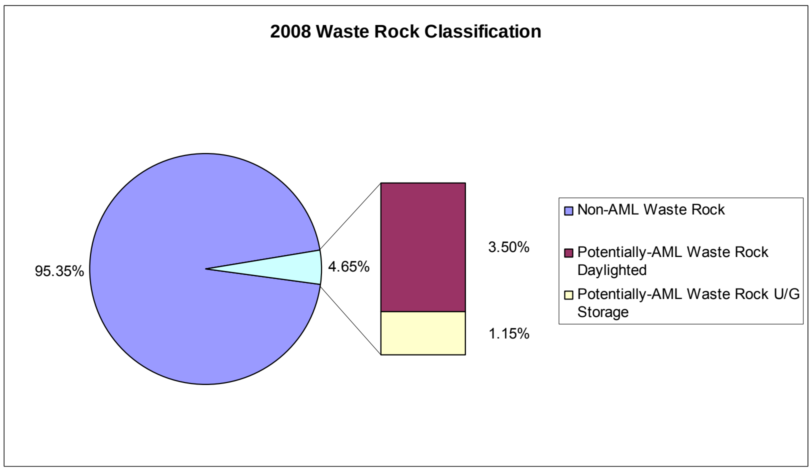
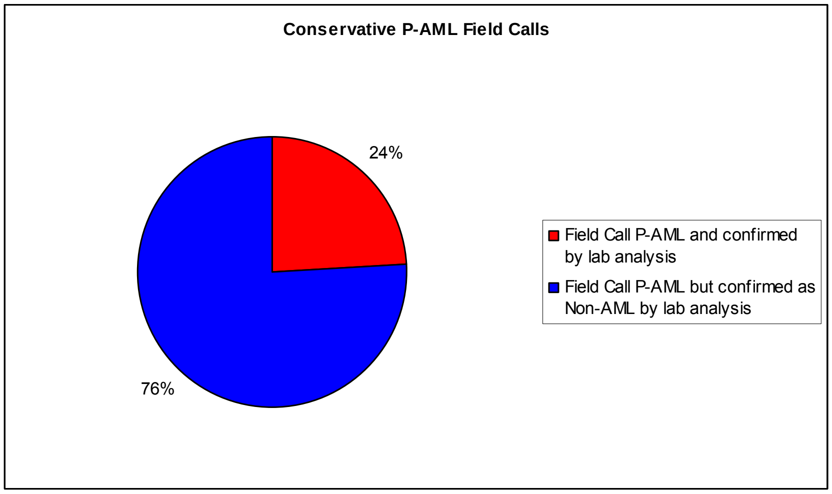


Table 6 Breakdown of Currently Excavated Material and Classification

Rock Classification	Tonnes	Percent
Non-AML Waste Rock	45880.7	95.35%
Potentially-AML Waste Rock (Field screening classified)	2236.8	4.65%
Potentially-AML Waste Rock Daylighted	1682.7	3.50%
Potentially-AML Waste Rock U/G Storage	554.1	1.15%
Total Excavated Rock	48117.5	100.00%

Figure 16 Total Field Screening P-AML Calls and Proportion Confirmed by Lab Analysis



1.4.24.9 ICP/ABA Composite Sampling Schedule

In review of the proposed sampling schedule that has been put into practice for the Bellekeno Waste Rock Management Plan, the effectiveness and usefulness of data collected based on the current sampling schedule is currently being re-visited. The geochemical analysis of the 10,000 tonne composite has not proven to be useful in evaluating the rock characteristics of material excavated due to its large representative size. ICP data from the 1000 tonne composite alone has also had very limited value in the assessment of AML potential. The effectiveness of the field screening process in identifying specifically Pb and Zn has proven more than adequate for the limits set out in the Bellekeno WRMP. The only geochemical data obtained from ICP to date which has effectively screened for P-AML material has been S_{ICP}%, which on its own, is only good for screening excavated material with S_{ICP} > 1.5%. This has only been encountered in one sample analyzed, which was a Lithological Verification sample consisting 10.4 tonnes of a 141.9 tonne blasted round (7% of the round).

Amendments to the Waste Rock Management Plan sampling schedule are expected at a future date to maximize its effectiveness.

1.4.24.10 Mine Wall Testing Activities

Sampling of the Bellekeno mine wall rock has been conducted every 10m of lineal development completed within the last 6-9 months. Samples were collected as linear chip samples across the foliation of the mine wall rock, so as to get a representative sample of the overall wall rock characteristics. A total of 93 chip samples were collected from 4 different development headings. These samples are being analyzed for multi element ICP and acid base accounting as outlined in sample schedule 6.1.4.15.1. All samples will be analyzed by ALS Chemex Laboratories in Vancouver, B.C.

1.4.24.11 Data

All samples have been collected to date, but no ICP/ABA results are available as of yet.

Field Screening Data

Data from a total of 719 samples representing an estimated total of 48,400 tonnes of excavated material was collected throughout the field screening process. The average Fizz Rating recorded is 3.58 and the average pH of the entire data set is 8.71.

Lithology Verification ICP Data

Data obtained from a total of 61 Lithology Verification samples representing an estimated total of 3,700 tonnes of excavated material was collected for geochemical verification of field screening effectiveness. This represents 7% of the total excavated material. The average Fizz Rating recorded is 3.61 and the average pH of the data set was 8.60. The average Pb, Zn, and S levels are 24ppm, 74ppm and 0.39% respectively.

ICP and ABA Composite Data

Data obtained from a total of 109 ICP composites of which 36 were also analyzed for ABA was collected for evaluating geochemical characteristics of excavated material. The average Pb, Zn, and S levels are 41ppm, 115ppm, and 0.36% respectively. The average NP:MPA ratio for the 36 ABA composites is 9.39 with an average pH of 8.38.

ATTACHMENT A

To: Dan Cornett, Rob McIntyre, Access Consulting Group

From: Diane Lister

Date: January 4, 2008

RE: **Review of Historic Keno Static Test Data to Define ARD/ML – Controlling and Correlating Factors**

1. Scope

Review static test data of 1996 Keno Hill site-wide waste rock characterization sampling that were analysed in 2006 for standard ICP multi-elements, acid base accounting, and leachate extraction. Objective is to identify any geochemical parameters that are controlling or are strongly correlated with generation of net acidity and/or Zn or Pb leaching. This purpose of this review is to provide a tool to assist in prediction of ARD/ML in any future development in the Keno Hill area, and to provide a basis for field classification of potentially reactive material during excavation.

2. Background

This study examines analyses carried out on 47 samples of dump and pit material from various sites at the Keno Hill Mine site in central Yukon. Sampling was conducted in 1996 using a backhoe to collect approximately 60 kg of rock per site, and duplicated locations sampled in 1995 and reported in the Keno Hill Mines Site Characterization Study (Access Mining Consultants, 1996).

Samples were labelled and sealed in plastic pails, and stored until 2006, when they were retrieved, their condition verified, and submitted to ALS Chemex Labs in North Vancouver for analysis.

Samples were analysed via 27-element ICP-AES with aqua regia digestion (including sulphur), modified acid-base accounting including sulphate via both sodium carbonate leach and HCl digestion, total inorganic carbon via coulometer, and paste pH at a 1:1 solids to water ratio. Twenty-four hour shake flask extractions were performed using a 3:1 water to solids ratio, and the filtrate analysed for pH and 33-element dissolved metals.

Data were compiled and for statistical analysis purposes, results above or below limits of detection were assigned a value equal to the respective detection limit. Metal loading in mg/kg was calculated by multiplying leachate concentration by the dilution factor of 3:1, and percent extraction by dividing the metal loading by its respective solids concentration in ppm. The zone and lithology of each sample was added to the database, based on the sample description information.

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3. Details of Analysis

This review consisted of four phases:

i) conduct general review of data and generate of statistical summaries;

ii) identify reactive samples in dataset;

iii) analyse data for trends and database criteria that appear to control or correlate strongly with sample reactivity, and that can be used to isolate reactive samples; and

iv) check of criteria against the database to determine over or under-filtering.

3.1. Summary of Data

All analytical data is given in Appendix A1, and comprehensive summary statistics in Appendix A2. Statistics for acid base accounting and selected trace element parameters are given in Tables 1 and 2.

Samples show a range of geochemical characteristics, with paste pH ranging from 3.2 to 8.7, and a median value of 7.2. Total sulphur concentrations in solids is low to moderately elevated, ranging from detection-limit levels of 0.01% to 1.93%, with a median of 0.17%. Carbonate tends to be somewhat low with a median of 0.5%, with samples typically ranging up to 4 percent. Two outliers of 6.7% and 13.4%CO_2 occur in samples of quartzite and vein respectively. Neutralization potential (NP) tends to be low (median of 7 kg $CaCO_3$/t), with samples of more than 0.5% CO_2 tending to have NP's in 10 to 70 kg $CaCO_3$/t range.

An average of 40% of sulphur is in the soluble form of sulphate. Other elements with elevated soluble fraction are Ca, Co, Cd, Mn, and Zn (averaging 11%, 11%, 9%, 6% and 5% respectively).

Appendix A6 shows statistical box and whisker plots of key ABA and ICP parameters by lithology. The various lithologies show similar tendencies, however schist lithology samples tend to show the lowest paste pH in the dataset, while quartzite samples show the broadest range of sulphur (<0.01 to 2 percent).

Table 1. Summary Statistics of of Acid Base Accounting Parameters

Statistic	Paste pH	Fizz Rating	Total S (%)	Sulphate via Carbonate Leach (%)	Sulphate via HCl Leach (%)	Sulphide, Calculated (%)	Maximum Potential Acidity (kg$CaCO_3$/t)	Neutralization Potential (kg$CaCO_3$/t)	Net Neutralization Potential (kg$CaCO_3$/t)	Neutralization Potential : Maximum Potential Acidity	Inorganic Carbon (%)	CO_2, Calculated (%)
No. of observations	47	47	47	47	47	47	47	47	47	47	47	47
No. of missing values	0	0	0	0	0	0	0	0	0	0	0	0
Minimum	3.2	1	0.01	0.01	0.01	0.01	0.3	-5.0	-43.0	-0.26	0.05	0.20
Maximum	8.7	3	1.93	0.45	0.46	1.48	60.3	308.0	285.0	54.40	3.64	13.40
Median	7.2	1	0.17	0.02	0.03	0.06	5.3	7.0	3.0	2.29	0.06	0.20
Mean	6.9	1.6	0.35	0.11	0.11	0.24	10.9	23.9	13.0	4.93	0.33	1.23
Standard deviation	1.2	0.8	0.46	0.14	0.13	0.36	14.3	48.1	43.9	8.51	0.60	2.22
Geometric mean	6.8	1.5	0.12	0.04	0.05	0.08	3.7				0.13	0.52
Geometric standard deviation	1.2	1.6	5.16	4.29	4.31	5.04	5.2				3.42	3.31

Table 2. Summary Statistics of Selected Trace Element Parameters

Statistic	Ag (ppm)	As (ppm)	Ca (%)	Fe (%)	Pb (ppm)	S (%)	Zn (ppm)
	Trace Element Composition via ICP-AES						
No. of observations	47	47	47	47	47	47	47
No. of missing values	0	0	0	0	0	0	0
Minimum	1	5	0.02	0.45	18	0.01	57
Maximum	100	944	8.32	14.05	10000	2.00	10000
Median	20	85	0.15	2.81	896	0.17	489
Mean	37	219	0.64	3.37	2653	0.36	1731
Standard deviation (n)	39	248	1.36	2.66	3500	0.48	2655
Geometric mean	13	107	0.17	2.62	753	0.12	642
Geometric standard deviation	6	4	5.05	2.06	7	5.27	4

Statistic	Ag	As	Ca	Fe	Pb	S[1]	Zn
	Soluble Loading (mg product in leachate per kilogram of solid)						
No. of observations	47	47	47	47	47	47	47
No. of missing values	0	0	0	0	0	0	0
Minimum	0.00003	0.0004	2.2	0.090	0.001	0.01	0.012
Maximum	0.014	4.2	1644	1854	48.9	0.45	867
Median	0.0005	0.003	96.9	0.09	0.11	0.02	0.32
Mean	0.0017	0.117	380.3	60.9	1.99	0.11	70.6
Standard deviation (n)	0.003	0.609	521.8	280.7	7.17	0.14	209.0
Geometric mean	0.001	0.006	77.2	0.29	0.12	0.04	0.9
Geometric standard deviation	4.923	6.272	8.6	12.5	13.73	4.29	26.2

Statistic	Ag	As	Ca	Fe	Pb	S[1]	Zn
	Soluble Fraction (mass ratio of product product in leachate : product in solid, as percent)						
No. of observations	47	47	47	47	47	47	47
No. of missing values	0	0	0	0	0	0	0
Minimum	0.0%	0.0%	0.0%	0.0%	0.0%	3%	0.0%
Maximum	0.8%	5.1%	50.6%	10.1%	1.5%	100%	87.7%
Median	0.0%	0.0%	4.5%	0.0%	0.0%	33%	0.0%
Mean	0.0%	0.1%	11.2%	0.4%	0.1%	44%	5.2%
Standard deviation (n)	0.1%	0.7%	13.7%	1.6%	0.2%	29%	14.6%
Geometric mean	0.0%	0.0%	4.5%	0.0%	0.0%	34%	0.1%
Geometric standard deviation	5.44	8.92	4.85	15.02	7.01	226	18.05

[1] Calculated based on total sulphur via Leco furnace and sulphate via carbonate leach extraction.

3.2. Identifying Reactive Samples in Dataset

The leachate extraction dataset was examined to determine levels of leachate pH, Zn loading and Pb loading that serve to divide the "reactive" (those generating net acidity and/or Pb or Zn leaching) from non-reactive samples. Frequency distribution curves (histograms and cumulative distributions) were utilized.

Net Acidity. A leachate pH criteria <u>≤ 5.5</u> is selected to differentiate those samples generating net acidity. Histogram and cumulative distribution plots for leachate pH are shown in Figure 1. As seen, two very distinct populations are present: i) 5 acidic samples ranging in pH from 2.61 to 3.78; and ii) 41 weakly acidic to weakly alkaline samples ranging in pH from 5.74 to 7.87. Only one sample, at pH 4.99, lies between the two groups. A pH value of 5.5 isolates the larger, essentially non-reactive group, and conservatively assigns any between-population pH results to the acidic category.

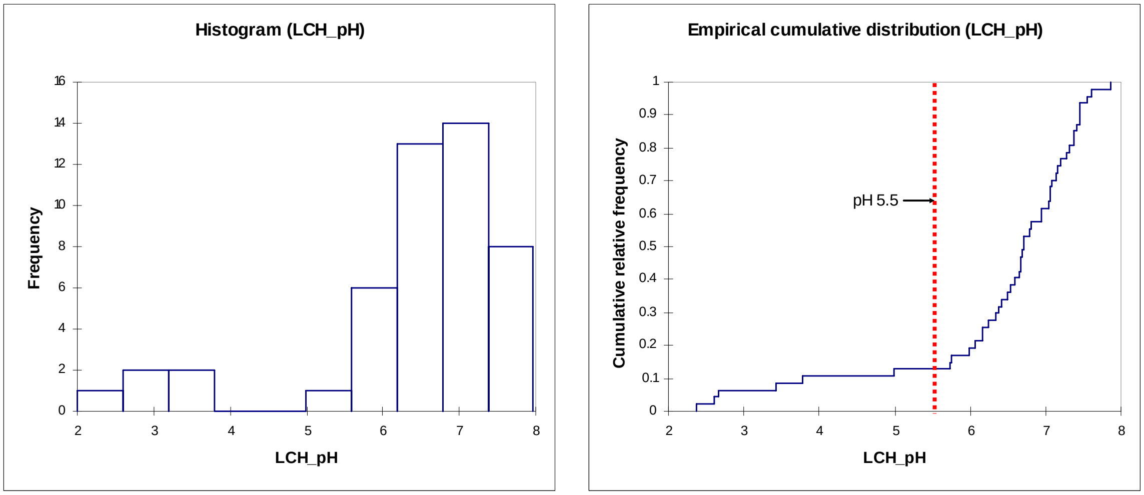

Figure 1. Frequency Distribution of Leachate pH and Selected Criteria

Metal Leaching. Criteria of <u>10</u> mg/kg Zn and <u>3</u> mg/kg Pb were selected based on the logarithmic distribution plots shown in Figures 2 and 3. For Pb, a horizontal inflection between $10^{0.087}$ and $10^{0.511}$ (1 to 3 mg/kg Pb) indicates a division between populations. Hence a 3 mg/kg Pb value would better serve to differentiate the lesser from the elevated loadings. In the case of Zn, the cumulative distribution curve demonstrates more uniform population than that of Pb, but nonetheless with a plateau in the cumulative curve between $10^{0.498}$ and $10^{1.044}$ (3 and 11 mg/kg Zn). Thus a value of 10 mg/kg Zn is selected distinguishes the elevated loadings in the dataset.

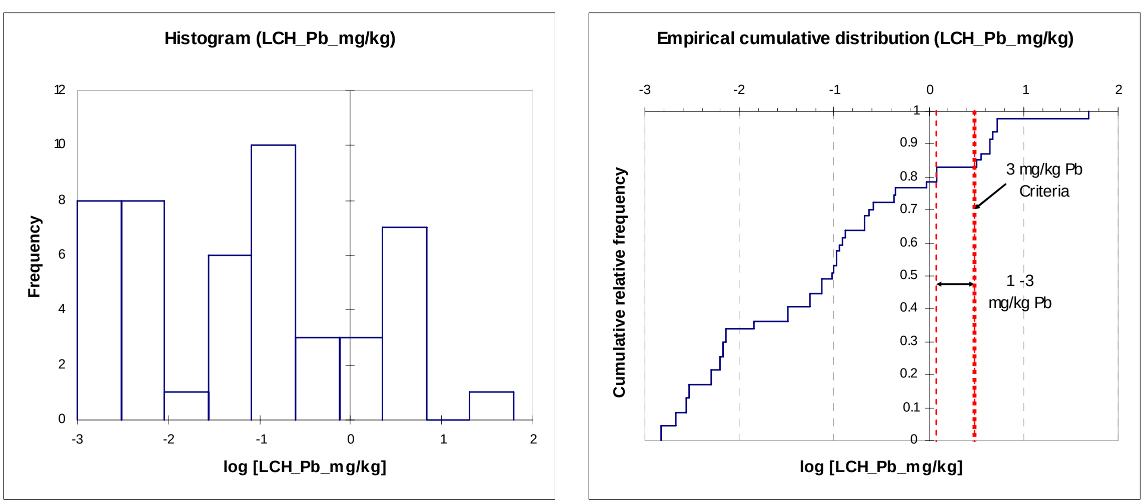

Figure 2. Frequency Distribution of Pb Loading and Selected Criteria

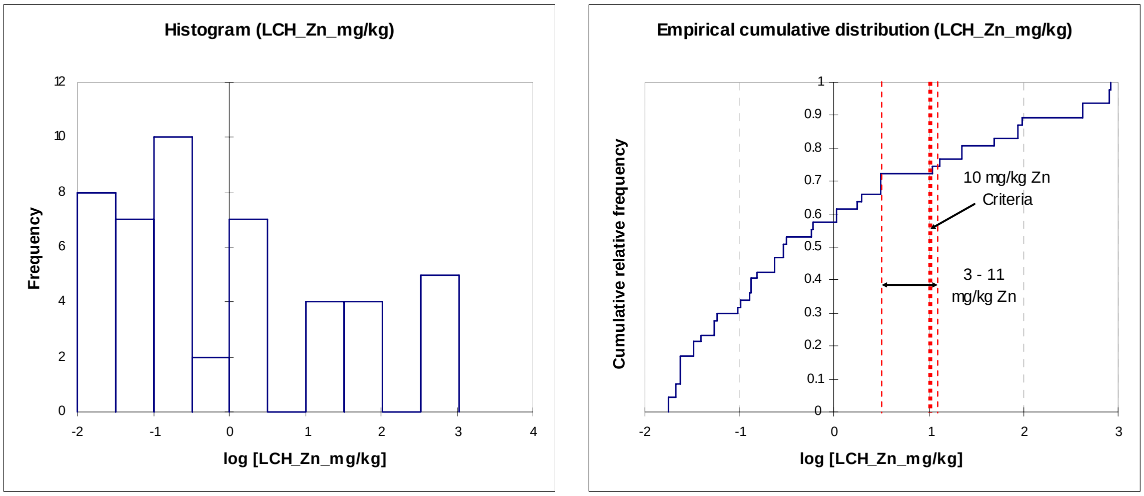

Figure 3. Frequency Distribution of Zn Loading and Selected Criteria

Tables 3 and 4 summarize the breakdown of reactive samples by rock type, and by zones sampled.

Of the 47 samples, 17 (36%) meet one or more of the "reactive" criteria, with 6 of the 17 being net acidic, 13 zinc-leaching, and 8 lead-leaching. The quartzite units sampled showed the highest proportion of reactive samples (46%), followed by mixed quartzite and schist (40%), and vein (25%). Pit wall samples appear to store less soluble products, (none of the pit wall samples were reactive), likely a function of the more exposed environment relative to a waste rock dump with limited infiltration and transport of solutes.

Table 3. Summary of 2006 Leachate Extraction Results by Major Rock Type

						Leachate Extraction Characteristics (# of Samples)		
Zone	Database Code	Total # of Samples	# Non-Reactive	# Reactive	% of Samples Reactive	Leachate pH ≤ 5.5	Zn load ≥ 10 mg/kg	Pb Load ≥ 3 mg/kg
All		47	30	17	36%	6	13	8
Mixed Quartzite & Schist	02	5	3	2	40%	1	2	1
Schist	10	10	8	2	20%	1	2	0
Quartzite	20	26	14	12	46%	4	8	6
Greenstone	30	1	1	0	0%	0	0	0
Vein	40	4	3	1	25%	0	1	1
Unspecified	01	1	1	0	0%	0	0	0

Table 4. Summary of 2006 Leachate Extraction Results by Zone

						Leachate Extraction Characteristics (# of Samples)		
Zone	Sample Type	Total # of Samples	# Non-Reactive	# Reactive	% of Samples Reactive	Leachate pH ≤ 5.5	Zn load ≥ 10 mg/kg	Pb Load ≥ 3 mg/kg
All		47	30	17	36%	6	13	8
Bellekeno Adit	Dump	1	1	0	0%	0	0	0
Bermingham Pit	Pit Wall	6	6	0	0%	0	0	0
Bermingham Pit	Dump	6	5	1	17%	0	1	1
Calumet 1-15 Pit	Pit Wall	2	2	0	0%	0	0	0
Calumet 1-15 Pit	Dump	3	0	3	100%	0	0	3
Dixie Adit	Dump	3	0	3	100%	3	3	0
Galkeno 900	Unspecified	1	0	1	100%	1	1	0
Hector Adit	Dump	3	0	3	100%	0	3	1
Hector Pit	Dump	1	0	1	100%	0	0	1
Husky SW	Dump	1	0	1	100%	1	1	0
Keno 700 Adit	Dump	2	2	0	0%	0	0	0
Miller Pit	Dump	1	1	0	0%	0	0	0
ONEK pit	Pit Wall	1	1	0	0%	0	0	0
ONEK pit	Dump	4	4	0	0%	0	0	0
Ruby Adit	Dump	3	3	1	33%	0	1	1
SIME 35 pit	Pit Wall	2	2	0	0%	0	0	0
SIME 4&6 pit	Dump	1	1	0	0%	0	0	0
SIME 4 pit	Pit Wall	1	1	0	0%	0	0	0
SIME 6 pit	Pit Wall	2	2	0	0%	0	0	0
Silver King Pit	Dump	1	0	1	100%	1	1	0
Townsite Adit	Dump	2	0	2	100%	0	2	1
UN Adit	Dump	1	1	0	0%	0	0	0

3.3. Key Controlling and Correlating Factors for Sample Reactivity

Parameters which are either readily available in an exploration database, or are easily measured in the field were examined to identify any factors potentially controlling net acidity and/or metal dissolution. Based on the information provided with the 47 samples for this review, these 'eligible' parameters include multi-element analyses via ICP, and the sample's 'fizz' rating (effervescence reaction of sample to dilute hydrochloric acid). Of this suite, the examination then focussed on those parameters which either demonstrate high mobility in the leachate extraction tests (specificially Ca, Cd, Co, Mg, and Zn) or are obviously anomalously elevated in the rock (Pb and Zn).

Key findings are summarized in the following text and illustrated by graphs.

As shown in Table 2, Ca showed the highest water soluble fraction during the leachate extraction tests relative to its ICP value in the rock, with a median calculated percent extraction of 4.5% (average of 11%). Values ranged from less than 1 to just over 50%. Other elements demonstrating a lesser, but notable water-soluble fraction were Cd, Co, Mg, and Zn (see Table 2 for Zn, and Appendix A4 for remaining elements).

The six samples yielding acidic leachate demonstrate a relatively wide range of sulphur values (0.28% to 1.25%), indicating a relatively low sulphur "cutoff" value under certain conditions. As is commonly observed in other deposits, calcium appears to influence the manifestation of net acidity – in the case of the Keno Hill samples the extraction data indicates that samples with leachate pH less than 3 show between 44 to 50% of total Ca in soluble form. Samples with leachate pH between 3.4 and 6.6 show intermediate values. Thus, it is likely that dissolution of Ca is occurring in response to localized acid generating reactions.

When Ca and S geochemistry of the 47 samples is plotted on a simple x-y graph, all samples with leachate pH less than 5.5 fall within a quadrant defined by S > 0.25% and Ca < 0.51% (see Figure 4), demonstrating that for this dataset, this criteria pair serves as a 'net acidity' threshold.

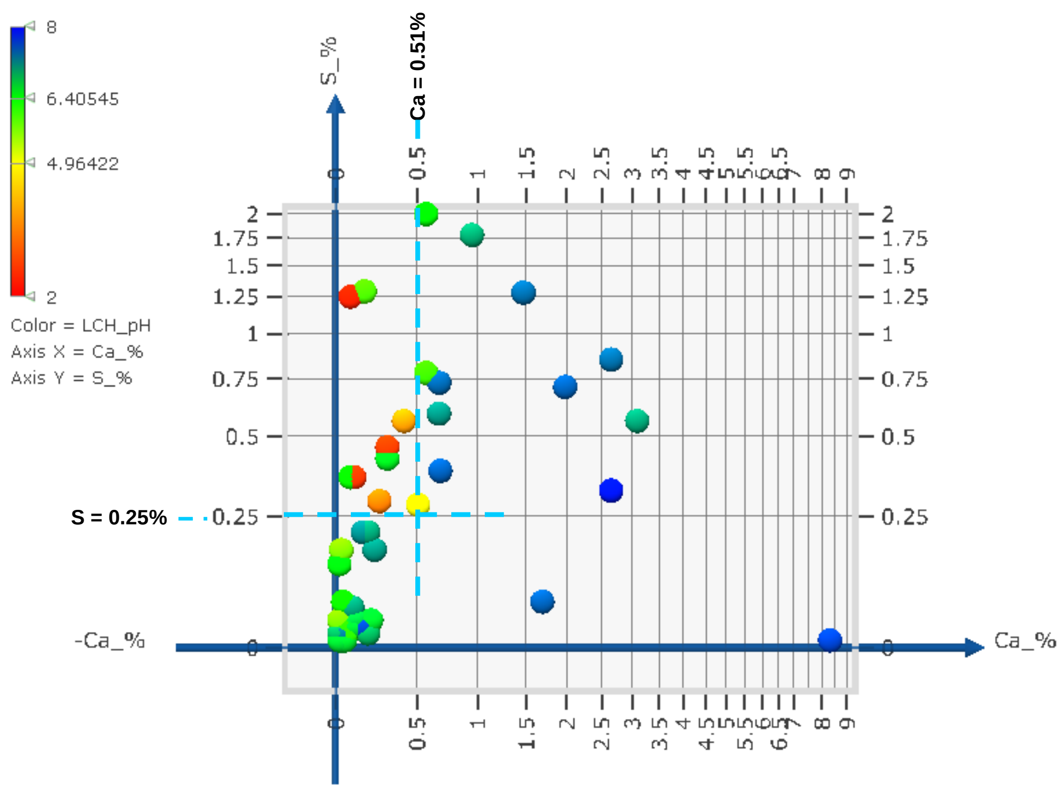

Figure 4. Ca vs. S in rock analyses. Note that low pH leachate samples (shown as yellow, orange and red data points) are clustered in a quadrant defined by S > 0.25% and Ca < 0.51%.

The mobility of Zn appears to be controlled by two mechanisms, as shown in Figures 5 and 6:

i) due to the increased mobility of Zn with decreasing pH, many of the samples with elevated Zn loading also fall within the 'net acidity' quadrant defined by S > 0.25% and Ca < 0.51%. Thus, most samples with net acidity also demonstrate elevated Zn dissolution;

ii) samples with anomalous Zn in the rock geochemistry (eg. > 5000 ppm Zn) tend to show elevated dissolution of Zn.

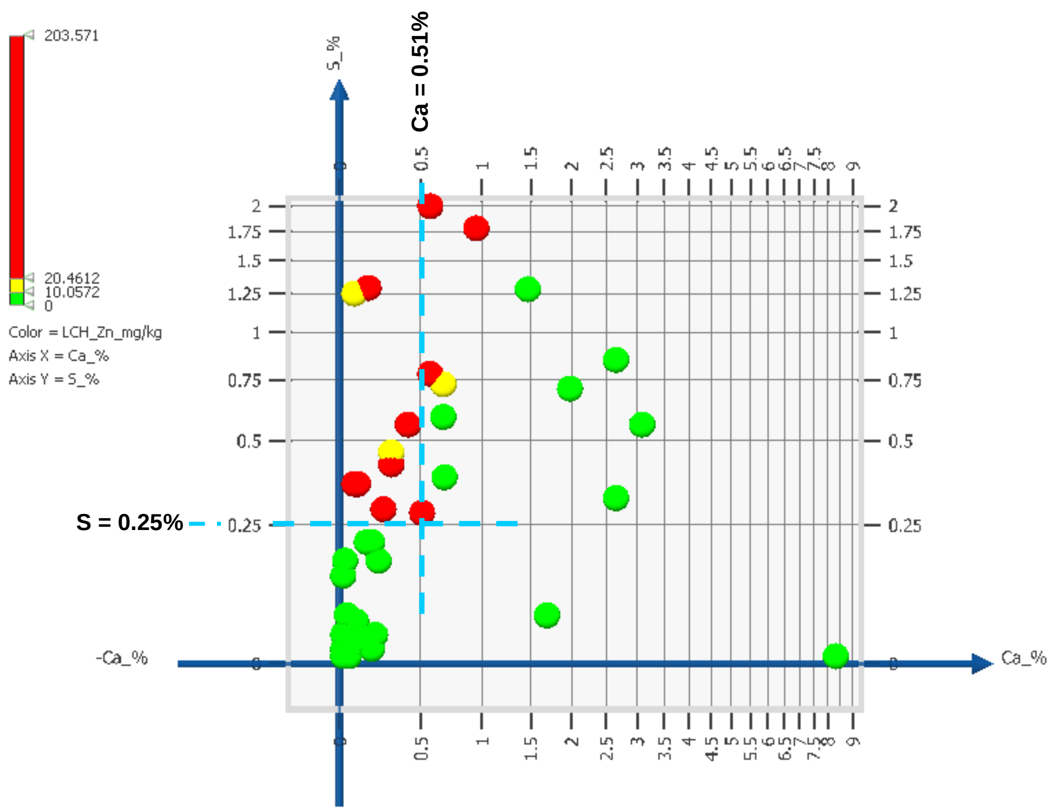

Figure 5. Ca vs. S in rock analyses. Note that many of the 13 elevated Zn loading samples (shown as yellow and red data points) are within the same quadrant occupied by the low leachate pH samples; see also Figure 4.

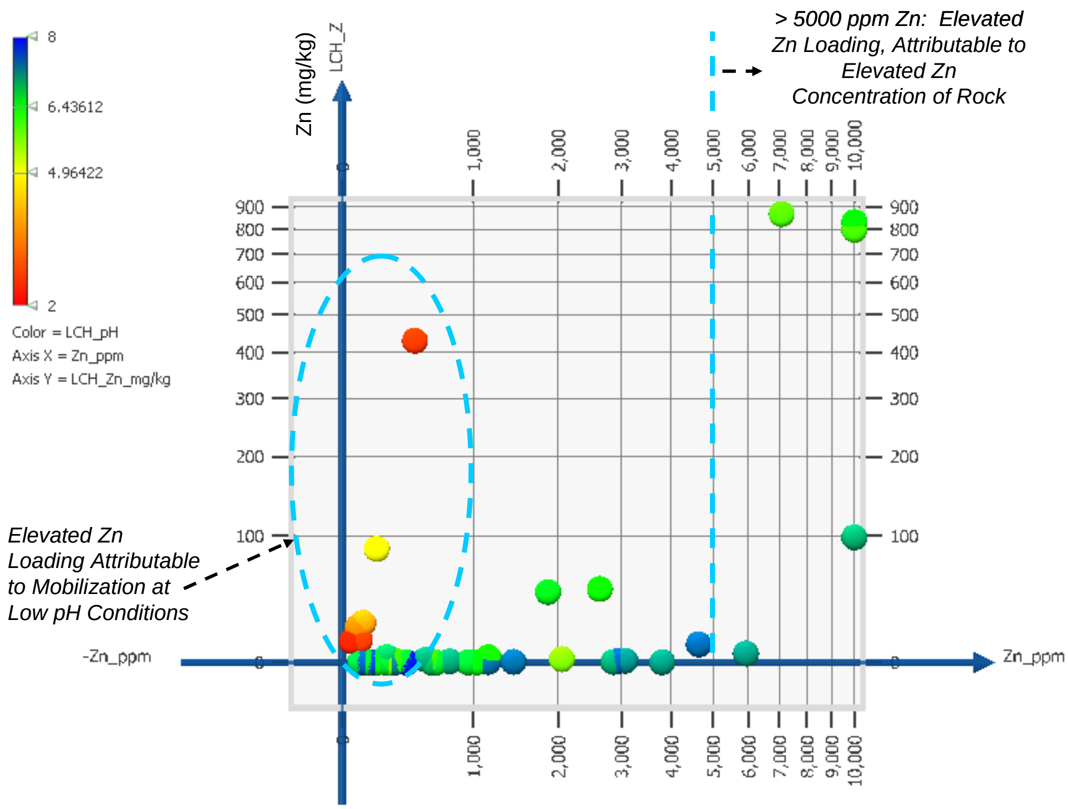

Figure 6. Zn in rock vs. Zn dissolution. Note the two apparent mechanisms for Zn dissolution: 1) low pH conditions (as shown by the red, yellow and orange data points), and 2) elevated Zn in rock.

Occurrences of elevated Pb dissolution is less frequent in the dataset than that of Zn (8 of the 47 samples showing ≥3 mg/kg) and appears to be purely a function of concentration of Pb in the rock, as shown in Figure 7. A threshold of 5000 ppm appears to segregate the samples with dissolution ≥3 mg/kg. Due to solubility constraints Pb dissolution occurs only at neutral to alkaline pH conditions.

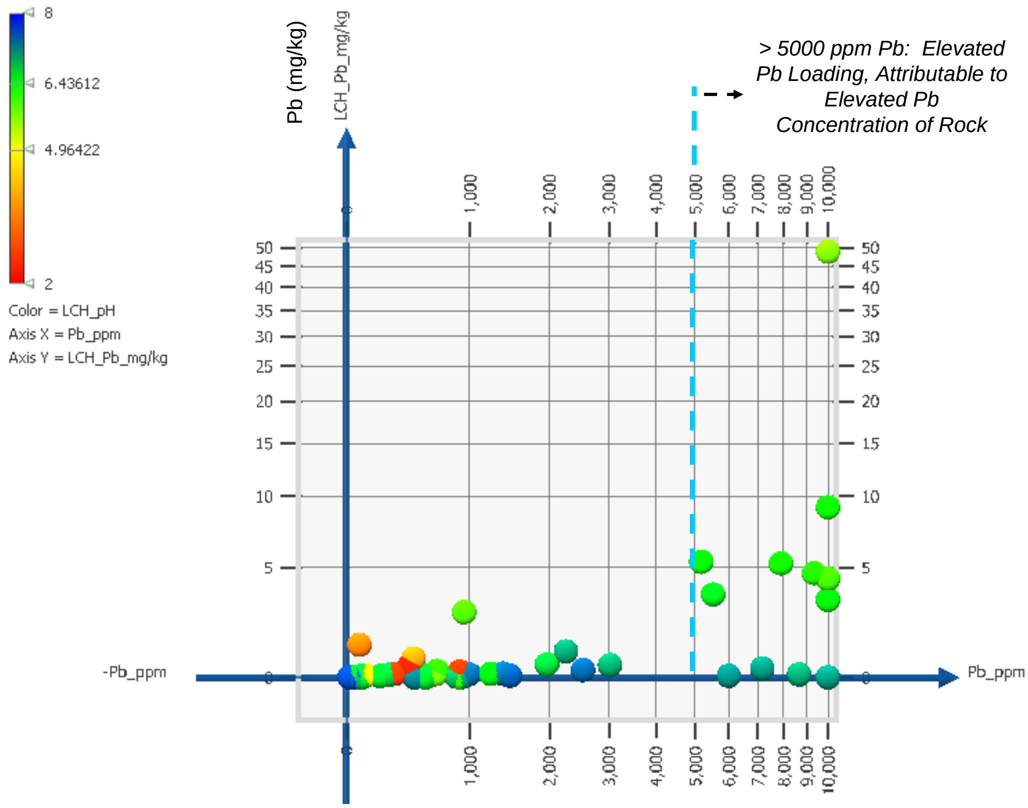

Figure 7. Pb in rock vs. Pb dissolution. Note that elevated Pb dissolution (≥ 3 mg/kg) appears to be largely a function of Pb concentration in rock. Also note the very low Pb dissolution under acidic conditions..

Based on the above graphics, the criteria of $S_{via\ ICP} \geq 0.25\%$ and Ca ≤ 0.51% was selected for identifying samples with net acidity ± metal leaching. Criteria of Pb ≥ 5000 ppm and Zn ≥ 5000 ppm were selected for segregation of samples showing elevated Pb and Zn solubility.

The above screening criteria were applied singly and then in combination to the 47-sample dataset to assess the degree of success in: i) isolating the reactive samples, and ii) minimizing "dilution" by non-reactive samples (in other words, minimizing the inclusion of any non-reactive samples in the samples isolated).

Results of the filtering are summarized in Table 5. When all three of the above criteria are applied to the 47-sample database, 20 samples are isolated, including 16 of the 17 reactive samples and 4 non-reactive samples. Only one marginally reactive sample showing 11 mg/kg Zn dissolution, 4640 ppm Zn, 0.73 %S, and leachate pH of 7.4 reports to the non-reactive category. In a waste rock segregation scenario, the occasional inclusion of a rock demonstrating marginally elevated Zn loading with no net acidity is acceptable as it is unlikely to have a significant effect on overall drainage water quality from a waste rock pile. Conversely, this filtering also shows that 13% of the non-reactive samples in the dataset are grouped by this filtering.

Similar results are obtained when substituting a Fizz Rating of <3 in place of ICP Calcium ≤ 0.51% – the reactive samples are filtered identically, however 'dilution' by non-reactive samples increases to 20%. Nonetheless, these results indicate Fizz Rating to be a potential screening parameter, which is of interest as a field screening tool for segregating rock during active mining.

Table 5. Summary of Results of Filter Criteria Trials, 2006 Leachate Extraction Analyses (selected criteria in bold)

	Criteria for Reactive Sample	# Samples	S% ≥ 0.25% *and* Ca ≤ 0.51%	S% ≥ 0.25% *and* Fizz Rating < 3	Pb ≥ 5000 ppm	Zn ≥ 5000 ppm	**S% ≥ 0.25%** *and* **Ca% ≤ 0.51%** *or* **Pb ≥ 5000 ppm** *or* **Zn ≥ 5000 ppm**	**S% ≥ 0.25%** *and* **Fizz Rating < 3** *or* **Pb ≥ 5000 ppm** *or* **Zn ≥ 5000 ppm**
Total # Samples		47	9	12	12	17	**20**	**22**
Leachate pH	< 5	6	6	6	0	0	**6**	**6**
Zn Loading (mg/kg)	> 10	13	9	10	4	7	**12**	**12**
Pb Loading (mg/kg)	> 3	8	2	3	8	7	**8**	**8**
# of Samples Meeting any one Criteria		17	9	10	8	10	**16**	**16**
# of Samples Not Meeting any of Above Criteria		30	0	2	4	7	**4**	**6**
% of Low Leachate pH samples isolated			100%	100%	0%	0%	**100%**	**100%**
% of anomalous Zn load samples isolated			69%	77%	31%	54%	**92%**	**92%**
% of anomalous Pb samples isolated			25%	38%	100%	88%	**100%**	**100%**
% of Reactive Samples Isolated			53%	59%	47%	59%	**94%**	**94%**
% of Non-Reactive Samples Included			0%	7%	13%	23%	**13%**	**20%**

4. *Key Conclusions*

- In the 47-sample leachate extraction database examined, net acidic samples are defined as those yielding a leachate pH ≤5.5. Metal leaching samples are defined as those with Zn loading ≥10 mg/kg, and/or Pb loading ≥3 mg/kg. Any sample meeting at least one of these three conditions is defined as "reactive".

- As observed in section 7 of the 1996 Characterization Study, it is important to note that most samples were taken from adit dump waste rock pile samples, and thus tend to be comprised of material in close proximity to mineralization. Samples from open pit waste piles, comprised of a greater amount of rock further from the vein systems, are less sulphidic and show less evidence of acidity and metal solubilization.

- Of the 47 samples, 17 (36%) meet one or more of the "reactive" criteria, with 6 of the 17 being net acidic, 13 zinc-leaching, and 8 lead-leaching. The quartzite units sampled showed the highest proportion of reactive samples (46%), followed by mixed quartzite and schist (40%), and vein (25%). Pit wall samples appear to store less soluble products, (none of the pit wall samples were reactive), likely a function of the more exposed environment relative to a waste rock dump with limited infiltration and transport of solutes.

- An average of 40% of sulphur is in the soluble form of sulphate, as indicated by an average SO4:Total S ratio of 0.4 for the 47 samples. Other elements with elevated soluble fraction are Ca, Co, Cd, Mn, and Zn (averaging 11%, 11%, 9%, 6% and 5% respectively).

- The following controls are noted for acidity and metal leaching:

  - Net Acidity: The two key aspects of samples demonstrating leachate pH ≤ 5.5, are either a calcium level in the rock of ≤0.51% or a CO_2 level of ≤0.6% , coupled with a sulphur level of ≥0.25%. Production of net acidity thus appears to be directly related to insufficient levels of available calcium (as calcium carbonate) to compensate for ongoing oxidation of sulphide minerals.

  - Zinc Leaching: leaching of zinc to levels ≥ 10 mg/kg appears to occur under two differing conditions: i) solubilization of zinc under net acidic conditions – independent of zinc concentration in rock, and ii) solubilization of zinc under overall neutral to alkaline conditions where Zn concentrations in rock exceed 5000 ppm.

  - Lead Leaching: leaching of lead to levels ≥ 3 mg/kg occurs only under neutral pH conditions, where Pb concentrations in rock exceed 5000 ppm.

- Various geochemical parameters were evaluated to identify a simple filter to best isolate the reactive samples from the non-reactive samples, using information normally available in an exploration database (eg. lithology, ICP analyses, simple field tests). While priority was given to ensuring complete isolation of the net acidic samples, it was considered that minor under-filtering of metal-leaching would not be detrimental to overall drainage quality of a waste rock storage area. After several trials, the following filter criteria were identified to discriminate reactive samples in the 47-sample database:

    1. $S_{via\ ICP} \geq 0.25\%$ and $Ca \leq 0.51\%$; *or*

    2. Pb $\geq$ 5000 ppm; or

    3. Zn $\geq$ 5000 ppm.

- When these criteria are applied to the 47-sample database, 16 of the 17 reactive samples are isolated, along with 4 non-reactive samples. 100% of the net acidic samples, 92% of the zinc-leaching samples, and 100% of the lead-leaching samples are isolated. On the other hand, 13% of the samples isolated using these criteria were actually non-reactive in the leachate extraction test, indicating that some potential 'dilution' by non- ARD/ML waste rock is possible if using this filter for waste rock classification.

- Similar results are obtained when substituting a Fizz Rating of <3 in place of ICP Calcium $\leq$ 0.51% – the reactive samples are filtered identically, however 'dilution' by non-reactive samples increases to 20%. Nonetheless, these results indicate Fizz Rating to be a potential screening parameter, which is of interest as a field screening tool for segregating rock during active mining.

Prepared By:

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<u>Attachments:</u>

Appendices A1 through A6

APPENDIX A1-1

Rock Codes

00		**Miscellaneous**
01		Unspecified
02		Mixed Quartzite and Schist
	OVB	Overburden
10	**SCH**	**Schists, undifferentiated**
11	CHSCH	Chloritic Schist
12	GSCH	Graphitic Schist
13	SSCH	Sericitic Schist
14	CSCH	Calcareous Schist
20		**Quartzite, Undifferentiated**
21	CQTZT	Calcareous Quartzite
22	QTZT	Quartzite
30	**GNST**	**Greenstone, Undifferentiated**
40	**VN**	**Vein, undifferentiated**
50	**PHY**	**Phyllite**

Zones:

	Unspecified	0
Dixie		10
	DixieAdit	11
Bermingham		20
	BermhamPit	21
Ruby		30
	RubyAdit	31
Calumet		40
	Calu_1_15_pit	41
Husky		50
	HuskySW	51
Hector		60
	HectorPit	61
	HectorAdit	62
Millier		70
	MillerPit	71
SIME		80
	SIME6pit	81
	SIME4pit	82
	SIME35pit	83
	SIME4&6pit	84
ONEK		90
	ONEKpit	91
Keno		100
	Keno700_Adit	101
UN		110
	UNAdit	111
Townsite		120
	TownsiteAdit	121
Bellekeno		130
	BelleKenoAdit	131
Silver King		140
	SlvrKing_Pit	141
Galkeno		150
	Galkeno900	151

APPENDIX A2-1

Waste Rock Dump Sample Descriptions - May 2007			
Mine/dump location	**No. of 20 L Pails**	**Sample ID**	**Sample Description**
DIXIE Adit dump			
	1	95UKHDD01	grey fine gr. mat'l, minor >3", 3" rusty bands every 12"
	1	95UKHDD02	brownish & grey fine gr. mat'l (broken schist, some fragments, grey qtzite)
	1	95UKHDD03	grey fine gr. mat'l, rusty bands (6") every 14", sample from 8' depth
BERMINGHAM pit wall			
	1	95UKHBP01	thin bedded qtzite, rusty weathering; North wall of pit
	2	95UKHBP02	thick bedded blocky, rusty weathering qtzite; manganese staining (?); above old brim. Shaft; N. wall pit
	2	95UKHBP03	thick bedded, blocky qtzite, buff weathering, some minor graphitic schist talus; N. wall pit
	2	95UKHBP04	rusty weathering, blocky qtzite, minor schist; 70%>4", 10%>8"
	2	95UKHBP06	graphitic schist, platy talus on South pit wall, 1/2" x 8" pieces
	2	95UKHBP07	sericitic schist, platy to blocky talus on S. pit bench
BERMINGHAM pit dump			
	2	95UKHBD01	fine grained ore stockpile (1/2">x<3"), rusty weathering, 70% "soil" fraction mat'l
	2	95UKHBD02	fine grained ore stockpile (1/2">x<3"), rusty weathering, 70% "soil" fraction mat'l
	1	95UKHBD03	ore and colluvium (?) scraped from floor of ore stockpile area
	1	95UKHBD04	graphitic schist
	1	95UKHBD05	ore and colluvium (?) scraped from floor of ore stockpile area
	1	95UKHBD06	buff weathering, blocky qyzite
RUBY adit dump			
	2	95UKHRD01	grey - black fine grained qtzite rubble, iron stain banding (on only, 6" thick, dipping 45')
	2	95UKHRD02	grey - black fine grained qtzite rubble, weak iron stain banding (on only, 6" thick, dipping 45')
	2	95UKHRD03	grey - black fine grained qtzite rubble, iron stain banding (on only, 6" thick, dipping 45')
HUSKY SW			
	1	95UKHWD01	very pyritic grey qtzite
CALUMET 1-15 pit dump			
	2	95UKHCD01	buff weathering, altered (?) qtzite, rusty fractures
	2	95UKHCD02	buff weathering, blocky qtzite, rusty fracturing, possible some vein mat'l (15%)
	2	95UKHCD03	ore stockpile scrapings mixed and some colluvium, minor buff weathering qtzite w/ rusty fractures
CALUMET 1-15 pit wall			
	1	95UKHCP01	graphitic schist, platy talus (1/2" thick x 6-10" long)
	2	95UKHCP02	grey blocky qtzite, maroon fractures, >60%+4"
HECTOR pit dump			
	2	95UKHCD04	grey blocky qtzite, maroon weathering on fractures
MILLER pit dump			
	2	95UKHMD01	greenish-grey fine grained qtzite, rusty weathering on fracture surfaces, some pyrite casts
HECTOR adit dump			
	1	95UKHHD01	grey qtzite rubble, mixed with debris; top of dump
	2	95UKHHD02	grey qtzite rubble, mixed with debris; top of dump
	1	95UKHHD03	green sercite schist rubble, woody debris & fines; toe of dump
SIME 6 pit wall			
	2	95UKHSP01	grey, platy graphitic schist; 1/4" thick x 4-10" long
	2	95UKHSP02	buff weathering , blocky qtzite, some rusty fracture surfaces
SIME 4 pit wall			
	1	95UKHSP03	thick bedded, grey massive qtzite, some pyrite casts, all surfaces iron stained
SIME 35 pit wall			
	2	95UKHSP04	very fine grained schist, some Fe stain
	2	95UKHSP05	
SIME 4 & 6 pits wall			
	1	95UKHSD01	clean buff qtzite, 4" blocks, minor oxidation on 50% of fracture surfaces
ONEK pit			
	2	95UKHOP01	grey, clean qtzite mixed with schist - Fe staining laminar in schist
ONEK pit dump			
	1	95UKHOD01	greenstone, blocky 3" x 7" pieces and chips
	1	95UKHOD02	buff weathered qtzite, rusty fractures
	2	95UKHOD03	grey platy graphitic schist, 1/2" x 7"
KENO 700 adit dump			
	1	95UKHKD01	grey qtzite, qtz bands
	1	95UKHKD02	green seritic schist
UN adit dump			
	2	95UKHUD01	mixture grey graphitic schist and buff weath. qtzite, 30" + 3" 70" <3"
TOWNSITE adit dump			
	2	95UKHTD01	buff weathering qtzite, 10% >3", mostly fine fraction, some oxidation
	2	95UKHTD02	grey qtzite with serecite schist, 10% > 3", mostly fine fraction
BELLEKENO adit dump			
	2	95UKHLD01	dark grey pyritic qtzite, qtz stringers abundant
SILVER KING pit dump			
	1	95UKHVD01	mixed grey and buff qtzite, minor schist, some sandsize particles
GALKENO 900			
	1	95UKGK901	grey, fine gr. Schist
TOTAL # of SAMPLE SITES:	47		
TOTAL # of 20 L PAILS	74		

APPENDIX A2-2
Shakeflask Extraction Results

ALS Environmental
11-May-07

RESULTS OF ANALYSIS

Mine/Dump Location		Dixie Adit Dump			Bermingham Pit Wall						Bemingham Pit Dump						F
Sample ID		95UKHDD01	95UKHDD02	95UKHDD03	95UKHBP01	95UKHBP02	95UKHBP03	95UKHBP04	95UKHBP06	95UKHBP07	95UKHBD01	95UKHBD02	95UKHBD03	95UKHBD04	95UKHBD05	95UKHBD06	95UKHRD01
Date of Analysis	11-May-07																
ALS Sample ID		L481965-1	L481965-2	L481965-3	L481965-4	L481965-5	L481965-6	L481965-7	L481965-8	L481965-9	L481965-10	L481965-11	L481965-12	L481965-13	L481965-14	L481965-15	L481965-16
Matrix		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Leachable Anions & Nutrients	**Units**																
pH	pH	3.43	2.61	4.99	6.17	6.94	6.67	6.69	7.45	7.56	7.14	7.07	6.07	7.20	7.27	6.95	7.38
Leachable Metals																	
Aluminum (Al)-Leachable	mg/L	38.6	98.2	2.68	0.0111	0.0197	0.0204	0.0263	0.0198	0.840	<0.0030	0.203	<0.10	0.0054	<0.0030	0.0146	0.295
Antimony (Sb)-Leachable	mg/L	<0.0020	0.011	<0.0010	0.00289	0.00420	0.00205	0.00359	0.00558	0.00561	0.00051	0.00118	<0.010	0.00072	0.00208	0.00530	0.0031
Arsenic (As)-Leachable	mg/L	0.0049	0.130	<0.0010	0.00102	0.00729	0.00177	0.00082	0.00051	0.00101	0.00029	0.00681	<0.010	0.00023	0.00036	0.00081	0.0068
Barium (Ba)-Leachable	mg/L	0.109	<0.0050	0.0439	0.00935	0.00244	0.00683	0.00151	0.0232	0.00853	0.00224	0.0114	0.0569	0.00649	0.00267	0.00586	0.0263
Beryllium (Be)-Leachable	mg/L	<0.010	<0.050	<0.0050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.00050	<0.050	<0.0010	<0.00050	<0.00050	<0.0050
Bismuth (Bi)-Leachable	mg/L	<0.010	<0.050	<0.0050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.00050	<0.050	<0.0010	<0.00050	<0.00050	<0.0050
Boron (B)-Leachable	mg/L	<0.20	<1.0	<0.10	0.013	<0.010	0.013	<0.010	<0.020	0.011	<0.010	<0.010	<1.0	<0.020	0.011	<0.010	<0.10
Cadmium (Cd)-Leachable	mg/L	0.173	2.41	0.500	0.00604	0.000448	0.000716	0.000264	0.00111	0.000218	0.0120	0.0122	35.7	0.0446	0.00194	0.137	0.0156
Calcium (Ca)-Leachable	mg/L	268	148	511	5.22	11.3	3.31	1.87	142	5.01	47.0	86.5	136	45.8	4.52	6.15	548
Chromium (Cr)-Leachable	mg/L	0.023	0.210	<0.0050	0.00094	0.00156	0.00084	0.00240	<0.0010	<0.00050	<0.00050	0.00081	<0.050	<0.0010	<0.00050	<0.00050	<0.0050
Cobalt (Co)-Leachable	mg/L	0.0478	0.210	0.108	0.00013	<0.00010	<0.00010	<0.00010	0.00178	0.00022	<0.00010	0.00066	0.064	<0.00020	0.00012	0.00025	0.0044
Copper (Cu)-Leachable	mg/L	0.125	1.14	0.0732	0.00168	<0.00060	<0.00050	0.00170	0.00515	0.00434	<0.00050	0.00323	0.016	<0.0011	<0.0010	0.00091	0.0028
Iron (Fe)-Leachable	mg/L	15.2	188	2.03	<0.030	0.036	<0.030	<0.030	<0.030	0.409	<0.030	0.215	<0.030	<0.030	<0.030	<0.030	0.316
Lead (Pb)-Leachable	mg/L	0.407	0.0697	0.0251	0.00168	<0.00050	<0.00090	0.000973	0.00238	0.00204	0.00226	0.0353	1.45	0.0187	<0.00070	0.0108	0.0383
Lithium (Li)-Leachable	mg/L	<0.10	<0.50	0.066	0.0067	0.0097	0.0088	<0.0050	0.016	0.0085	0.0125	0.0111	<0.50	0.019	<0.0050	<0.0050	<0.050
Magnesium (Mg)-Leachable	mg/L	48.1	30.4	62.1	1.10	2.13	0.92	0.47	30.4	1.59	26.1	28.2	51.0	19.9	1.24	1.66	205
Manganese (Mn)-Leachable	mg/L	90.6	207	15.9	0.142	0.00428	0.0237	0.0162	1.26	0.0443	0.0311	0.282	122	0.276	1.94	0.461	3.48
Mercury (Hg)-Leachable	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Molybdenum (Mo)-Leachable	mg/L	<0.0010	<0.0050	<0.00050	<0.000050	0.000216	0.000062	0.000068	0.00625	0.00495	<0.000050	0.000066	<0.0050	<0.00010	0.000189	0.000083	<0.00050
Nickel (Ni)-Leachable	mg/L	0.234	0.981	0.417	0.00317	<0.00050	0.00067	0.00051	0.0039	0.00075	0.00072	0.00183	0.166	0.0014	0.00068	0.00088	0.0238
Phosphorus (P)-Leachable	mg/L	<0.30	1.59	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)-Leachable	mg/L	3.4	<2.0	4.5	4.2	<2.0	2.7	<2.0	6.3	3.5	2.6	3.5	6.4	3.4	<2.0	<2.0	6.0
Selenium (Se)-Leachable	mg/L	<0.020	<0.10	<0.010	<0.0010	<0.0010	<0.0010	<0.0010	0.0079	0.0013	0.0049	0.0075	<0.10	0.0073	0.0015	<0.0010	<0.010
Silicon (Si)-Leachable	mg/L	5.84	4.35	3.77	3.99	3.04	3.85	2.48	2.41	5.79	2.00	2.29	1.85	1.81	2.44	2.54	1.30
Silver (Ag)-Leachable	mg/L	0.00452	0.0011	<0.00010	0.000077	0.000208	0.000375	0.000045	0.000065	0.000080	0.000216	0.00105	<0.0010	0.000080	0.000026	0.000141	0.00099
Sodium (Na)-Leachable	mg/L	<2.0	<2.0	<2.0	<2.0	4.2	<2.0	<2.0	<2.0	2.6	4.8	6.2	5.9	<2.0	<2.0	<2.0	<2.0
Strontium (Sr)-Leachable	mg/L	0.168	0.097	0.175	0.0243	0.0255	0.0173	0.00802	0.378	0.0110	0.0696	0.100	0.221	0.0561	0.0234	0.0296	0.784
Thallium (Tl)-Leachable	mg/L	0.0026	<0.010	0.0013	<0.00010	<0.00010	<0.00010	<0.00010	<0.00020	<0.00010	<0.00010	<0.00010	<0.010	<0.00020	<0.00010	<0.00010	<0.0010
Tin (Sn)-Leachable	mg/L	<0.0020	<0.010	<0.0010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00020	<0.00010	<0.00010	<0.00010	<0.010	<0.00020	<0.00010	<0.00010	<0.0010
Titanium (Ti)-Leachable	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.011	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Leachable	mg/L	0.00947	0.0503	0.00043	<0.000010	0.000013	<0.000010	<0.000010	0.00155	0.000079	<0.000010	0.000075	<0.0010	<0.000020	<0.000010	<0.000010	0.00059
Vanadium (V)-Leachable	mg/L	<0.020	<0.10	<0.010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0020	<0.0010	<0.0010	<0.0010	<0.10	<0.0020	<0.0010	<0.0010	<0.010
Zinc (Zn)-Leachable	mg/L	7.42	143	29.0	0.0790	<0.0060	0.0107	<0.0080	0.0080	<0.0070	0.0437	0.0988	266	0.351	0.0178	1.05	0.105

APPENDIX A2-2
Shakeflask Extraction Results

ALS Environmental
11-May-07

RESULTS OF ANALYSIS

Mine/Dump Location		Ruby Adit Dump		Calumet 1-15 Pit Dump			Calumet 1-15 Pit Wall		Husky SW	Hector Pit Dump	Miller Pit Dump	Hector Adit Dump			SIME 6 Pit Wall	
Sample ID		95UKHRD02	95UKHRD03	95UKHCD01	95UKHCD02	95UKHCD03	95UKHCP01	95UKHCP02	95UKHWD01	95UKHCD04	95UKHMD01	95UKHHD01	95UKHHD02	95UKHHD03	95UKHSP01	95UKHSP02
Date of Analysis	11-May-07															
ALS Sample ID		L481965-17	L481965-18	L481962-1	L481962-2	L481962-7	L481962-4	L481962-5	L481962-3	L481962-6	L481962-8	L481962-9	L481962-10	L481962-11	L481962-12	L481962-13
Matrix		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Leachable Anions & Nutrients	**Units**															
pH	pH	6.59	7.07	6.25	5.74	6.49	5.76	6.17	2.38	6.34	6.71	6.42	7.04	7.41	7.08	6.53
Leachable Metals																
Aluminum (Al)-Leachable	mg/L	<0.0050	0.0468	<0.0030	0.0217	<0.0010	0.142	0.0041	158	0.0037	0.0245	<0.80	<0.080	0.0221	0.0286	0.0055
Antimony (Sb)-Leachable	mg/L	0.00136	0.00277	0.00077	<0.00050	0.00170	0.00134	0.00299	0.0090	0.00069	0.00175	<0.010	0.0045	0.00454	0.00098	0.00101
Arsenic (As)-Leachable	mg/L	<0.00050	0.00051	0.00014	0.00070	0.00031	0.00055	0.00080	1.40	0.00022	0.00083	0.012	0.0048	0.00127	0.00028	0.00051
Barium (Ba)-Leachable	mg/L	0.0422	0.0392	0.0213	0.306	0.0418	0.00609	0.00765	0.0133	0.259	0.0255	0.0202	0.0860	0.0620	0.0226	0.00448
Beryllium (Be)-Leachable	mg/L	<0.0025	<0.0025	<0.00050	<0.0025	<0.00050	<0.00050	<0.00050	<0.010	<0.00050	<0.00050	<0.050	<0.0050	<0.0025	<0.00050	<0.00050
Bismuth (Bi)-Leachable	mg/L	<0.0025	<0.0025	<0.00050	<0.0025	<0.00050	<0.00050	<0.00050	<0.010	<0.00050	<0.00050	<0.050	<0.0050	<0.0025	<0.00050	<0.00050
Boron (B)-Leachable	mg/L	<0.050	<0.050	0.013	<0.050	0.012	0.021	0.012	<0.20	<0.010	0.012	<1.0	<0.10	<0.050	0.022	0.020
Cadmium (Cd)-Leachable	mg/L	1.25	0.0610	0.00208	0.0771	0.0107	0.000993	0.0169	0.0648	0.190	0.000435	5.03	1.10	0.350	0.0169	0.00230
Calcium (Ca)-Leachable	mg/L	351	439	1.22	32.3	2.75	0.723	3.73	129	6.86	3.39	418	483	458	1.12	1.16
Chromium (Cr)-Leachable	mg/L	<0.0025	<0.0025	<0.00050	<0.0025	<0.00050	<0.00050	<0.00050	0.450	<0.00050	0.00271	<0.050	<0.0050	<0.0025	<0.00050	<0.00050
Cobalt (Co)-Leachable	mg/L	0.0237	0.0403	0.00024	0.00124	0.00014	0.00012	0.00138	0.356	0.00357	<0.00010	0.315	0.0218	0.00522	0.00038	0.00026
Copper (Cu)-Leachable	mg/L	0.0460	0.00157	0.00052	0.0106	0.00130	0.00391	0.00486	1.04	0.00500	0.00283	0.017	0.0113	0.00756	0.00232	0.00395
Iron (Fe)-Leachable	mg/L	<0.030	0.054	<0.030	<0.030	<0.030	<0.030	<0.030	618	<0.030	0.036	<0.090	<0.030	<0.030	<0.030	<0.030
Lead (Pb)-Leachable	mg/L	1.17	0.00482	1.56	16.3	1.08	0.0410	0.0786	0.144	1.75	0.0317	1.78	0.148	0.0878	0.319	0.0440
Lithium (Li)-Leachable	mg/L	<0.025	0.036	<0.0050	<0.025	<0.0050	<0.0050	0.0054	0.27	<0.0050	<0.0050	<0.50	<0.050	<0.025	0.0050	0.0060
Magnesium (Mg)-Leachable	mg/L	49.3	46.2	0.17	3.70	0.51	0.16	0.54	95.3	1.63	0.25	75.9	85.0	48.3	0.20	0.29
Manganese (Mn)-Leachable	mg/L	14.2	16.6	0.0303	0.345	0.0462	0.0434	0.615	19.7	0.448	0.0251	515	17.1	5.41	0.230	0.182
Mercury (Hg)-Leachable	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Molybdenum (Mo)-Leachable	mg/L	<0.00025	<0.00025	<0.000050	<0.00025	<0.000050	<0.000050	<0.000050	0.0024	0.000547	<0.000050	0.0052	0.00053	0.00041	0.000230	<0.000050
Nickel (Ni)-Leachable	mg/L	0.144	0.136	0.00176	0.0067	0.00090	<0.00050	0.00441	0.909	0.00863	<0.00050	0.663	0.0735	0.0260	0.00176	0.00118
Phosphorus (P)-Leachable	mg/L	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	2.27	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)-Leachable	mg/L	4.6	4.8	2.3	12.1	3.1	6.2	3.5	<2.0	2.4	<2.0	5.6	5.0	6.8	6.4	4.1
Selenium (Se)-Leachable	mg/L	0.0050	<0.0050	<0.0010	<0.0050	<0.0010	0.0022	0.0015	<0.020	<0.0010	<0.0010	<0.10	<0.010	<0.0050	<0.0010	<0.0010
Silicon (Si)-Leachable	mg/L	2.45	2.19	2.06	3.52	2.87	3.17	2.65	6.77	3.45	2.72	2.32	2.06	2.03	3.99	3.58
Silver (Ag)-Leachable	mg/L	0.000187	<0.000050	0.00156	0.00465	0.000618	0.000213	0.000061	0.00132	0.000023	0.000047	<0.0010	0.00016	0.000160	0.000883	0.000062
Sodium (Na)-Leachable	mg/L	<2.0	<2.0	<2.0	6.2	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Strontium (Sr)-Leachable	mg/L	0.232	0.324	0.00670	0.156	0.0208	0.00563	0.0168	0.263	0.0582	0.00645	0.432	0.764	0.463	0.00678	0.00641
Thallium (Tl)-Leachable	mg/L	<0.00050	<0.00050	0.00017	<0.00050	<0.00010	0.00014	<0.00010	<0.0020	<0.00010	<0.00010	<0.010	<0.0010	<0.00050	<0.00010	<0.00010
Tin (Sn)-Leachable	mg/L	<0.00050	<0.00050	<0.00010	<0.00050	<0.00010	<0.00010	<0.00010	<0.0020	<0.00010	<0.00010	<0.010	<0.0010	<0.00050	<0.00010	<0.00010
Titanium (Ti)-Leachable	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.019	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Leachable	mg/L	<0.000050	0.000276	<0.000010	<0.000050	<0.000010	<0.000010	<0.000010	0.0109	0.000046	<0.000010	<0.0010	0.00022	0.000435	0.000011	<0.000010
Vanadium (V)-Leachable	mg/L	<0.0050	<0.0050	<0.0010	<0.0050	<0.0010	<0.0010	<0.0010	0.235	<0.0010	<0.0010	<0.10	<0.010	<0.0050	<0.0010	<0.0010
Zinc (Zn)-Leachable	mg/L	16.2	0.590	0.0318	0.660	0.0518	0.0194	0.192	4.36	1.03	0.0418	277	32.9	3.69	0.199	0.0342

APPENDIX A2-2
Shakeflask Extraction Results

ALS Environmental
11-May-07

RESULTS OF ANALYSIS

Mine/Dump Location		SIME 4 Pit Wall	SIME 35 Pit Wall		SIME 4 & 6 Pit Walls	Onek Pit	Onke Pit Dump			Keno 700 Adit Dump		UN Adit Dump	Townsite Adit Dump		Bellekeno Adit Dump
Sample ID		95UKHSP03	95UKHSP04	95UKHSP05	95UKHSD01	95UKHOP01	95UKHOD01	95UKHOD02	95UKHOD03	95UKHKD01	95UKHKD02	95UKHUD01	95UKHTD01	95UKHTD02	95UKHLD01
Date of Analysis	11-May-07														
ALS Sample ID		L481962-14	L481962-15	L481962-16	L481962-17	L481962-18	L481962-19	L481962-20	L481962-21	L481962-22	L481962-23	L481962-24	L481962-25	L481962-26	L481962-27
Matrix		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Leachable Anions & Nutrients	**Units**														
pH	pH	6.81	6.66	6.71	7.32	7.87	7.61	6.67	7.45	7.15	7.46	6.78	5.99	6.37	7.37
Leachable Metals															
Aluminum (Al)-Leachable	mg/L	0.0084	0.0120	0.119	0.0408	0.156	0.270	0.0857	0.0486	0.0099	0.0101	0.0444	0.48	0.0448	0.0289
Antimony (Sb)-Leachable	mg/L	0.0156	0.00148	0.00361	0.00291	0.00232	0.0125	0.00337	0.00100	0.00938	0.00815	0.00558	<0.020	0.00628	0.00877
Arsenic (As)-Leachable	mg/L	0.00508	0.00073	0.00274	0.00219	0.00091	0.0118	0.00463	0.00124	0.00121	0.00591	0.00063	<0.020	0.00106	0.00525
Barium (Ba)-Leachable	mg/L	0.00275	0.00327	0.00424	0.000447	0.00260	0.00118	0.00852	0.0133	0.0396	0.0386	0.0411	0.027	0.0359	0.0413
Beryllium (Be)-Leachable	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.0010	<0.00050	<0.10	<0.0025	<0.0025
Bismuth (Bi)-Leachable	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.0010	<0.00050	<0.10	<0.0025	<0.0025
Boron (B)-Leachable	mg/L	<0.010	<0.010	<0.010	<0.010	0.011	<0.010	0.027	0.012	<0.020	<0.020	0.014	<2.0	<0.050	<0.050
Cadmium (Cd)-Leachable	mg/L	0.00247	0.00137	0.00298	0.00144	0.000071	<0.000050	0.00196	0.000301	0.174	0.0204	0.0132	5.58	1.29	0.00930
Calcium (Ca)-Leachable	mg/L	2.33	5.42	1.91	9.57	18.7	9.93	1.80	39.6	134	155	3.76	91.7	61.8	214
Chromium (Cr)-Leachable	mg/L	<0.00050	<0.00050	<0.00050	0.00133	<0.00050	<0.00050	0.00118	0.00075	<0.0010	<0.0010	<0.00050	<0.10	<0.0025	<0.0025
Cobalt (Co)-Leachable	mg/L	0.00014	0.00010	0.00014	<0.00010	<0.00010	0.00015	<0.00010	<0.00010	0.00198	<0.00020	0.00043	0.361	0.00736	<0.00050
Copper (Cu)-Leachable	mg/L	0.00144	0.00168	0.00158	0.00047	<0.0012	0.00272	0.00383	0.00348	0.00842	0.00527	0.00427	0.038	0.00893	0.00456
Iron (Fe)-Leachable	mg/L	<0.030	<0.030	0.081	<0.030	<0.030	0.098	0.081	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Lead (Pb)-Leachable	mg/L	0.0331	0.00965	0.0265	0.00161	0.00155	<0.00040	0.0175	0.00895	0.105	0.0199	0.156	0.881	3.03	0.0464
Lithium (Li)-Leachable	mg/L	<0.0050	0.0126	0.0059	<0.0050	0.0057	<0.0050	<0.0050	0.0067	<0.010	<0.010	0.0066	<1.0	<0.025	<0.025
Magnesium (Mg)-Leachable	mg/L	0.26	0.56	0.17	0.56	1.74	0.65	0.31	4.40	6.09	19.3	0.70	47.3	64.6	13.0
Manganese (Mn)-Leachable	mg/L	0.0577	0.0642	0.0874	0.0728	0.00686	0.00381	0.0847	0.00540	0.701	0.201	0.170	455	5.06	0.319
Mercury (Hg)-Leachable	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Molybdenum (Mo)-Leachable	mg/L	0.000104	0.000570	0.000206	0.000265	0.00201	0.00197	0.000269	0.00143	0.00086	0.0187	<0.000050	<0.010	<0.00025	0.00971
Nickel (Ni)-Leachable	mg/L	<0.00050	0.00079	0.00086	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.0054	<0.0010	0.00148	0.62	0.0293	<0.0025
Phosphorus (P)-Leachable	mg/L	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)-Leachable	mg/L	<2.0	<2.0	2.3	<2.0	4.2	<2.0	<2.0	4.1	3.2	4.7	3.1	5.0	4.1	6.7
Selenium (Se)-Leachable	mg/L	<0.0010	0.0030	<0.0010	<0.0010	0.0029	<0.0010	<0.0010	0.0068	<0.0020	<0.0020	<0.0010	<0.20	<0.0050	<0.0050
Silicon (Si)-Leachable	mg/L	1.69	3.71	2.11	1.67	1.79	4.03	2.52	2.04	2.24	2.09	3.59	2.24	4.02	2.16
Silver (Ag)-Leachable	mg/L	0.000078	0.000012	0.000328	0.000018	<0.000010	<0.000010	0.000229	0.000016	0.000171	0.000053	0.000172	<0.0020	0.000143	0.000096
Sodium (Na)-Leachable	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	4.5	<2.0	<2.0	<2.0	<2.0	<2.0	9.0
Strontium (Sr)-Leachable	mg/L	0.0101	0.0140	0.00621	0.00937	0.0557	0.0204	0.0126	0.103	0.205	0.335	0.0154	0.140	0.0225	0.332
Thallium (Tl)-Leachable	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00020	<0.00020	<0.00010	<0.020	<0.00050	<0.00050
Tin (Sn)-Leachable	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00016	<0.00010	<0.00020	<0.00020	<0.00010	<0.020	<0.00050	<0.00050
Titanium (Ti)-Leachable	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Leachable	mg/L	<0.000010	<0.000010	0.000016	0.000021	0.000223	0.000033	0.000015	0.000240	0.000076	0.000545	<0.000010	<0.0020	<0.000050	0.00237
Vanadium (V)-Leachable	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0047	<0.0010	<0.0010	<0.0020	<0.0020	<0.0010	<0.20	<0.0050	<0.0050
Zinc (Zn)-Leachable	mg/L	0.0131	0.0317	0.0878	0.0473	<0.0040	<0.0050	0.0278	<0.0050	1.76	0.221	0.118	289	17.0	0.0829

APPENDIX A2-3
UKHM Haulage Route Sampling

Keno Hill Waste Rock Chemistry Data				DIXIE Adit dump			BERMINGHAM pit wall						BERMINGHAM pit dump					
		Method	Units	95UKHDD01	95UKHDD02	95UKHDD03	95UKHBP01	95UKHBP02	95UKHBP03	95UKHBP04	95UKHBP06	95UKHBP07	95UKHBD01	95UKHBD02	95UKHBD03	95UKHBD04	95UKHBD05	95UKHBD06
MPA	OA-VOL08	*Basic Acid Base Accounting*	tCaCO3/1000t ore	10	11.6	9.1	0.9	0.6	0.9	0.3	21.6	0.6	5.3	6.3	23.4	6.6	0.9	0.9
FIZZ RATING	OA-VOL08	*Basic Acid Base Accounting*	Unity	1	1	2	1	1	1	1	3	1	1	2	3	2	1	1
NNP	OA-VOL08	*Basic Acid Base Accounting*	tCaCO3/1000t ore	-6	-15	2	4	4	6	5	46	6	15	11	285	24	6	1
NP	OA-VOL08	*Basic Acid Base Accounting*	tCaCO3/1000t ore	4	-3	11	5	5	7	5	68	7	20	17	308	31	7	2
pH	OA-ELE07	*Paste pH*	Unity	4.3	3.5	5.2	6.6	7	7.1	7.4	7.7	8.2	7.4	7.4	7	7.5	7.6	7.6
Ratio (NP:MPA)	OA-VOL08	*Basic Acid Base Accounting*	Unity	0.4	-0.26	1.21	5.33	8	7.47	16	3.15	11.2	3.76	2.72	13.14	4.72	7.47	2.13
S	S-IR08	*Total Sulphur (Leco)*	%	0.32	0.37	0.29	0.03	0.02	0.03	0.01	0.69	0.02	0.17	0.2	0.75	0.21	0.03	0.03
S	S-GRA06	*Sulfate Sulfur-carbonate leach*	%	0.22	0.3	0.23	0.01	0.01	<0.01	<0.01	0.05	0.01	0.03	0.05	0.18	0.02	0.01	0.02
S	S-GRA06a	*Sulfate Sulfur (HCl leachable)*	%	0.21	0.3	0.22	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	0.16	0.17	0.21	0.08	0.01	0.01
S	S-CAL06	*Sulfide Sulpher (calculated)*	%	0.1	0.07	0.06	0.02	0.01	0.03	0.01	0.64	0.01	0.14	0.15	0.57	0.19	0.02	0.01
C	C-GAS05	*Inorganic Carbon (CO2)*	%	0.08	<0.05	0.15	<0.05	<0.05	<0.05	<0.05	0.8	<0.05	0.18	0.15	3.64	0.37	0.11	<0.05
CO2	C-GAS05	*Inorganic Carbon (CO2)*	%	0.3	<0.2	0.6	<0.2	<0.2	<0.2	<0.2	2.9	<0.2	0.7	0.6	13.4	1.4	0.4	<0.2
Au	Au-ICP21	*Au 30g FA ICP-AES Finish*	ppm	0.013	0.015	0.003	0.005	0.008	0.019	0.004	0.001	<0.001	0.056	0.046	0.085	0.039	0.009	0.016
Ag (Silver)	ME-ICP61	*27 element four acid ICP-AES*	ppm	1.7	14.7	1.6	11.5	6.1	15.1	3.4	0.5	<0.5	**>100**	**>100**	**>100**	95.4	5.3	10.7
Al (Aluminum)	ME-ICP61	*27 element four acid ICP-AES*	%	2.08	1.3	3.42	1.87	4.16	5.69	1.02	4.49	8.68	2.39	2.94	1.72	3.19	0.46	0.99
As (Arsenic)	ME-ICP61	*27 element four acid ICP-AES*	ppm	66	49	22	69	304	331	43	38	<5	620	433	944	424	39	89
Ba (Barium)	ME-ICP61	*27 element four acid ICP-AES*	ppm	300	210	430	350	600	1110	130	770	860	530	880	330	630	140	260
Be (Beryllium)	ME-ICP61	*27 element four acid ICP-AES*	ppm	0.6	<0.5	1	0.5	1.3	1.4	<0.5	1.1	2.3	0.7	0.8	0.6	0.8	<0.5	<0.5
Bi (Bismuth)	ME-ICP61	*27 element four acid ICP-AES*	ppm	<2	<2	<2	2	<2	3	<2	<2	3	5	7	7	3	<2	2
Ca (Calcium)	ME-ICP61	*27 element four acid ICP-AES*	%	0.25	0.1	0.51	0.06	0.18	0.08	0.02	1.98	0.15	0.22	0.18	0.57	0.15	0.03	0.02
Cd (Cadmium)	ME-ICP61	*27 element four acid ICP-AES*	ppm	<0.5	5.9	3.7	15.8	24.6	15.8	5.2	1.2	1	211	151	691	110	12.9	9
Co (Cobalt)	ME-ICP61	*27 element four acid ICP-AES*	ppm	<1	<1	2	3	2	6	1	8	14	5	3	<1	3	<1	<1
Cr (Chromium)	ME-ICP61	*27 element four acid ICP-AES*	ppm	46	34	60	38	77	78	45	47	61	36	42	32	56	32	34
Cu (Copper)	ME-ICP61	*27 element four acid ICP-AES*	ppm	9	15	11	39	25	39	14	24	22	119	86	137	76	10	16
Fe (Iron)	ME-ICP61	*27 element four acid ICP-AES*	%	2.1	1.2	1.81	1.45	2.95	4.14	1.15	2.24	3.95	10.9	8.54	14.05	6.01	1.21	1.09
Ga (Gallium)	ME-ICP61	*27 element four acid ICP-AES*	ppm	10	<10	10	10	10	10	<10	10	20	<10	10	<10	10	<10	<10
K (Potassium)	ME-ICP61	*27 element four acid ICP-AES*	%	0.36	0.36	0.66	0.5	0.88	1.69	0.21	1.27	2.56	0.62	0.87	0.49	0.85	0.13	0.27
La (Lanthanum)	ME-ICP61	*27 element four acid ICP-AES*	ppm	10	10	20	10	20	20	<10	20	40	10	10	10	20	<10	10
Mg (Magnesium)	ME-ICP61	*27 element four acid ICP-AES*	%	0.16	0.06	0.24	0.14	0.54	0.34	0.12	0.95	0.93	0.24	0.24	0.38	0.25	0.02	0.05
Mn (Manganese)	ME-ICP61	*27 element four acid ICP-AES*	ppm	1040	691	179	1690	1985	4430	1615	707	441	46400	29300	82800	18700	3420	1615
Mo (Molybdenum)	ME-ICP61	*27 element four acid ICP-AES*	ppm	1	<1	1	<1	1	1	<1	4	<1	1	2	1	<1	<1	<1
Na (Sodium)	ME-ICP61	*27 element four acid ICP-AES*	%	0.08	0.02	0.14	----	0.15	0.17	0.04	0.39	0.97	0.08	0.08	0.04	0.1	0.01	0.03
Ni (Nickel)	ME-ICP61	*27 element four acid ICP-AES*	ppm	8	6	15	15	26	25	10	24	34	19	17	11	17	3	2
P (Phosphorous)	ME-ICP61	*27 element four acid ICP-AES*	ppm	280	390	470	440	600	560	150	1320	340	630	650	750	540	190	140
Pb (Lead)	ME-ICP61	*27 element four acid ICP-AES*	ppm	81	896	122	897	75	576	101	38	18	**>10000**	8660	**>10000**	6010	489	864
S (Sulphur)	ME-ICP61	*27 element four acid ICP-AES*	%	0.29	0.36	0.28	0.02	0.02	0.03	0.01	0.71	0.03	0.17	0.21	0.78	0.21	0.02	0.02
Sb (Antimony)	ME-ICP61	*27 element four acid ICP-AES*	ppm	21	35	9	18	27	24	12	5	9	222	153	247	131	11	31
Sc (Scandium)	ME-ICP61	*27 element four acid ICP-AES*	ppm	3	3	5	4	10	12	4	7	13	7	7	7	7	1	2
Sr (Strontium)	ME-ICP61	*27 element four acid ICP-AES*	ppm	35	20	59	28	71	91	24	126	92	86	82	37	76	10	27
Th	ME-ICP61	*27 element four acid ICP-AES*	ppm	<20	<20	<20	<20	<20	<20	<20	<20	20	<20	<20	<20	<20	<20	<20
Ti (Titanium)	ME-ICP61	*27 element four acid ICP-AES*	%	0.13	0.12	0.18	0.11	0.25	0.23	0.11	0.22	0.24	0.1	0.1	0.08	0.18	0.05	0.08
Tl (Thallium)#	ME-ICP61	*27 element four acid ICP-AES*	ppm	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	<10	10	<10	<10	<10
U (Uranium)	ME-ICP61	*27 element four acid ICP-AES*	ppm	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	<10	<10	<10
V (Vanadium)	ME-ICP61	*27 element four acid ICP-AES*	ppm	41	30	63	37	92	130	31	66	77	52	63	36	66	10	21
W (Tungsten)	ME-ICP61	*27 element four acid ICP-AES*	ppm	<10	<10	<10	<10	<10	10	<10	<10	<10	<10	<10	<10	<10	<10	10
Zn (Zinc)	ME-ICP61	*27 element four acid ICP-AES*	ppm	93	489	214	646	621	659	276	120	112	3800	2860	**>10000**	3070	337	281
Fire Assay Results for samples triggered due to concentration indicated during ICP testing																		
Ag (Silver)	Ag-OG62	*Ore Grade Ag - Four Acid*	**ppm**										**230**	**191**	**190**			
Ag (Silver)		*Calculated*	**oz. (troy) / Tonne**										**7.39**	**6.14**	**6.11**			
Pb (Lead)	Pb-OG62	*Ore Grade Pb - Four Acid*	**%**										**1.17**		**1.14**			
Zn (Zinc)	Zn-OG62	*Ore Grade Zn - Four Acid*	**%**												**1.18**			

Red = fire assay testing triggered

Keno Hill Waste Rock Chemistry Data				RUBY adit dump			HUSKY SW	CALUMET 1-14 pit dump		HUSKY SW	CALUMET 1-15 pit wall		CALUMET 1-15 pit dump		MILLER pit dump
	Method		Units	95UKHRD01	95UKHRD02	95UKHRD03	95UKHWD01	95UKHCD01	95UKHCD02	95UKHWD01	95UKHCP01	95UKHCP02	95UKHCD04	95UKHCD03	95UKHMD01
MPA	OA-VOL08	*Basic Acid Base Accounting*	tCaCO3/1000t ore	38.1	12.8	15.6	37.5	0.6	5.3	37.5	0.9	0.9	2.2	4.4	0.3
FIZZ RATING	OA-VOL08	*Basic Acid Base Accounting*	Unity	2	2	2	1	1	1	1	1	1	1	1	1
NNP	OA-VOL08	*Basic Acid Base Accounting*	tCaCO3/1000t ore	14	5	2	-43	0	-3	-43	-1	1	3	-4	4
NP	OA-VOL08	*Basic Acid Base Accounting*	tCaCO3/1000t ore	52	18	18	-5	1	2	-5	0	2	5	0	4
pH	OA-ELE07	*Paste pH*	Unity	7.5	7.1	7.6	3.2	6.6	6.1	3.2	6.9	7.1	6.9	6.7	7.3
Ratio (NP:MPA)	OA-VOL08	*Basic Acid Base Accounting*	Unity	1.36	1.4	1.15	-0.13	1.6	0.38	-0.13	0	2.13	2.29	0	12.8
S	S-IR08	*Total Sulphur (Leco)*	%	1.22	0.41	0.5	1.2	0.02	0.17	1.2	0.03	0.03	0.07	0.14	0.01
S	S-GRA06	*Sulfate Sulfur-carbonate leach*	%	0.44	0.12	0.26	0.42	0.01	0.07	0.42	0.01	0.02	0.02	0.11	<0.01
S	S-GRA06a	*Sulfate Sulfur (HCl leachable)*	%	0.46	0.14	0.25	0.37	<0.01	0.13	0.37	0.02	0.02	0.04	0.11	<0.01
S	S-CAL06	*Sulfide Sulpher (calculated)*	%	0.78	0.29	0.24	0.78	0.01	0.1	0.78	0.02	0.01	0.05	0.03	0.01
C	C-GAS05	*Inorganic Carbon (CO2)*	%	0.78	0.34	0.12	<0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
CO2	C-GAS05	*Inorganic Carbon (CO2)*	%	2.9	1.3	0.5	<0.2	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.2	<0.2
Au	Au-ICP21	*Au 30g FA ICP-AES Finish*	ppm	0.024	0.177	0.011	0.029	0.018	0.175	0.029	0.011	0.001	0.066	0.106	0.005
Ag (Silver)	ME-ICP61	*27 element four acid ICP-AES*	ppm	19	**>100**	23	8.2	**>100**	**>100**	8.2	21.5	34.3	**>100**	**>100**	6.4
Al (Aluminum)	ME-ICP61	*27 element four acid ICP-AES*	%	4.73	3.02	4.85	2.62	1.15	2.59	2.62	6.8	2.21	2.14	1.87	0.6
As (Arsenic)	ME-ICP61	*27 element four acid ICP-AES*	ppm	172	178	53	82	117	800	82	56	70	295	829	53
Ba (Barium)	ME-ICP61	*27 element four acid ICP-AES*	ppm	610	420	310	420	100	480	420	1180	410	150	230	100
Be (Beryllium)	ME-ICP61	*27 element four acid ICP-AES*	ppm	1.2	0.8	0.8	0.5	<0.5	0.6	0.5	1.5	0.7	<0.5	<0.5	<0.5
Bi (Bismuth)	ME-ICP61	*27 element four acid ICP-AES*	ppm	<2	<2	<2	<2	<2	2	<2	2	<2	3	<2	3
Ca (Calcium)	ME-ICP61	*27 element four acid ICP-AES*	%	1.47	0.3	3.09	0.08	0.02	0.03	0.08	0.02	0.05	0.04	0.02	0.03
Cd (Cadmium)	ME-ICP61	*27 element four acid ICP-AES*	ppm	17.4	47.3	7.9	0.5	1	22.9	0.5	2	3.4	27.8	16.6	12.2
Co (Cobalt)	ME-ICP61	*27 element four acid ICP-AES*	ppm	6	1	21	1	1	<1	1	<1	<1	5	<1	1
Cr (Chromium)	ME-ICP61	*27 element four acid ICP-AES*	ppm	71	53	42	52	25	53	52	110	56	51	46	30
Cu (Copper)	ME-ICP61	*27 element four acid ICP-AES*	ppm	21	128	100	14	73	242	14	27	11	295	211	8
Fe (Iron)	ME-ICP61	*27 element four acid ICP-AES*	%	3.71	3.06	5.41	1.83	1.28	6.51	1.83	2.51	1.71	3.17	3.67	1.21
Ga (Gallium)	ME-ICP61	*27 element four acid ICP-AES*	ppm	10	10	10									
K (Potassium)	ME-ICP61	*27 element four acid ICP-AES*	%	1.16	0.73	0.46	0.51	0.27	0.81	0.51	2.12	0.62	0.27	0.52	0.19
La (Lanthanum)	ME-ICP61	*27 element four acid ICP-AES*	ppm	20	20	10									
Mg (Magnesium)	ME-ICP61	*27 element four acid ICP-AES*	%	0.42	0.22	1.52	0.17	0.04	0.07	0.17	0.14	0.11	0.44	0.04	0.02
Mn (Manganese)	ME-ICP61	*27 element four acid ICP-AES*	ppm	8680	5920	1865	176	182	6630	176	94	155	2950	3590	4970
Mo (Molybdenum)	ME-ICP61	*27 element four acid ICP-AES*	ppm	2	1	<1	<1	<1	1	<1	1	<1	<1	1	<1
Na (Sodium)	ME-ICP61	*27 element four acid ICP-AES*	%	0.15	0.09	0.49	0.09	0.02	0.06	0.09	0.14	0.05	0.19	0.04	0.02
Ni (Nickel)	ME-ICP61	*27 element four acid ICP-AES*	ppm	40	14	41	10	6	5	10	9	8	20	5	3
P (Phosphorous)	ME-ICP61	*27 element four acid ICP-AES*	ppm	650	430	730	70	80	440	70	370	500	270	320	250
Pb (Lead)	ME-ICP61	*27 element four acid ICP-AES*	ppm	992	5520	915	447	9330	**>10000**	447	668	681	7890	**>10000**	620
S (Sulphur)	ME-ICP61	*27 element four acid ICP-AES*	%	1.28	0.42	0.56	1.25	0.02	0.17	1.25	0.04	0.03	0.07	0.14	0.01
Sb (Antimony)	ME-ICP61	*27 element four acid ICP-AES*	ppm	24	161	27	22	54	282	22	17	20	136	258	13
Sc (Scandium)	ME-ICP61	*27 element four acid ICP-AES*	ppm	8	6	18									
Sr (Strontium)	ME-ICP61	*27 element four acid ICP-AES*	ppm	99	47	128	27	8	29	27	94	30	41	18	12
Th	ME-ICP61	*27 element four acid ICP-AES*	ppm	<20	<20	<20									
Ti (Titanium)	ME-ICP61	*27 element four acid ICP-AES*	%	0.24	0.15	0.69	0.24	0.08	0.11	0.24	0.36	0.14	0.23	0.1	0.06
Tl (Thallium)#	ME-ICP61	*27 element four acid ICP-AES*	ppm	<10	<10	<10									
U (Uranium)	ME-ICP61	*27 element four acid ICP-AES*	ppm	<10	<10	<10									
V (Vanadium)	ME-ICP61	*27 element four acid ICP-AES*	ppm	77	57	197	65	16	48	65	108	42	72	32	13
W (Tungsten)	ME-ICP61	*27 element four acid ICP-AES*	ppm	<10	<10	<10	10	<10	<10	10	<10	<10	<10	<10	<10
Zn (Zinc)	ME-ICP61	*27 element four acid ICP-AES*	ppm	1430	1860	578	57	276	2050	57	306	357	1155	1040	950
Fire Assay Results for samples triggered due to concentration indicated during ICP testing															
Ag (Silver)	Ag-OG62	*Ore Grade Ag - Four Acid*	**ppm**		**241**			**126**	**290**				**265**	**219**	
Ag (Silver)		*Calculated*	**oz. (troy) / Tonne**		**7.75**			**4.05**	**9.32**				**8.52**	**7.04**	
Pb (Lead)	Pb-OG62	*Ore Grade Pb - Four Acid*	**%**						**1.51**					**1.46**	
Zn (Zinc)	Zn-OG62	*Ore Grade Zn - Four Acid*	**%**												

Red = fire assay testing triggered

APPENDIX A2-3
UKHM Haulage Route Sampling

Keno Hill Waste Rock Chemistry Data				HECTOR adit dump			SIME 6 pit wall		SIME 4 pit wall	SIME 35 pit wall		SIME 4 & 6 pits wall	ONEK pit	ONEK pit dump			KENO 700
	Method		Units	95UKHHD01	95UKHHD02	95UKHHD03	95UKHSP01	95UKHSP02	95UKHSP03	95UKHSP04	95UKHSP05	95UKHSD01	95UKHOP01	95UKHOD01	95UKHOD02	95UKHOD03	95UKHKD01
MPA	OA-VOL08	*Basic Acid Base Accounting*	tCaCO3/1000t ore	60.3	53.8	21.9	1.9	1.3	0.3	1.3	0.9	0.6	9.4	0.3	0.3	1.9	17.8
FIZZ RATING	OA-VOL08	*Basic Acid Base Accounting*	Unity	2	3	3	1	1	1	1	1	1	3	2	1	3	3
NNP	OA-VOL08	*Basic Acid Base Accounting*	tCaCO3/1000t ore	1	49	19	2	1	1	3	2	3	55	17	1	36	17
NP	OA-VOL08	*Basic Acid Base Accounting*	tCaCO3/1000t ore	61	103	41	4	2	1	4	3	4	64	17	1	38	35
pH	OA-ELE07	*Paste pH*	Unity	6	7.2	7.4	7.1	7.1	7.5	7.4	7.6	8	8.4	8.7	8.1	7.7	7.8
Ratio (NP:MPA)	OA-VOL08	*Basic Acid Base Accounting*	Unity	1.01	1.92	1.87	2.13	1.6	3.2	3.2	3.2	6.4	6.83	54.4	3.2	20.27	1.96
S	S-IR08	*Total Sulphur (Leco)*	%	1.93	1.72	0.7	0.06	0.04	0.01	0.04	0.03	0.02	0.3	0.01	0.01	0.06	0.57
S	S-GRA06	*Sulfate Sulfur-carbonate leach*	%	0.45	0.26	0.18	0.02	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.04
S	S-GRA06a	*Sulfate Sulfur (HCl leachable)*	%	0.42	0.24	0.16	0.03	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.04
S	S-CAL06	*Sulfide Sulpher (calculated)*	%	1.48	1.46	0.52	0.04	0.03	0.01	0.04	0.03	0.02	0.3	0.01	0.01	0.06	0.53
C	C-GAS05	*Inorganic Carbon (CO2)*	%	0.91	1.82	0.63	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.89	0.11	<0.05	0.51	0.47
CO2	C-GAS05	*Inorganic Carbon (CO2)*	%	3.3	6.7	2.3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	3.3	0.4	<0.2	1.9	1.7
Au	Au-ICP21	*Au 30g FA ICP-AES Finish*	ppm	0.058	0.039	0.022	0.179	0.009	0.011	0.006	0.003	0.004	<0.001	<0.001	0.004	0.001	0.116
Ag (Silver)	ME-ICP61	*27 element four acid ICP-AES*	ppm	**>100**	60.1	54.8	51.4	8.9	2.5	0.7	1.5	1.2	<0.5	<0.5	4.9	<0.5	90.5
Al (Aluminum)	ME-ICP61	*27 element four acid ICP-AES*	%	3.15	2.44	3.46	7.04	2.97	0.43	5.52	3.59	0.58	3.92	8.55	0.58	9.26	1.72
As (Arsenic)	ME-ICP61	*27 element four acid ICP-AES*	ppm	352	733	188	59	36	84	18	37	29	9	7	85	25	423
Ba (Barium)	ME-ICP61	*27 element four acid ICP-AES*	ppm	500	510	680	1070	480	70	940	440	80	500	20	50	1160	310
Be (Beryllium)	ME-ICP61	*27 element four acid ICP-AES*	ppm	0.8	0.6	0.8	1.9	0.7	<0.5	1.4	0.9	<0.5	1	0.7	<0.5	2.3	<0.5
Bi (Bismuth)	ME-ICP61	*27 element four acid ICP-AES*	ppm	2	2	2	2	3	<2	<2	2	<2	<2	<2	<2	<2	3
Ca (Calcium)	ME-ICP61	*27 element four acid ICP-AES*	%	0.57	0.95	0.67	0.09	0.02	0.02	0.2	0.1	0.05	2.65	8.32	0.05	1.69	0.67
Cd (Cadmium)	ME-ICP61	*27 element four acid ICP-AES*	ppm	203	211	61.4	9.6	2.1	4.5	2.3	10.3	7.8	2.9	0.9	6.2	1.4	85.2
Co (Cobalt)	ME-ICP61	*27 element four acid ICP-AES*	ppm	1	5	4	1	1	<1	<1	2	2	6	41	<1	12	3
Cr (Chromium)	ME-ICP61	*27 element four acid ICP-AES*	ppm	50	48	63	87	60	27	95	79	34	58	109	42	112	48
Cu (Copper)	ME-ICP61	*27 element four acid ICP-AES*	ppm	109	58	51	59	16	7	28	7	2	11	144	55	28	68
Fe (Iron)	ME-ICP61	*27 element four acid ICP-AES*	%	4.8	5.35	2.91	2.84	1.59	0.46	3.12	2.09	0.45	2.17	8.5	1	4.52	2.19
Ga (Gallium)	ME-ICP61	*27 element four acid ICP-AES*	ppm														
K (Potassium)	ME-ICP61	*27 element four acid ICP-AES*	%	0.92	0.74	1.05	2.36	0.93	0.12	1.16	0.79	0.16	0.76	0.02	0.17	1.78	0.49
La (Lanthanum)	ME-ICP61	*27 element four acid ICP-AES*	ppm														
Mg (Magnesium)	ME-ICP61	*27 element four acid ICP-AES*	%	0.27	0.46	0.3	0.16	0.1	0.02	0.37	0.12	0.02	0.26	4.15	0.04	0.36	0.18
Mn (Manganese)	ME-ICP61	*27 element four acid ICP-AES*	ppm	13550	23900	8300	952	174	73	229	752	732	275	1440	163	277	3870
Mo (Molybdenum)	ME-ICP61	*27 element four acid ICP-AES*	ppm	<1	<1	1	1	<1	<1	2	<1	<1	<1	<1	1	1	1
Na (Sodium)	ME-ICP61	*27 element four acid ICP-AES*	%	0.08	0.06	0.1	0.17	0.05	0.01	0.26	0.1	0.02	0.16	1.08	0.02	0.31	0.07
Ni (Nickel)	ME-ICP61	*27 element four acid ICP-AES*	ppm	16	21	15	10	5	2	21	16	4	21	93	2	54	13
P (Phosphorous)	ME-ICP61	*27 element four acid ICP-AES*	ppm	440	350	390	740	440	120	1210	450	110	450	610	170	1030	260
Pb (Lead)	ME-ICP61	*27 element four acid ICP-AES*	ppm	5170	3020	2530	2250	1230	292	48	103	68	43	19	224	79	7170
S (Sulphur)	ME-ICP61	*27 element four acid ICP-AES*	%	2	1.78	0.73	0.06	0.04	0.01	0.04	0.03	0.02	0.32	0.01	0.01	0.07	0.59
Sb (Antimony)	ME-ICP61	*27 element four acid ICP-AES*	ppm	130	76	59	46	17	19	<5	9	<5	5	11	6	<5	96
Sc (Scandium)	ME-ICP61	*27 element four acid ICP-AES*	ppm														
Sr (Strontium)	ME-ICP61	*27 element four acid ICP-AES*	ppm	37	42	55	103	30	8	108	43	10	207	253	6	226	42
Th	ME-ICP61	*27 element four acid ICP-AES*	ppm														
Ti (Titanium)	ME-ICP61	*27 element four acid ICP-AES*	%	0.16	0.13	0.17	0.38	0.19	0.05	0.27	0.2	0.06	0.2	0.97	0.07	0.27	0.13
Tl (Thallium)#	ME-ICP61	*27 element four acid ICP-AES*	ppm														
U (Uranium)	ME-ICP61	*27 element four acid ICP-AES*	ppm														
V (Vanadium)	ME-ICP61	*27 element four acid ICP-AES*	ppm	54	47	58	117	49	8	108	60	9	59	341	12	145	31
W (Tungsten)	ME-ICP61	*27 element four acid ICP-AES*	ppm	<10	<10	<10	<10	<10	10	<10	<10	<10	<10	<10	<10	<10	<10
Zn (Zinc)	ME-ICP61	*27 element four acid ICP-AES*	ppm	**>10000**	**>10000**	4640	778	224	108	161	414	309	421	181	172	168	5920
Fire Assay Results for samples triggered due to concentration indicated during ICP testing																	
Ag (Silver)	Ag-OG62	*Ore Grade Ag - Four Acid*	**ppm**	**123**													
Ag (Silver)		*Calculated*	**oz. (troy) / Tonne**	**3.95**													
Pb (Lead)	Pb-OG62	*Ore Grade Pb - Four Acid*	**%**														
Zn (Zinc)	Zn-OG62	*Ore Grade Zn - Four Acid*	**%**	**1.62**	**1.66**												

Red = fire assay testing triggered

APPENDIX A2-3
UKHM Haulage Route Sampling

Keno Hill Waste Rock Chemistry Data				adit dump	UN adit dump	TOWNSITE adit dump		BELLEKENO adit dump	SILVER KING pit dump	GALKENO 900
	Method		Units	95UKHKD02	95UKHUD01	95UKHTD01	95UKHTD02	95UKHLD01	95UKHVD01	95UKGK901
MPA	OA-VOL08	*Basic Acid Base Accounting*	tCaCO3/1000t ore	12.8	1.3	39.7	10.9	24.4	14.7	17.8
FIZZ RATING	OA-VOL08	*Basic Acid Base Accounting*	Unity	3	1	2	2	3	1	2
NNP	OA-VOL08	*Basic Acid Base Accounting*	tCaCO3/1000t ore	28	3	-24	-1	49	-14	-11
NP	OA-VOL08	*Basic Acid Base Accounting*	tCaCO3/1000t ore	41	4	16	10	73	1	7
pH	OA-ELE07	*Paste pH*	Unity	7.9	7.8	5.7	6.7	7.1	4.2	4.6
Ratio (NP:MPA)	OA-VOL08	*Basic Acid Base Accounting*	Unity	3.2	3.2	0.4	0.91	2.99	0.07	0.39
S	S-IR08	*Total Sulphur (Leco)*	%	0.41	0.04	1.27	0.35	0.78	0.47	0.57
S	S-GRA06	*Sulfate Sulfur-carbonate leach*	%	0.08	0.01	0.24	0.23	0.04	0.42	0.37
S	S-GRA06a	*Sulfate Sulfur (HCl leachable)*	%	0.07	0.01	0.23	0.22	0.02	0.4	0.37
S	S-CAL06	*Sulfide Sulpher (calculated)*	%	0.33	0.03	1.03	0.12	0.74	0.05	0.2
C	C-GAS05	*Inorganic Carbon (CO2)*	%	0.49	<0.05	0.36	0.23	1.03	<0.05	0.13
CO2	C-GAS05	*Inorganic Carbon (CO2)*	%	1.8	<0.2	1.3	0.9	3.8	0.2	0.5
Au	Au-ICP21	*Au 30g FA ICP-AES Finish*	ppm	0.112	0.019	0.076	0.339	0.016	0.121	0.021
Ag (Silver)	ME-ICP61	*27 element four acid ICP-AES*	ppm	21.2	49.3	61.5	**>100**	28.5	19.7	25.3
Al (Aluminum)	ME-ICP61	*27 element four acid ICP-AES*	%	3.93	5.57	2.07	2.08	2.24	4.37	3.47
As (Arsenic)	ME-ICP61	*27 element four acid ICP-AES*	ppm	367	78	125	696	348	290	101
Ba (Barium)	ME-ICP61	*27 element four acid ICP-AES*	ppm	2870	1010	320	260	330	1050	1030
Be (Beryllium)	ME-ICP61	*27 element four acid ICP-AES*	ppm	1.2	1.4	0.5	0.7	0.6	0.9	0.9
Bi (Bismuth)	ME-ICP61	*27 element four acid ICP-AES*	ppm	4	<2	<2	<2	<2	<2	<2
Ca (Calcium)	ME-ICP61	*27 element four acid ICP-AES*	%	0.68	0.11	0.16	0.08	2.65	0.3	0.41
Cd (Cadmium)	ME-ICP61	*27 element four acid ICP-AES*	ppm	34.9	5.7	90.8	56.5	12.9	1.4	1.1
Co (Cobalt)	ME-ICP61	*27 element four acid ICP-AES*	ppm	11	3	4	<1	3	1	2
Cr (Chromium)	ME-ICP61	*27 element four acid ICP-AES*	ppm	56	90	58	46	61	54	61
Cu (Copper)	ME-ICP61	*27 element four acid ICP-AES*	ppm	105	31	33	285	24	25	19
Fe (Iron)	ME-ICP61	*27 element four acid ICP-AES*	%	3.33	2.81	2.99	4.17	2.03	2.33	2.11
Ga (Gallium)	ME-ICP61	*27 element four acid ICP-AES*	ppm							
K (Potassium)	ME-ICP61	*27 element four acid ICP-AES*	%	1.02	1.31	0.59	0.4	0.5	1.28	0.92
La (Lanthanum)	ME-ICP61	*27 element four acid ICP-AES*	ppm							
Mg (Magnesium)	ME-ICP61	*27 element four acid ICP-AES*	%	0.79	0.32	0.13	0.1	0.26	0.25	0.27
Mn (Manganese)	ME-ICP61	*27 element four acid ICP-AES*	ppm	4900	371	7300	4260	2210	235	593
Mo (Molybdenum)	ME-ICP61	*27 element four acid ICP-AES*	ppm	2	1	<1	<1	1	<1	1
Na (Sodium)	ME-ICP61	*27 element four acid ICP-AES*	%	0.24	0.21	0.04	0.05	0.06	0.15	0.12
Ni (Nickel)	ME-ICP61	*27 element four acid ICP-AES*	ppm	35	19	9	12	16	11	18
P (Phosphorous)	ME-ICP61	*27 element four acid ICP-AES*	ppm	300	720	340	430	490	360	430
Pb (Lead)	ME-ICP61	*27 element four acid ICP-AES*	ppm	1460	1960	941	**>10000**	1370	333	477
S (Sulphur)	ME-ICP61	*27 element four acid ICP-AES*	%	0.38	0.04	1.29	0.36	0.85	0.46	0.56
Sb (Antimony)	ME-ICP61	*27 element four acid ICP-AES*	ppm	27	53	39	707	27	28	27
Sc (Scandium)	ME-ICP61	*27 element four acid ICP-AES*	ppm							
Sr (Strontium)	ME-ICP61	*27 element four acid ICP-AES*	ppm	100	89	21	20	107	78	78
Th	ME-ICP61	*27 element four acid ICP-AES*	ppm							
Ti (Titanium)	ME-ICP61	*27 element four acid ICP-AES*	%	0.15	0.3	0.12	0.08	0.14	0.5	0.18
Tl (Thallium)#	ME-ICP61	*27 element four acid ICP-AES*	ppm							
U (Uranium)	ME-ICP61	*27 element four acid ICP-AES*	ppm							
V (Vanadium)	ME-ICP61	*27 element four acid ICP-AES*	ppm	81	95	35	30	42	157	70
W (Tungsten)	ME-ICP61	*27 element four acid ICP-AES*	ppm	<10	<10	<10	<10	<10	10	<10
Zn (Zinc)	ME-ICP61	*27 element four acid ICP-AES*	ppm	2920	240	7070	2630	1150	105	127
Fire Assay Results for samples triggered due to concentration indicated during ICP testing										
Ag (Silver)	Ag-OG62	*Ore Grade Ag - Four Acid*	**ppm**				**679**			
Ag (Silver)		*Calculated*	**oz. (troy) / Tonne**				**21.83**			
Pb (Lead)	Pb-OG62	*Ore Grade Pb - Four Acid*	**%**				**3.95**			
Zn (Zinc)	Zn-OG62	*Ore Grade Zn - Four Acid*	**%**							

Red = fire assay testing triggered

APPENDIX A3-1

Samp_ID	LCH_Al_mg/kg	LCH_Sb_mg/kg	LCH_As_mg/kg	LCH_Ba_mg/kg	LCH_Be_mg/kg	LCH_Bi_mg/kg	LCH_B_mg/kg	LCH_Cd_mg/kg	LCH_Ca_mg/kg	LCH_Cr_mg/kg	LCH_Co_mg/kg	LCH_Cu_mg/kg	LCH_Fe_mg/kg	LCH_Pb_mg/kg	LCH_Li_mg/kg	LCH_Mg_mg/kg	LCH_Mn_mg/kg
95UKHDD01	115.800	0.006	0.015	0.327	0.030	0.030	0.600	0.519	804.000	0.069	0.143	0.375	45.600	1.221	0.300	144.300	271.800
95UKHDD02	294.600	0.033	0.390	0.015	0.150	0.150	3.000	7.230	444.000	0.630	0.630	3.420	564.000	0.209	1.500	91.200	621.000
95UKHDD03	8.040	0.003	0.003	0.132	0.015	0.015	0.300	1.500	1533.000	0.015	0.324	0.220	6.090	0.075	0.198	186.300	47.700
95UKHBP01	0.033	0.009	0.003	0.028	0.002	0.002	0.039	0.018	15.660	0.003	0.000	0.005	0.090	0.005	0.020	3.300	0.426
95UKHBP02	0.059	0.013	0.022	0.007	0.002	0.002	0.030	0.001	33.900	0.005	0.000	0.002	0.108	0.002	0.029	6.390	0.013
95UKHBP03	0.061	0.006	0.005	0.020	0.002	0.002	0.039	0.002	9.930	0.003	0.000	0.002	0.090	0.003	0.026	2.760	0.071
95UKHBP04	0.079	0.011	0.002	0.005	0.002	0.002	0.030	0.001	5.610	0.007	0.000	0.005	0.090	0.003	0.015	1.410	0.049
95UKHBP06	0.059	0.017	0.002	0.070	0.003	0.003	0.060	0.003	426.000	0.003	0.005	0.015	0.090	0.007	0.048	91.200	3.780
95UKHBP07	2.520	0.017	0.003	0.026	0.002	0.002	0.033	0.001	15.030	0.002	0.001	0.013	1.227	0.006	0.026	4.770	0.133
95UKHBD01	0.009	0.002	0.001	0.007	0.002	0.002	0.030	0.036	141.000	0.002	0.000	0.002	0.090	0.007	0.038	78.300	0.093
95UKHBD02	0.609	0.004	0.020	0.034	0.002	0.002	0.030	0.037	259.500	0.002	0.002	0.010	0.645	0.106	0.033	84.600	0.846
95UKHBD03	0.300	0.030	0.030	0.171	0.150	0.150	3.000	107.100	408.000	0.150	0.192	0.048	0.090	4.350	1.500	153.000	366.000
95UKHBD04	0.016	0.002	0.001	0.019	0.003	0.003	0.060	0.134	137.400	0.003	0.001	0.003	0.090	0.056	0.057	59.700	0.828
95UKHBD05	0.009	0.006	0.001	0.008	0.002	0.002	0.033	0.006	13.560	0.002	0.000	0.003	0.090	0.002	0.015	3.720	5.820
95UKHBD06	0.044	0.016	0.002	0.018	0.002	0.002	0.030	0.411	18.450	0.002	0.001	0.003	0.090	0.032	0.015	4.980	1.383
95UKHRD01	0.885	0.009	0.020	0.079	0.015	0.015	0.300	0.047	1644.000	0.015	0.013	0.008	0.948	0.115	0.150	615.000	10.440
95UKHRD02	0.015	0.004	0.002	0.127	0.008	0.008	0.150	3.750	1053.000	0.008	0.071	0.138	0.090	3.510	0.075	147.900	42.600
95UKHRD03	0.140	0.008	0.002	0.118	0.008	0.008	0.150	0.183	1317.000	0.008	0.121	0.005	0.162	0.014	0.108	138.600	49.800
95UKHCD01	0.009	0.002	0.000	0.064	0.002	0.002	0.039	0.006	3.660	0.002	0.001	0.002	0.090	4.680	0.015	0.510	0.091
95UKHCD02	0.065	0.002	0.002	0.918	0.008	0.008	0.150	0.231	96.900	0.008	0.004	0.032	0.090	48.900	0.075	11.100	1.035
95UKHCD03	0.003	0.005	0.001	0.125	0.002	0.002	0.036	0.032	8.250	0.002	0.000	0.004	0.090	3.240	0.015	1.530	0.139
95UKHCP01	0.426	0.004	0.002	0.018	0.002	0.002	0.063	0.003	2.169	0.002	0.000	0.012	0.090	0.123	0.015	0.480	0.130
95UKHCP02	0.012	0.009	0.002	0.023	0.002	0.002	0.036	0.051	11.190	0.002	0.004	0.015	0.090	0.236	0.016	1.620	1.845
95UKHWD01	474.000	0.027	4.200	0.040	0.030	0.030	0.600	0.194	387.000	1.350	1.068	3.120	1854.000	0.432	0.810	285.900	59.100
95UKHCD04	0.011	0.002	0.001	0.777	0.002	0.002	0.030	0.570	20.580	0.002	0.011	0.015	0.090	5.250	0.015	4.890	1.344
95UKHMD01	0.074	0.005	0.002	0.077	0.002	0.002	0.036	0.001	10.170	0.008	0.000	0.008	0.108	0.095	0.015	0.750	0.075
95UKHHD01	2.400	0.030	0.036	0.061	0.150	0.150	3.000	15.090	1254.000	0.150	0.945	0.051	0.270	5.340	1.500	227.700	1545.000
95UKHHD02	0.240	0.014	0.014	0.258	0.015	0.015	0.300	3.300	1449.000	0.015	0.065	0.034	0.090	0.444	0.150	255.000	51.300
95UKHHD03	0.066	0.014	0.004	0.186	0.008	0.008	0.150	1.050	1374.000	0.008	0.016	0.023	0.090	0.263	0.075	144.900	16.230
95UKHSP01	0.086	0.003	0.001	0.068	0.002	0.002	0.066	0.051	3.360	0.002	0.001	0.007	0.090	0.957	0.015	0.600	0.690
95UKHSP02	0.017	0.003	0.002	0.013	0.002	0.002	0.060	0.007	3.480	0.002	0.001	0.012	0.090	0.132	0.018	0.870	0.546
95UKHSP03	0.025	0.047	0.015	0.008	0.002	0.002	0.030	0.007	6.990	0.002	0.000	0.004	0.090	0.099	0.015	0.780	0.173
95UKHSP04	0.036	0.004	0.002	0.010	0.002	0.002	0.030	0.004	16.260	0.002	0.000	0.005	0.090	0.029	0.038	1.680	0.193
95UKHSP05	0.357	0.011	0.008	0.013	0.002	0.002	0.030	0.009	5.730	0.002	0.000	0.005	0.243	0.080	0.018	0.510	0.262
95UKHSD01	0.122	0.009	0.007	0.001	0.002	0.002	0.030	0.004	28.710	0.004	0.000	0.001	0.090	0.005	0.015	1.680	0.218
95UKHOP01	0.468	0.007	0.003	0.008	0.002	0.002	0.033	0.000	56.100	0.002	0.000	0.004	0.090	0.005	0.017	5.220	0.021
95UKHOD01	0.810	0.038	0.035	0.004	0.002	0.002	0.030	0.000	29.790	0.002	0.000	0.008	0.294	0.001	0.015	1.950	0.011
95UKHOD02	0.257	0.010	0.014	0.026	0.002	0.002	0.081	0.006	5.400	0.004	0.000	0.011	0.243	0.053	0.015	0.930	0.254
95UKHOD03	0.146	0.003	0.004	0.040	0.002	0.002	0.036	0.001	118.800	0.002	0.000	0.010	0.090	0.027	0.020	13.200	0.016
95UKHKD01	0.030	0.028	0.004	0.119	0.003	0.003	0.060	0.522	402.000	0.003	0.006	0.025	0.090	0.315	0.030	18.270	2.103
95UKHKD02	0.030	0.024	0.018	0.116	0.003	0.003	0.060	0.061	465.000	0.003	0.001	0.016	0.090	0.060	0.030	57.900	0.603
95UKHUD01	0.133	0.017	0.002	0.123	0.002	0.002	0.042	0.040	11.280	0.002	0.001	0.013	0.090	0.468	0.020	2.100	0.510
95UKHTD01	1.440	0.060	0.060	0.081	0.300	0.300	6.000	16.740	275.100	0.300	1.083	0.114	0.090	2.643	3.000	141.900	1365.000
95UKHTD02	0.134	0.019	0.003	0.108	0.008	0.008	0.150	3.870	185.400	0.008	0.022	0.027	0.090	9.090	0.075	193.800	15.180
95UKHLD01	0.087	0.026	0.016	0.124	0.008	0.008	0.150	0.028	642.000	0.008	0.002	0.014	0.090	0.139	0.075	39.000	0.957
95UKHVD01	263.100	0.003	0.525	0.024	0.018	0.015	0.300	0.345	1518.000	0.702	0.921	3.390	342.000	0.134	0.465	219.900	63.000
95UKGK901	135.600	0.015	0.015	0.151	0.075	0.075	1.500	0.299	1206.000	0.075	1.107	1.146	43.800	0.687	0.750	375.000	292.500

APPENDIX A3-1

Samp_ID	LCH_Hg_mg/kg	LCH_Mo_mg/kg	LCH_Ni_mg/kg	LCH_P_mg/kg	LCH_K_mg/kg	LCH_Se_mg/kg	LCH_Si_mg/kg	LCH_Ag_mg/kg	LCH_Na_mg/kg	LCH_Sr_mg/kg	LCH_Tl_mg/kg	LCH_Sn_mg/kg	LCH_Ti_mg/kg	LCH_U_mg/kg	LCH_V_mg/kg	LCH_Zn_mg/kg
95UKHDD01	0.003	0.003	0.702	0.900	10.200	0.060	17.520	0.014	6.000	0.504	0.008	0.006	0.030	0.028	0.060	22.260
95UKHDD02	0.003	0.015	2.943	4.770	6.000	0.300	13.050	0.003	6.000	0.291	0.030	0.030	0.030	0.151	0.300	429.000
95UKHDD03	0.003	0.002	1.251	0.900	13.500	0.030	11.310	0.000	6.000	0.525	0.004	0.003	0.030	0.001	0.030	87.000
95UKHBP01	0.003	0.000	0.010	0.900	12.600	0.003	11.970	0.000	6.000	0.073	0.000	0.000	0.030	0.000	0.003	0.237
95UKHBP02	0.003	0.001	0.002	0.900	6.000	0.003	9.120	0.001	12.600	0.077	0.000	0.000	0.030	0.000	0.003	0.018
95UKHBP03	0.003	0.000	0.002	0.900	8.100	0.003	11.550	0.001	6.000	0.052	0.000	0.000	0.030	0.000	0.003	0.032
95UKHBP04	0.003	0.000	0.002	0.900	6.000	0.003	7.440	0.000	6.000	0.024	0.000	0.000	0.030	0.000	0.003	0.024
95UKHBP06	0.003	0.019	0.012	0.900	18.900	0.024	7.230	0.000	6.000	1.134	0.001	0.001	0.030	0.005	0.006	0.024
95UKHBP07	0.003	0.015	0.002	0.900	10.500	0.004	17.370	0.000	7.800	0.033	0.000	0.000	0.030	0.000	0.003	0.021
95UKHBD01	0.003	0.000	0.002	0.900	7.800	0.015	6.000	0.001	14.400	0.209	0.000	0.000	0.030	0.000	0.003	0.131
95UKHBD02	0.003	0.000	0.005	0.900	10.500	0.023	6.870	0.003	18.600	0.300	0.000	0.000	0.033	0.000	0.003	0.296
95UKHBD03	0.003	0.015	0.498	0.900	19.200	0.300	5.550	0.003	17.700	0.663	0.030	0.030	0.030	0.003	0.300	798.000
95UKHBD04	0.003	0.000	0.004	0.900	10.200	0.022	5.430	0.000	6.000	0.168	0.001	0.001	0.030	0.000	0.006	1.053
95UKHBD05	0.003	0.001	0.002	0.900	6.000	0.005	7.320	0.000	6.000	0.070	0.000	0.000	0.030	0.000	0.003	0.053
95UKHBD06	0.003	0.000	0.003	0.900	6.000	0.003	7.620	0.000	6.000	0.089	0.000	0.000	0.030	0.000	0.003	3.150
95UKHRD01	0.003	0.002	0.071	0.900	18.000	0.030	3.900	0.003	6.000	2.352	0.003	0.003	0.030	0.002	0.030	0.315
95UKHRD02	0.003	0.001	0.432	0.900	13.800	0.015	7.350	0.001	6.000	0.696	0.002	0.002	0.030	0.000	0.015	48.600
95UKHRD03	0.003	0.001	0.408	0.900	14.400	0.015	6.570	0.000	6.000	0.972	0.002	0.002	0.030	0.001	0.015	1.770
95UKHCD01	0.003	0.000	0.005	0.900	6.900	0.003	6.180	0.005	6.000	0.020	0.001	0.000	0.030	0.000	0.003	0.095
95UKHCD02	0.003	0.001	0.020	0.900	36.300	0.015	10.560	0.014	18.600	0.468	0.002	0.002	0.030	0.000	0.015	1.980
95UKHCD03	0.003	0.000	0.003	0.900	9.300	0.003	8.610	0.002	6.000	0.062	0.000	0.000	0.030	0.000	0.003	0.155
95UKHCP01	0.003	0.000	0.002	0.900	18.600	0.007	9.510	0.001	6.000	0.017	0.000	0.000	0.030	0.000	0.003	0.058
95UKHCP02	0.003	0.000	0.013	0.900	10.500	0.005	7.950	0.000	6.000	0.050	0.000	0.000	0.030	0.000	0.003	0.576
95UKHWD01	0.003	0.007	2.727	6.810	6.000	0.060	20.310	0.004	6.000	0.789	0.006	0.006	0.057	0.033	0.705	13.080
95UKHCD04	0.003	0.002	0.026	0.900	7.200	0.003	10.350	0.000	6.000	0.175	0.000	0.000	0.030	0.000	0.003	3.090
95UKHMD01	0.003	0.000	0.002	0.900	6.000	0.003	8.160	0.000	6.000	0.019	0.000	0.000	0.030	0.000	0.003	0.125
95UKHHD01	0.003	0.016	1.989	0.900	16.800	0.300	6.960	0.003	6.000	1.296	0.030	0.030	0.030	0.003	0.300	831.000
95UKHHD02	0.003	0.002	0.221	0.900	15.000	0.030	6.180	0.000	6.000	2.292	0.003	0.003	0.030	0.001	0.030	98.700
95UKHHD03	0.003	0.001	0.078	0.900	20.400	0.015	6.090	0.000	6.000	1.389	0.002	0.002	0.030	0.001	0.015	11.070
95UKHSP01	0.003	0.001	0.005	0.900	19.200	0.003	11.970	0.003	6.000	0.020	0.000	0.000	0.030	0.000	0.003	0.597
95UKHSP02	0.003	0.000	0.004	0.900	12.300	0.003	10.740	0.000	6.000	0.019	0.000	0.000	0.030	0.000	0.003	0.103
95UKHSP03	0.003	0.000	0.002	0.900	6.000	0.003	5.070	0.000	6.000	0.030	0.000	0.000	0.030	0.000	0.003	0.039
95UKHSP04	0.003	0.002	0.002	0.900	6.000	0.009	11.130	0.000	6.000	0.042	0.000	0.000	0.030	0.000	0.003	0.095
95UKHSP05	0.003	0.001	0.003	0.900	6.900	0.003	6.330	0.001	6.000	0.019	0.000	0.000	0.030	0.000	0.003	0.263
95UKHSD01	0.003	0.001	0.002	0.900	6.000	0.003	5.010	0.000	6.000	0.028	0.000	0.000	0.030	0.000	0.003	0.142
95UKHOP01	0.003	0.006	0.002	0.900	12.600	0.009	5.370	0.000	6.000	0.167	0.000	0.000	0.030	0.001	0.003	0.012
95UKHOD01	0.003	0.006	0.002	0.900	6.000	0.003	12.090	0.000	6.000	0.061	0.000	0.000	0.030	0.000	0.014	0.015
95UKHOD02	0.003	0.001	0.002	0.900	6.000	0.003	7.560	0.001	6.000	0.038	0.000	0.000	0.030	0.000	0.003	0.083
95UKHOD03	0.003	0.004	0.002	0.900	12.300	0.020	6.120	0.000	13.500	0.309	0.000	0.000	0.030	0.001	0.003	0.015
95UKHKD01	0.003	0.003	0.016	0.900	9.600	0.006	6.720	0.001	6.000	0.615	0.001	0.001	0.030	0.000	0.006	5.280
95UKHKD02	0.003	0.056	0.003	0.900	14.100	0.006	6.270	0.000	6.000	1.005	0.001	0.001	0.030	0.002	0.006	0.663
95UKHUD01	0.003	0.000	0.004	0.900	9.300	0.003	10.770	0.001	6.000	0.046	0.000	0.000	0.030	0.000	0.003	0.354
95UKHTD01	0.003	0.030	1.860	0.900	15.000	0.600	6.720	0.006	6.000	0.420	0.060	0.060	0.030	0.006	0.600	867.000
95UKHTD02	0.003	0.001	0.088	0.900	12.300	0.015	12.060	0.000	6.000	0.068	0.002	0.002	0.030	0.000	0.015	51.000
95UKHLD01	0.003	0.029	0.008	0.900	20.100	0.015	6.480	0.000	27.000	0.996	0.002	0.002	0.030	0.007	0.015	0.249
95UKHVD01	0.003	0.002	1.335	1.980	6.000	0.030	23.580	0.003	6.000	1.158	0.003	0.003	0.042	0.093	0.030	13.680
95UKGK901	0.003	0.008	3.780	0.900	13.500	0.150	17.460	0.002	6.000	1.329	0.015	0.015	0.030	0.022	0.150	25.290

APPENDIX A3-1

Samp_ID	%Extr_Ag	%Extr_Al	%Extr_As	%Extr_Ba	%Extr_Be	%Extr_Bi	%Extr_Ca	%Extr_Cd	%Extr_Co	%Extr_Cr	%Extr_Cu	%Extr_Fe	%Extr_K	%Extr_Mg	%Extr_Mn	%Extr_Na	%Extr_Ni
95UKHDD01	0.8%	0.6%	0.02%	0.1%	5.0%	1.5%	32.2%	104%	14.3%	0.2%	4.2%	0.2%	0.3%	9.0%	26.1%	0.8%	8.8%
95UKHDD02	0.0%	2.3%	0.80%	0.0%	30.0%	7.5%	44.4%	123%	63.0%	1.9%	22.8%	4.7%	0.2%	15.2%	89.9%	3.0%	49.1%
95UKHDD03	0.0%	0.0%	0.01%	0.0%	1.5%	0.8%	30.1%	41%	16.2%	0.0%	2.0%	0.0%	0.2%	7.8%	26.6%	0.4%	8.3%
95UKHBP01	0.0%	0.0%	0.00%	0.0%	0.3%	0.1%	2.6%	0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.2%	0.0%		0.1%
95UKHBP02	0.0%	0.0%	0.01%	0.0%	0.1%	0.1%	1.9%	0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.0%	0.8%	0.0%
95UKHBP03	0.0%	0.0%	0.00%	0.0%	0.1%	0.1%	1.2%	0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.4%	0.0%
95UKHBP04	0.0%	0.0%	0.01%	0.0%	0.3%	0.1%	2.8%	0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.1%	0.0%	1.5%	0.0%
95UKHBP06	0.0%	0.0%	0.00%	0.0%	0.3%	0.2%	2.2%	0%	0.1%	0.0%	0.1%	0.0%	0.1%	1.0%	0.5%	0.2%	0.0%
95UKHBP07	0.0%	0.0%	0.06%	0.0%	0.1%	0.1%	1.0%	0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.1%	0.0%	0.1%	0.0%
95UKHBD01	0.0%	0.0%	0.00%	0.0%	0.2%	0.0%	6.4%	0%	0.0%	0.0%	0.0%	0.0%	0.1%	3.3%	0.0%	1.8%	0.0%
95UKHBD02	0.0%	0.0%	0.00%	0.0%	0.2%	0.0%	14.4%	0%	0.1%	0.0%	0.0%	0.0%	0.1%	3.5%	0.0%	2.3%	0.0%
95UKHBD03	0.0%	0.0%	0.00%	0.1%	25.0%	2.1%	7.2%	15%	19.2%	0.5%	0.0%	0.0%	0.4%	4.0%	0.4%	4.4%	4.5%
95UKHBD04	0.0%	0.0%	0.00%	0.0%	0.4%	0.1%	9.2%	0%	0.0%	0.0%	0.0%	0.0%	0.1%	2.4%	0.0%	0.6%	0.0%
95UKHBD05	0.0%	0.0%	0.00%	0.0%	0.3%	0.1%	4.5%	0%	0.0%	0.0%	0.0%	0.0%	0.5%	1.9%	0.2%	6.0%	0.1%
95UKHBD06	0.0%	0.0%	0.00%	0.0%	0.3%	0.1%	9.2%	5%	0.1%	0.0%	0.0%	0.0%	0.2%	1.0%	0.1%	2.0%	0.1%
95UKHRD01	0.0%	0.0%	0.01%	0.0%	1.3%	0.8%	11.2%	0%	0.2%	0.0%	0.0%	0.0%	0.2%	14.6%	0.1%	0.4%	0.2%
95UKHRD02	0.0%	0.0%	0.00%	0.0%	0.9%	0.4%	35.1%	8%	7.1%	0.0%	0.1%	0.0%	0.2%	6.7%	0.7%	0.7%	3.1%
95UKHRD03	0.0%	0.0%	0.00%	0.0%	0.9%	0.4%	4.3%	2%	0.6%	0.0%	0.0%	0.0%	0.3%	0.9%	2.7%	0.1%	1.0%
95UKHCD01	0.0%	0.0%	0.00%	0.1%	0.3%	0.1%	1.8%	1%	0.1%	0.0%	0.0%	0.0%	0.3%	0.1%	0.0%	3.0%	0.1%
95UKHCD02	0.0%	0.0%	0.00%	0.2%	1.3%	0.4%	32.3%	1%	0.4%	0.0%	0.0%	0.0%	0.4%	1.6%	0.0%	3.1%	0.4%
95UKHCD03	0.0%	0.0%	0.00%	0.1%	0.3%	0.1%	4.1%	0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.4%	0.0%	1.5%	0.1%
95UKHCP01	0.0%	0.0%	0.00%	0.0%	0.1%	0.1%	1.1%	0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.1%	0.4%	0.0%
95UKHCP02	0.0%	0.0%	0.00%	0.0%	0.2%	0.1%	2.2%	1%	0.4%	0.0%	0.1%	0.0%	0.2%	0.1%	1.2%	1.2%	0.2%
95UKHWD01	0.0%	1.8%	5.12%	0.0%	6.0%	1.5%	48.4%	39%	106.8%	2.6%	22.3%	10.1%	0.1%	16.8%	33.6%	0.7%	27.3%
95UKHCD04	0.0%	0.0%	0.00%	0.5%	0.3%	0.1%	5.1%	2%	0.2%	0.0%	0.0%	0.0%	0.3%	0.1%	0.0%	0.3%	0.1%
95UKHMD01	0.0%	0.0%	0.00%	0.1%	0.3%	0.1%	3.4%	0%	0.0%	0.0%	0.1%	0.0%	0.3%	0.4%	0.0%	3.0%	0.1%
95UKHHD01	0.0%	0.0%	0.01%	0.0%	18.8%	7.5%	22.0%	7%	94.5%	0.3%	0.0%	0.0%	0.2%	8.4%	11.4%	0.8%	12.4%
95UKHHD02	0.0%	0.0%	0.00%	0.1%	2.5%	0.8%	15.3%	2%	1.3%	0.0%	0.1%	0.0%	0.2%	5.5%	0.2%	1.0%	1.1%
95UKHHD03	0.0%	0.0%	0.00%	0.0%	0.9%	0.4%	20.5%	2%	0.4%	0.0%	0.0%	0.0%	0.2%	4.8%	0.2%	0.6%	0.5%
95UKHSP01	0.0%	0.0%	0.00%	0.0%	0.1%	0.1%	0.4%	1%	0.1%	0.0%	0.0%	0.0%	0.1%	0.0%	0.1%	0.4%	0.1%
95UKHSP02	0.0%	0.0%	0.00%	0.0%	0.2%	0.1%	1.7%	0%	0.1%	0.0%	0.1%	0.0%	0.1%	0.1%	0.3%	1.2%	0.1%
95UKHSP03	0.0%	0.0%	0.02%	0.0%	0.3%	0.1%	3.5%	0%	0.0%	0.0%	0.1%	0.0%	0.5%	0.4%	0.2%	6.0%	0.1%
95UKHSP04	0.0%	0.0%	0.01%	0.0%	0.1%	0.1%	0.8%	0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.1%	0.2%	0.0%
95UKHSP05	0.1%	0.0%	0.02%	0.0%	0.2%	0.1%	0.6%	0%	0.0%	0.0%	0.1%	0.0%	0.1%	0.0%	0.0%	0.6%	0.0%
95UKHSD01	0.0%	0.0%	0.02%	0.0%	0.3%	0.1%	5.7%	0%	0.0%	0.0%	0.1%	0.0%	0.4%	0.8%	0.0%	3.0%	0.0%
95UKHOP01	0.0%	0.0%	0.03%	0.0%	0.2%	0.1%	0.2%	0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.2%	0.0%	0.4%	0.0%
95UKHOD01	0.0%	0.0%	0.51%	0.0%	0.2%	0.1%	0.0%	0%	0.0%	0.0%	0.0%	0.0%	3.0%	0.0%	0.0%	0.1%	0.0%
95UKHOD02	0.0%	0.0%	0.02%	0.1%	0.3%	0.1%	1.1%	0%	0.0%	0.0%	0.0%	0.0%	0.4%	0.2%	0.2%	3.0%	0.1%
95UKHOD03	0.0%	0.0%	0.01%	0.0%	0.1%	0.1%	0.7%	0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.4%	0.0%	0.4%	0.0%
95UKHKD01	0.0%	0.0%	0.00%	0.0%	0.6%	0.1%	6.0%	1%	0.2%	0.0%	0.0%	0.0%	0.2%	1.0%	0.1%	0.9%	0.1%
95UKHKD02	0.0%	0.0%	0.00%	0.0%	0.3%	0.1%	6.8%	0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.7%	0.0%	0.3%	0.0%
95UKHUD01	0.0%	0.0%	0.00%	0.0%	0.1%	0.1%	1.0%	1%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%	0.3%	0.0%
95UKHTD01	0.0%	0.0%	0.05%	0.0%	60.0%	15.0%	17.2%	18%	27.1%	0.5%	0.3%	0.0%	0.3%	10.9%	18.7%	1.5%	20.7%
95UKHTD02	0.0%	0.0%	0.00%	0.0%	1.1%	0.4%	23.2%	7%	2.2%	0.0%	0.0%	0.0%	0.3%	19.4%	0.4%	1.2%	0.7%
95UKHLD01	0.0%	0.0%	0.00%	0.0%	1.3%	0.4%	2.4%	0%	0.1%	0.0%	0.1%	0.0%	0.4%	1.5%	0.0%	4.5%	0.0%
95UKHVD01	0.0%	0.6%	0.18%	0.0%	2.0%	0.8%	50.6%	25%	92.1%	1.3%	13.6%	1.5%	0.0%	8.8%	26.8%	0.4%	12.1%
95UKGK901	0.0%	0.4%	0.01%	0.0%	8.3%	3.8%	29.4%	27%	55.4%	0.1%	6.0%	0.2%	0.1%	13.9%	49.3%	0.5%	21.0%

Samp_ID	%Extr_P	%Extr_Pb	%Extr_Sb	%Extr_Sr	%Extr_V	%Extr_Zn	%Extr_Ag_ore	%Extr_Pb_ore	%Extr_Zn_ore
95UKHDD01	0.3%	1.5%	0.0%	1.4%	0.1%	23.9%			
95UKHDD02	1.2%	0.0%	0.1%	1.5%	1.0%	87.7%			
95UKHDD03	0.2%	0.1%	0.0%	0.9%	0.0%	40.7%			
95UKHBP01	0.2%	0.0%	0.0%	0.3%	0.0%	0.0%			
95UKHBP02	0.2%	0.0%	0.0%	0.1%	0.0%	0.0%			
95UKHBP03	0.2%	0.0%	0.0%	0.1%	0.0%	0.0%			
95UKHBP04	0.6%	0.0%	0.1%	0.1%	0.0%	0.0%			
95UKHBP06	0.1%	0.0%	0.3%	0.9%	0.0%	0.0%			
95UKHBP07	0.3%	0.0%	0.2%	0.0%	0.0%	0.0%			
95UKHBD01	0.1%	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%	
95UKHBD02	0.1%	0.0%	0.0%	0.4%	0.0%	0.0%	0.0%		
95UKHBD03	0.1%	0.0%	0.0%	1.8%	0.8%	8.0%	0.0%	0.0%	6.8%
95UKHBD04	0.2%	0.0%	0.0%	0.2%	0.0%	0.0%			
95UKHBD05	0.5%	0.0%	0.1%	0.7%	0.0%	0.0%			
95UKHBD06	0.6%	0.0%	0.1%	0.3%	0.0%	1.1%			
95UKHRD01	0.1%	0.0%	0.0%	2.4%	0.0%	0.0%			
95UKHRD02	0.2%	0.1%	0.0%	1.5%	0.0%	2.6%	0.0%		
95UKHRD03	0.1%	0.0%	0.0%	0.8%	0.0%	0.3%			
95UKHCD01	1.1%	0.1%	0.0%	0.3%	0.0%	0.0%	0.0%		
95UKHCD02	0.2%	0.5%	0.0%	1.6%	0.0%	0.1%	0.0%	0.3%	
95UKHCD03	0.3%	0.0%	0.0%	0.3%	0.0%	0.0%	0.0%	0.0%	
95UKHCP01	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%			
95UKHCP02	0.2%	0.0%	0.0%	0.2%	0.0%	0.2%			
95UKHWD01	9.7%	0.1%	0.1%	2.9%	1.1%	22.9%			
95UKHCD04	0.3%	0.1%	0.0%	0.4%	0.0%	0.3%	0.0%		
95UKHMD01	0.4%	0.0%	0.0%	0.2%	0.0%	0.0%			
95UKHHD01	0.2%	0.1%	0.0%	3.5%	0.6%	8.3%	0.0%		5.1%
95UKHHD02	0.3%	0.0%	0.0%	5.5%	0.1%	1.0%			0.6%
95UKHHD03	0.2%	0.0%	0.0%	2.5%	0.0%	0.2%			
95UKHSP01	0.1%	0.0%	0.0%	0.0%	0.0%	0.1%			
95UKHSP02	0.2%	0.0%	0.0%	0.1%	0.0%	0.0%			
95UKHSP03	0.8%	0.0%	0.2%	0.4%	0.0%	0.0%			
95UKHSP04	0.1%	0.1%	0.1%	0.0%	0.0%	0.1%			
95UKHSP05	0.2%	0.1%	0.1%	0.0%	0.0%	0.1%			
95UKHSD01	0.8%	0.0%	0.2%	0.3%	0.0%	0.0%			
95UKHOP01	0.2%	0.0%	0.1%	0.1%	0.0%	0.0%			
95UKHOD01	0.1%	0.0%	0.3%	0.0%	0.0%	0.0%			
95UKHOD02	0.5%	0.0%	0.2%	0.6%	0.0%	0.0%			
95UKHOD03	0.1%	0.0%	0.1%	0.1%	0.0%	0.0%			
95UKHKD01	0.3%	0.0%	0.0%	1.5%	0.0%	0.1%			
95UKHKD02	0.3%	0.0%	0.1%	1.0%	0.0%	0.0%			
95UKHUD01	0.1%	0.0%	0.0%	0.1%	0.0%	0.1%			
95UKHTD01	0.3%	0.3%	0.2%	2.0%	1.7%	12.3%			
95UKHTD02	0.2%	0.1%	0.0%	0.3%	0.1%	1.9%	0.0%	0.0%	
95UKHLD01	0.2%	0.0%	0.1%	0.9%	0.0%	0.0%			
95UKHVD01	0.6%	0.0%	0.0%	1.5%	0.0%	13.0%			
95UKGK901	0.2%	0.1%	0.1%	1.7%	0.2%	19.9%			

APPENDIX A4-1
Statistical Summary

Acid Base Accounting Parameters

Statistic	paste_pH	FIZZ RATING	St_%	SO4_CbLch %	SO4_HCl%	S2-_%	MPA_kgCaCO3/t	NP_kgCaCO3/t	NNP_kgCaCO3/t	NP:MPA	Cinorg_%	CO2_%
No. of observations	47	47	47	47	47	47	47	47	47	47	47	47
No. of missing values	0	0	0	0	0	0	0	0	0	0	0	0
Minimum	3.200	1.000	0.010	0.010	0.010	0.010	0.300	-5.000	-43.000	-0.260	0.050	0.200
Maximum	8.700	3.000	1.930	0.450	0.460	1.480	60.300	308.000	285.000	54.400	3.640	13.400
1st Quartile	6.700	1.000	0.030	0.010	0.010	0.020	0.900	2.500	1.000	1.180	0.050	0.200
Median	7.200	1.000	0.170	0.020	0.030	0.060	5.300	7.000	3.000	2.290	0.060	0.200
3rd Quartile	7.600	2.000	0.485	0.200	0.210	0.295	15.150	25.500	14.500	5.025	0.365	1.350
Mean	6.904	1.617	0.348	0.108	0.113	0.242	10.877	23.851	12.957	4.931	0.330	1.228
Standard deviation (n)	1.213	0.787	0.458	0.138	0.132	0.363	14.308	48.104	43.931	8.512	0.604	2.217
Variation coefficient	0.176	0.487	1.315	1.273	1.164	1.498	1.316	2.017	3.390	1.726	1.829	1.806
Skewness (Pearson)	-1.520	0.789	1.801	1.262	1.119	1.999	1.801	4.497	5.026	4.339	3.862	3.876
Kurtosis (Pearson)	1.799	-0.943	2.799	0.267	0.089	3.454	2.797	23.142	28.411	21.629	17.138	17.253
Geometric mean	6.767	1.452	0.121	0.041	0.046	0.076	3.742				0.135	0.520
Geometric standard deviation	1.242	1.580	5.155	4.289	4.312	5.044	5.229				3.418	3.315

Leachate Extraction Parameters

Statistic	LCH_pH	LCH_Al_mg/L	LCH_Sb_mg/L	LCH_As_mg/L	LCH_Ba_mg/L	LCH_Be_mg/L	LCH_Bi_mg/L	LCH_B_mg/L	LCH_Cd_mg/L	LCH_Ca_mg/L	LCH_Cr_mg/L	LCH_Co_mg/L	LCH_Cu_mg/L	LCH_Fe_mg/L	LCH_Pb_mg/L	LCH_Li_mg/L	LCH_Mg_mg/L	LCH_Mn_mg/L	LCH_Hg_mg/L	LCH_Mo_mg/L
No. of observations	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47
No. of missing values	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum	2.380	0.001	0.001	0.000	0.000	0.001	0.001	0.010	0.000	0.723	0.001	0.000	0.000	0.030	0.000	0.005	0.160	0.004	0.001	0.000
Maximum	7.870	158.000	0.020	1.400	0.306	0.100	0.100	2.000	35.700	548.000	0.450	0.369	1.140	618.000	16.300	1.000	205.000	515.000	0.001	0.019
1st Quartile	6.210	0.011	0.001	0.001	0.005	0.001	0.001	0.011	0.002	3.745	0.001	0.000	0.002	0.030	0.007	0.005	0.560	0.052	0.001	0.000
Median	6.710	0.029	0.003	0.001	0.013	0.001	0.001	0.020	0.013	32.300	0.001	0.000	0.004	0.030	0.038	0.010	3.700	0.282	0.001	0.000
3rd Quartile	7.175	0.180	0.006	0.005	0.040	0.003	0.003	0.050	0.155	151.500	0.003	0.015	0.010	0.081	0.193	0.031	47.700	9.805	0.001	0.002
Mean	6.388	9.244	0.005	0.039	0.034	0.007	0.007	0.149	1.160	126.776	0.025	0.048	0.088	20.302	0.664	0.081	27.143	34.336	0.001	0.002
Standard deviation (n)	1.314	29.831	0.004	0.203	0.057	0.018	0.018	0.367	5.216	173.925	0.078	0.108	0.272	93.552	2.391	0.186	40.449	102.544	0.000	0.003
Variation coefficient	0.206	3.227	0.940	5.184	1.691	2.485	2.492	2.462	4.498	1.372	3.069	2.240	3.087	4.608	3.600	2.282	1.490	2.987	0.000	1.937
Skewness (Pearson)	-1.862	3.622	1.625	6.414	3.539	3.489	3.491	3.496	6.194	1.268	4.088	2.228	3.358	5.684	5.965	3.293	2.244	3.756		3.090
Kurtosis (Pearson)	2.703	12.930	2.599	39.984	12.806	12.520	12.528	12.564	37.946	0.089	17.277	3.316	9.655	32.693	35.950	11.391	6.156	13.494		10.648
Geometric mean	6.191	0.072	0.003	0.002	0.014	0.001	0.001	0.033	0.017	25.726	0.002	0.001	0.006	0.098	0.040	0.018	4.703	0.603	0.001	0.000
Geometric standard deviation	1.325	18.945	2.613	6.272	4.077	4.676	4.662	4.368	24.140	8.564	6.565	18.294	7.399	12.481	13.729	4.632	9.857	25.351	1.000	5.782

Elemental Composition of Solids

Statistic	As_ppm	Ba_ppm	Be_ppm	Bi_ppm	Ca_%	Cd_ppm	Co_ppm	Cr_ppm	Cu_ppm	Fe_%	Ga_ppm	K_%	La_ppm	Mg_%	Mn_ppm	Mo_ppm	Na_%	Ni_ppm	P_ppm	Pb_ppm
No. of observations	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47
No. of missing values	0	0	0	0	0	0	0	0	0	0	29	0	29	0	0	0	1	0	0	0
Minimum	5	20	1	2	0	1	1	25	2	0	10	0	10	0	73	1	0	2	70	18
Maximum	944	2870	2	7	8	691	41	112	295	14	20	3	40	4	82800	4	1	93	1320	10000
1st Quartile	46	260	1	2	0	3	1	42	16	2	10	0	10	0	324	1	0	8	290	173
Median	85	430	1	2	0	10	2	53	28	3	10	1	10	0	1615	1	0	15	430	896
3rd Quartile	340	725	1	2	1	31	5	61	81	4	10	1	20	0	4935	1	0	21	580	4095
Mean	219	545	1	2	1	47	4	56	62	3	11	1	16	0	6485	1	0	17	455	2653
Standard deviation (n)	248	475	0	1	1	110	7	21	71	3	2	1	8	1	14168	1	0	16	263	3500
Variation coefficient	1	1	1	0	2	2	2	0	1	1	0	1	0	2	2	0	1	1	1	1
Skewness (Pearson)	1	3	2	3	4	4	4	1	2	2	4	1	2	5	4	4	3	3	1	1
Kurtosis (Pearson)	1	10	2	9	19	22	17	1	3	5	13	2	3	26	16	19	10	10	2	0
Geometric mean	107	379	1	2	0	10	2	53	35	3	10	1	14	0	1549	1	0	12	381	753
Geometric standard deviation	4	3	2	1	5	6	3	1	3	2	1	2	2	3	6	1	3	2	2	7

APPENDIX A4-1
Statistical Summary

Acid Base Accounting Parameters

Statistic
No. of observations
No. of missing values
Minimum
Maximum
1st Quartile
Median
3rd Quartile
Mean
Standard deviation (n)
Variation coefficient
Skewness (Pearson)
Kurtosis (Pearson)
Geometric mean
Geometric standard deviation

Leachate Extraction Parameters

Statistic	LCH_Ni_mg/L	LCH_P_mg/L	LCH_K_mg/L	LCH_Se_mg/L	LCH_Si_mg/L	LCH_Ag_mg/L	LCH_Na_mg/L	LCH_Sr_mg/L	LCH_Tl_mg/L	LCH_Sn_mg/L	LCH_Ti_mg/L	LCH_U_mg/L	LCH_V_mg/L	LCH_Zn_mg/L
No. of observations	47	47	47	47	47	47	47	47	47	47	47	47	47	47
No. of missing values	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum	0.001	0.300	2.000	0.001	1.300	0.000	2.000	0.006	0.000	0.000	0.010	0.000	0.001	0.004
Maximum	1.260	2.270	12.100	0.200	7.860	0.005	9.000	0.784	0.020	0.020	0.019	0.050	0.235	289.000
1st Quartile	0.001	0.300	2.000	0.001	2.100	0.000	2.000	0.015	0.000	0.000	0.010	0.000	0.001	0.030
Median	0.002	0.300	3.500	0.003	2.520	0.000	2.000	0.056	0.000	0.000	0.010	0.000	0.001	0.105
3rd Quartile	0.051	0.300	4.750	0.008	3.740	0.001	2.000	0.227	0.001	0.001	0.010	0.000	0.005	4.025
Mean	0.132	0.377	3.857	0.015	3.089	0.001	2.583	0.150	0.001	0.001	0.010	0.003	0.019	23.523
Standard deviation (n)	0.288	0.339	1.956	0.037	1.402	0.001	1.479	0.191	0.004	0.004	0.001	0.009	0.049	69.666
Variation coefficient	2.186	0.899	0.507	2.362	0.454	1.759	0.573	1.274	2.457	2.490	0.137	3.342	2.503	2.962
Skewness (Pearson)	2.475	4.688	1.679	3.501	1.509	3.086	2.695	1.670	3.470	3.491	5.347	4.449	3.207	3.178
Kurtosis (Pearson)	5.302	21.236	4.439	12.630	2.028	9.792	6.819	2.450	12.424	12.531	28.620	19.939	9.792	8.532
Geometric mean	0.006	0.330	3.458	0.004	2.837	0.000	2.348	0.056	0.000	0.000	0.010	0.000	0.003	0.301
Geometric standard deviation	14.457	1.480	1.588	4.381	1.494	4.923	1.470	4.758	4.671	4.636	1.111	12.175	5.139	26.160

Elemental Composition of Solids

Statistic	S_%	Sb_ppm	Sc_ppm	Sr_ppm	Th_ppm	Ti_%	Tl_ppm	U_ppm	V_ppm	W_ppm	Zn_ppm	Ag_ore_ppm	Ag_ore_Oz/T	Pb_ore_%	Zn_ore_%
No. of observations	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47
No. of missing values	0	0	29	0	29	0	29	29	0	0	0	37	37	42	44
Minimum	0	5	1	6	20	0	10	10	8	10	57	123	4	1	1
Maximum	2	707	18	253	20	1	10	10	341	10	10000	679	22	4	2
1st Quartile	0	13	4	27	20	0	10	10	34	10	219	190	6	1	1
Median	0	27	7	43	20	0	10	10	57	10	489	225	7	1	2
3rd Quartile	1	68	8	92	20	0	10	10	77	10	1955	259	8	2	2
Mean	0	72	7	65	20	0	10	10	67	10	1731	255	8	2	1
Standard deviation (n)	0	118	4	55	0	0	0	0	57	0	2655	150	5	1	0
Variation coefficient	1	2	1	1	0	1	0	0	1	0	2	1	1	1	0
Skewness (Pearson)	2	4	1	2		3			3		2	2	2	1	-1
Kurtosis (Pearson)	3	15	1	3		10			10		4	3	3	0	-2
Geometric mean	0	31	6	45	20	0	10	10	50	10	642	227	7	2	1
Geometric standard deviation	5	3	2	2	1	2	1	1	2	1	4	2	2	2	1

APPENDIX A4-1
Statistical Summary

Soluble Product Loading

Statistic	LCH_Al_mg/kg	LCH_Sb_mg/kg	LCH_As_mg/kg	LCH_Ba_mg/kg	LCH_Be_mg/kg	LCH_Bi_mg/kg	LCH_B_mg/kg	LCH_Cd_mg/kg	LCH_Ca_mg/kg	LCH_Cr_mg/kg	LCH_Co_mg/kg	LCH_Cu_mg/kg	LCH_Fe_mg/kg	LCH_Pb_mg/kg	LCH_Li_mg/kg	LCH_Mg_mg/kg	LCH_Mn_mg/kg	LCH_Hg_mg/kg	LCH_Mo_mg/kg	LCH_Ni_mg/kg
No. of observations	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47
No. of missing values	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum	0.003	0.002	0.000	0.001	0.002	0.002	0.030	0.000	2.169	0.002	0.000	0.001	0.090	0.001	0.015	0.480	0.011	0.003	0.000	0.002
Maximum	474.000	0.060	4.200	0.918	0.300	0.300	6.000	107.100	1644.000	1.350	1.107	3.420	1854.000	48.900	3.000	615.000	1545.000	0.003	0.056	3.780
1st Quartile	0.032	0.004	0.002	0.016	0.002	0.002	0.033	0.005	11.235	0.002	0.000	0.005	0.090	0.021	0.015	1.680	0.156	0.003	0.000	0.002
Median	0.087	0.009	0.003	0.040	0.002	0.002	0.060	0.040	96.900	0.003	0.001	0.012	0.090	0.115	0.030	11.100	0.846	0.003	0.001	0.005
3rd Quartile	0.539	0.017	0.015	0.121	0.008	0.008	0.150	0.465	454.500	0.008	0.044	0.029	0.243	0.578	0.092	143.100	29.415	0.003	0.005	0.154
Mean	27.733	0.014	0.117	0.102	0.022	0.022	0.448	3.479	380.327	0.076	0.144	0.264	60.905	1.993	0.244	81.428	103.007	0.003	0.005	0.395
Standard deviation (n)	89.492	0.013	0.609	0.172	0.055	0.055	1.102	15.647	521.775	0.234	0.323	0.815	280.655	7.172	0.558	121.348	307.631	0.000	0.010	0.863
Variation coefficient	3.227	0.940	5.184	1.691	2.485	2.492	2.462	4.498	1.372	3.069	2.240	3.087	4.608	3.600	2.282	1.490	2.987	0.000	1.937	2.186
Skewness (Pearson)	3.622	1.625	6.414	3.539	3.489	3.491	3.496	6.194	1.268	4.088	2.228	3.358	5.684	5.965	3.293	2.244	3.756		3.090	2.475
Kurtosis (Pearson)	12.930	2.599	39.984	12.806	12.520	12.528	12.564	37.946	0.089	17.277	3.316	9.655	32.693	35.950	11.391	6.156	13.494		10.648	5.302
Geometric mean	0.217	0.009	0.006	0.042	0.004	0.004	0.099	0.052	77.179	0.006	0.004	0.017	0.294	0.119	0.054	14.108	1.810	0.003	0.001	0.018
Geometric standard deviation	18.945	2.613	6.272	4.077	4.676	4.662	4.368	24.140	8.564	6.565	18.294	7.399	12.481	13.729	4.632	9.857	25.351	1.000	5.782	14.457

% Solubilized (or % Extraction)

Statistic	%Extr_Ag	%Extr_Al	%Extr_As	%Extr_Ba	%Extr_Be	%Extr_Bi	%Extr_Ca	%Extr_Cd	%Extr_Co	%Extr_Cr	%Extr_Cu	%Extr_Fe	%Extr_K	%Extr_Mg	%Extr_Mn	%Extr_Na	%Extr_Ni	%Extr_P	%Extr_Pb	%Extr_Sb
No. of observations	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47
No. of missing values	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Minimum	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000
Maximum	0.008	0.023	0.051	0.005	0.600	0.150	0.506	1.225	1.068	0.026	0.228	0.101	0.030	0.194	0.899	0.060	0.491	0.097	0.015	0.003
1st Quartile	0.000	0.000	0.000	0.000	0.002	0.001	0.018	0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.004	0.000	0.002	0.000	0.000
Median	0.000	0.000	0.000	0.000	0.003	0.001	0.045	0.003	0.001	0.000	0.000	0.000	0.002	0.009	0.001	0.008	0.001	0.002	0.000	0.000
3rd Quartile	0.000	0.000	0.000	0.000	0.013	0.004	0.162	0.034	0.009	0.000	0.001	0.000	0.003	0.052	0.005	0.020	0.009	0.003	0.001	0.001
Mean	0.000	0.001	0.001	0.000	0.037	0.010	0.112	0.092	0.107	0.002	0.015	0.004	0.003	0.036	0.062	0.014	0.037	0.005	0.001	0.001
Standard deviation (n)	0.001	0.004	0.007	0.001	0.103	0.026	0.137	0.240	0.261	0.005	0.049	0.016	0.004	0.052	0.163	0.015	0.091	0.014	0.002	0.001
Variation coefficient	4.410	3.522	5.007	2.300	2.789	2.642	1.224	2.602	2.444	3.011	3.195	4.493	1.593	1.440	2.631	1.050	2.469	2.729	2.939	1.178
Skewness (Pearson)	6.488	4.068	6.325	5.047	4.057	3.989	1.449	3.607	2.634	3.755	3.574	5.230	5.858	1.564	3.487	1.562	3.325	6.311	5.525	1.839
Kurtosis (Pearson)	40.713	15.920	39.134	27.308	17.383	16.605	1.019	12.835	5.689	13.720	11.694	27.455	35.302	1.330	13.295	1.775	11.916	39.136	31.415	3.132
Geometric mean	0.000	0.000	0.000	0.000	0.006	0.002	0.045	0.005	0.002	0.000	0.000	0.000	0.002	0.008	0.001	0.008	0.001	0.003	0.000	0.000
Geometric standard deviation	5.440	18.112	8.920	4.384	5.391	4.859	4.853	14.878	24.079	7.194	10.332	15.020	2.166	8.306	26.138	3.080	15.489	2.341	7.009	5.210

APPENDIX A4-1
Statistical Summary

Soluble Product Loading

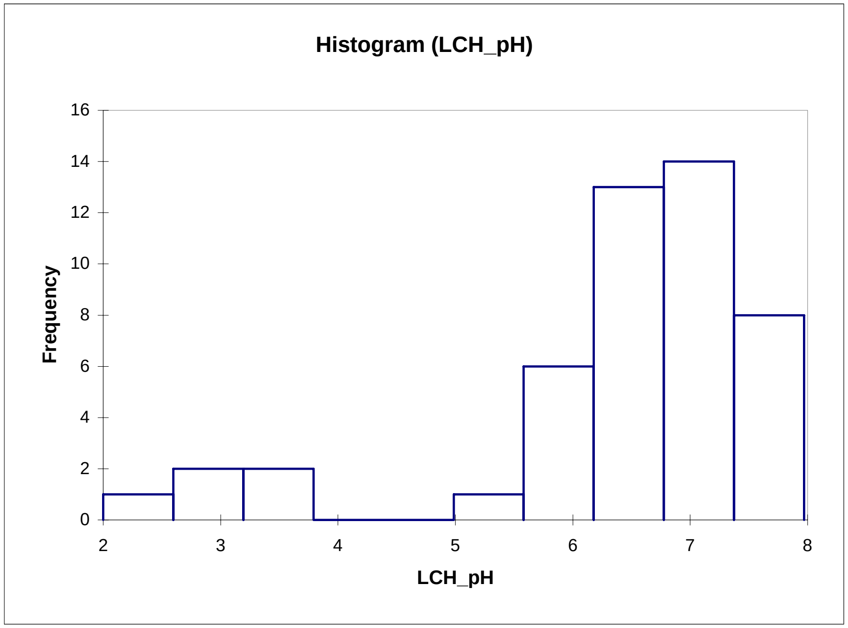
Statistic	LCH_P_mg/kg	LCH_K_mg/kg	LCH_Se_mg/kg	LCH_Si_mg/kg	LCH_Ag_mg/kg	LCH_Na_mg/kg	LCH_Sr_mg/kg	LCH_Tl_mg/kg	LCH_Sn_mg/kg	LCH_Ti_mg/kg	LCH_U_mg/kg	LCH_V_mg/kg	LCH_Zn_mg/kg
No. of observations	47	47	47	47	47	47	47	47	47	47	47	47	47
No. of missing values	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum	0.900	6.000	0.003	3.900	0.000	6.000	0.017	0.000	0.000	0.030	0.000	0.003	0.012
Maximum	6.810	36.300	0.600	23.580	0.014	27.000	2.352	0.060	0.060	0.057	0.151	0.705	867.000
1st Quartile	0.900	6.000	0.003	6.300	0.000	6.000	0.044	0.000	0.000	0.030	0.000	0.003	0.089
Median	0.900	10.500	0.009	7.560	0.000	6.000	0.168	0.000	0.000	0.030	0.000	0.003	0.315
3rd Quartile	0.900	14.250	0.023	11.220	0.002	6.000	0.680	0.002	0.002	0.030	0.001	0.015	12.075
Mean	1.131	11.572	0.046	9.266	0.002	7.749	0.451	0.004	0.004	0.031	0.008	0.058	70.570
Standard deviation (n)	1.016	5.868	0.110	4.206	0.003	4.437	0.574	0.011	0.011	0.004	0.026	0.146	208.998
Variation coefficient	0.899	0.507	2.362	0.454	1.759	0.573	1.274	2.457	2.490	0.137	3.342	2.503	2.962
Skewness (Pearson)	4.688	1.679	3.501	1.509	3.086	2.695	1.670	3.470	3.491	5.347	4.449	3.207	3.178
Kurtosis (Pearson)	21.236	4.439	12.630	2.028	9.792	6.819	2.450	12.424	12.531	28.620	19.939	9.792	8.532
Geometric mean	0.990	10.373	0.011	8.512	0.001	7.044	0.167	0.001	0.001	0.031	0.000	0.010	0.903
Geometric standard deviation	1.480	1.588	4.381	1.494	4.923	1.470	4.758	4.671	4.636	1.111	12.175	5.139	26.160

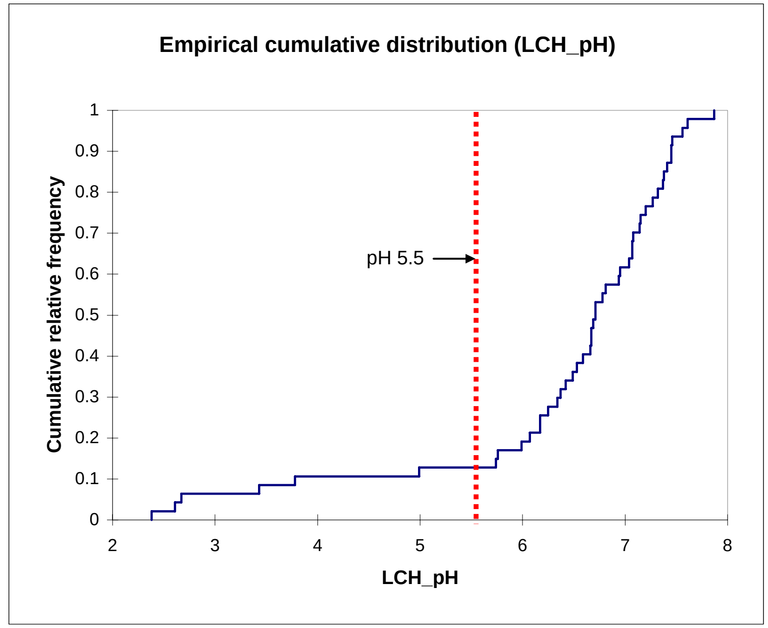
% Solubilized (or % Extraction)

Statistic	%Extr_Sr	%Extr_V	%Extr_Zn
No. of observations	47	47	47
No. of missing values	0	0	0
Minimum	0.000	0.000	0.000
Maximum	0.055	0.017	0.877
1st Quartile	0.001	0.000	0.000
Median	0.004	0.000	0.000
3rd Quartile	0.015	0.000	0.011
Mean	0.009	0.001	0.052
Standard deviation (n)	0.011	0.003	0.146
Variation coefficient	1.228	2.560	2.797
Skewness (Pearson)	2.051	3.201	4.214
Kurtosis (Pearson)	5.023	9.864	19.529
Geometric mean	0.004	0.000	0.001
Geometric standard deviation	4.597	5.783	18.050

APPENDIX A5-1
Leachate Criteria

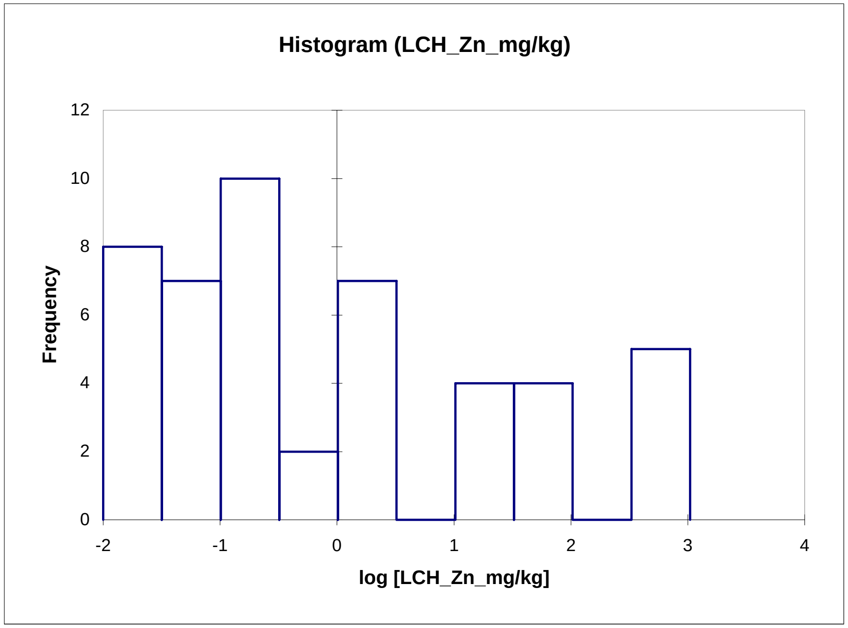
Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
LCH_pH	47	0	47	2.380	7.870	6.388	1.328
LCH_Zn_mg/kg	47	0	47	-1.745	2.920	-0.038	1.478
LCH_Pb_mg/kg	47	0	47	-2.824	1.689	-1.109	1.189

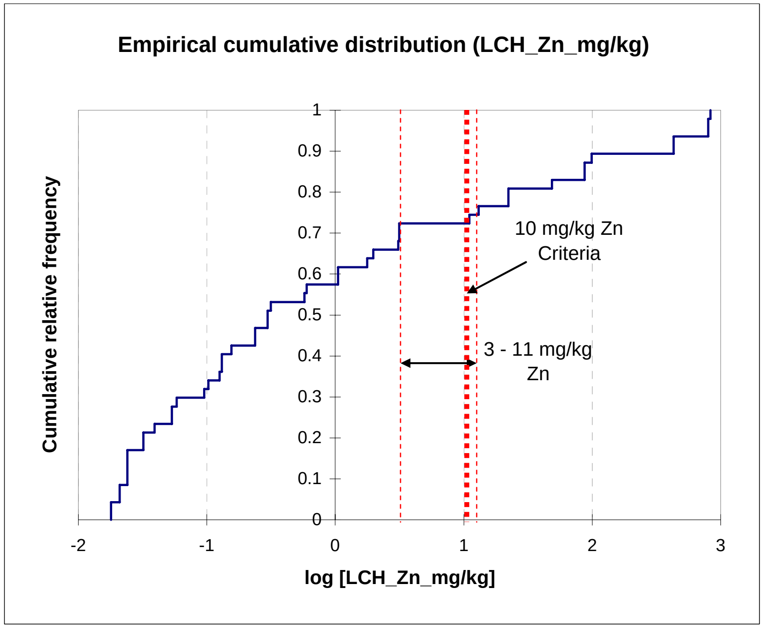




Descriptive statistics for the intervals (LCH_pH):

Lower bound [	Upper bound [	Frequency	Relative frequency	Density
2	2.597	1	0.021	0.036
2.597	3.194	2	0.043	0.071
3.194	3.791	2	0.043	0.071
3.791	4.388	0	0.000	0.000
4.388	4.985	0	0.000	0.000
4.985	5.582	1	0.021	0.036
5.582	6.179	6	0.128	0.214
6.179	6.776	13	0.277	0.463
6.776	7.373	14	0.298	0.499
7.373	7.97	8	0.170	0.285

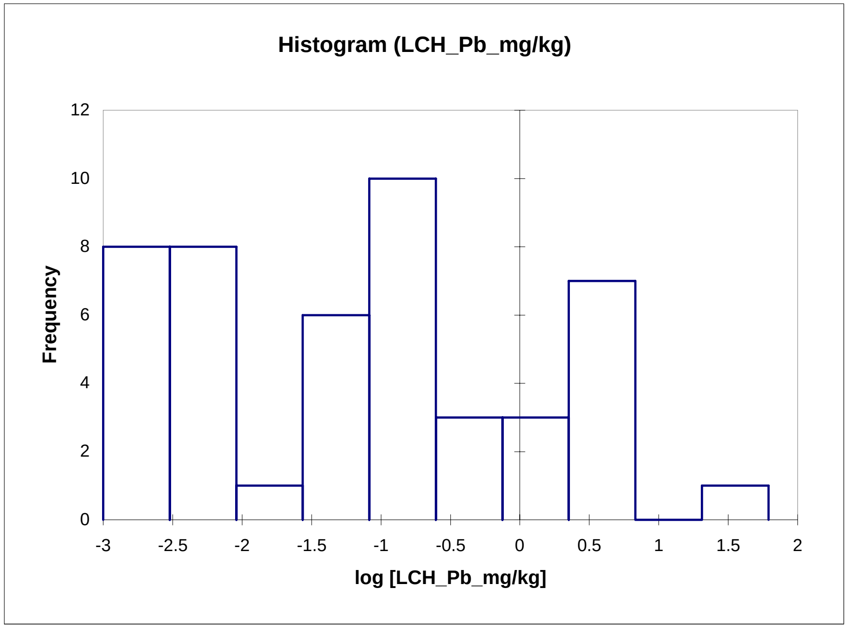


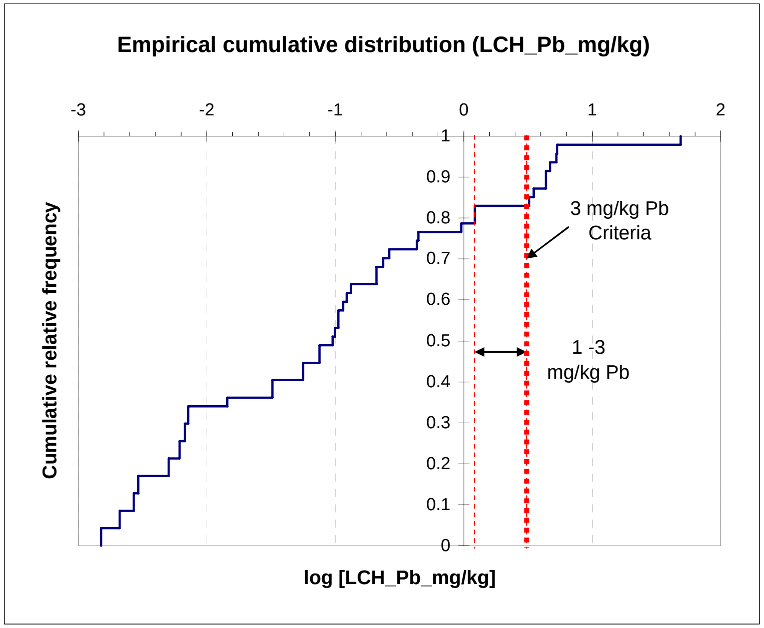


Descriptive statistics for the intervals (LCH_Zn_mg/kg):

Lower bound [	Upper bound [	Frequency	Relative frequency	Density
-2	-1.498039898	8	0.170	0.339
-1.498039898	-0.996079795	7	0.149	0.297
-0.996079795	-0.494119693	10	0.213	0.424
-0.494119693	0.00784041	2	0.043	0.085
0.00784041	0.509800512	7	0.149	0.297
0.509800512	1.011760614	0	0.000	0.000
1.011760614	1.513720717	4	0.085	0.170
1.513720717	2.015680819	4	0.085	0.170
2.015680819	2.517640921	0	0.000	0.000
2.517640921	3.019601024	5	0.106	0.212

APPENDIX A5-1
Leachate Criteria





Descriptive statistics for the intervals (LCH_Pb_mg/kg):

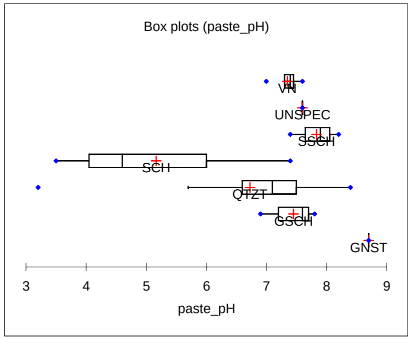
Lower bound [	Upper bound [	Frequency	Relative frequency	Density
-3	-2.521069114	8	0.170	0.355
-2.521069114	-2.042138228	8	0.170	0.355
-2.042138228	-1.563207342	1	0.021	0.044
-1.563207342	-1.084276456	6	0.128	0.267
-1.084276456	-0.60534557	10	0.213	0.444
-0.60534557	-0.126414685	3	0.064	0.133
-0.126414685	0.352516201	3	0.064	0.133
0.352516201	0.831447087	7	0.149	0.311
0.831447087	1.310377973	0	0.000	0.000
1.310377973	1.789308859	1	0.021	0.044

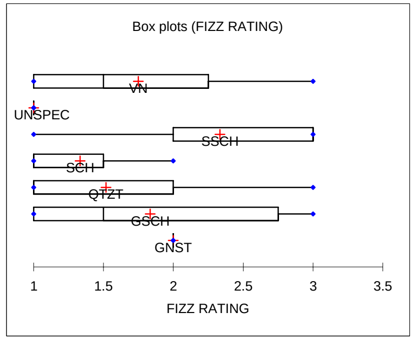
APPENDIX A6-1
Box Plots by Lithography

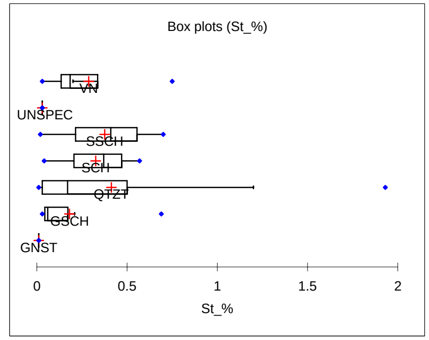
XLSTAT 2007.8.03 - Univariate plots - on 1/8/2008 at 7:22:49 PM
Quantitative data: Workbook = Compilation 1995 and 2007 ABAs.xls / Sheet = 1995 Rock Char / Range = '1995 Rock Char'!$E$1:$V$48 / 47 rows and 18 columns
Subsamples: Workbook = Compilation 1995 and 2007 ABAs.xls / Sheet = 1995 Rock Char / Range = '1995 Rock Char'!$C$1:$C$48 / 47 rows and 1 column

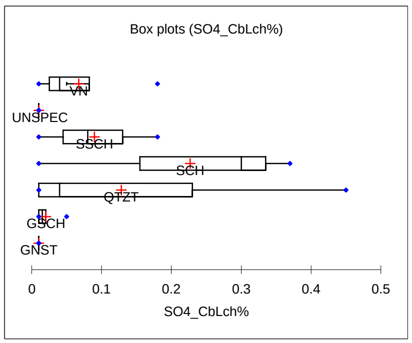
Box plots

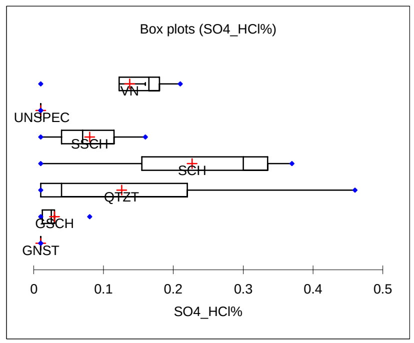
Box plots:

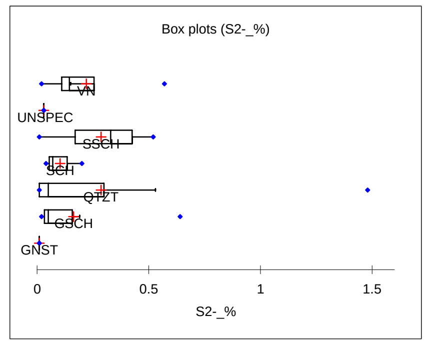


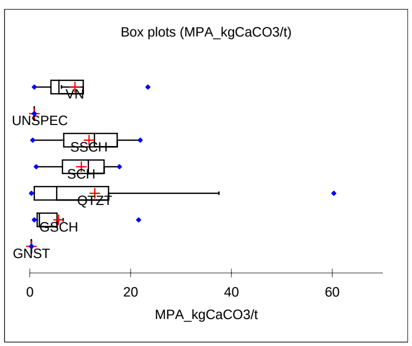


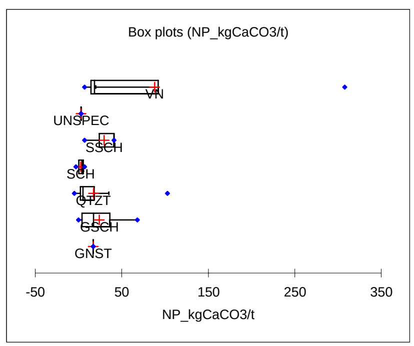


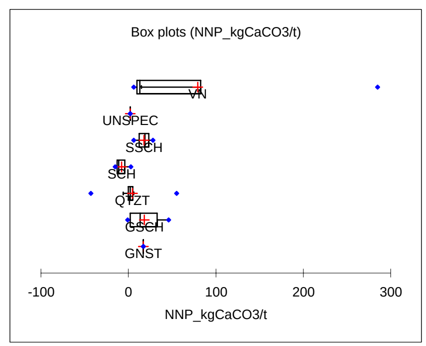




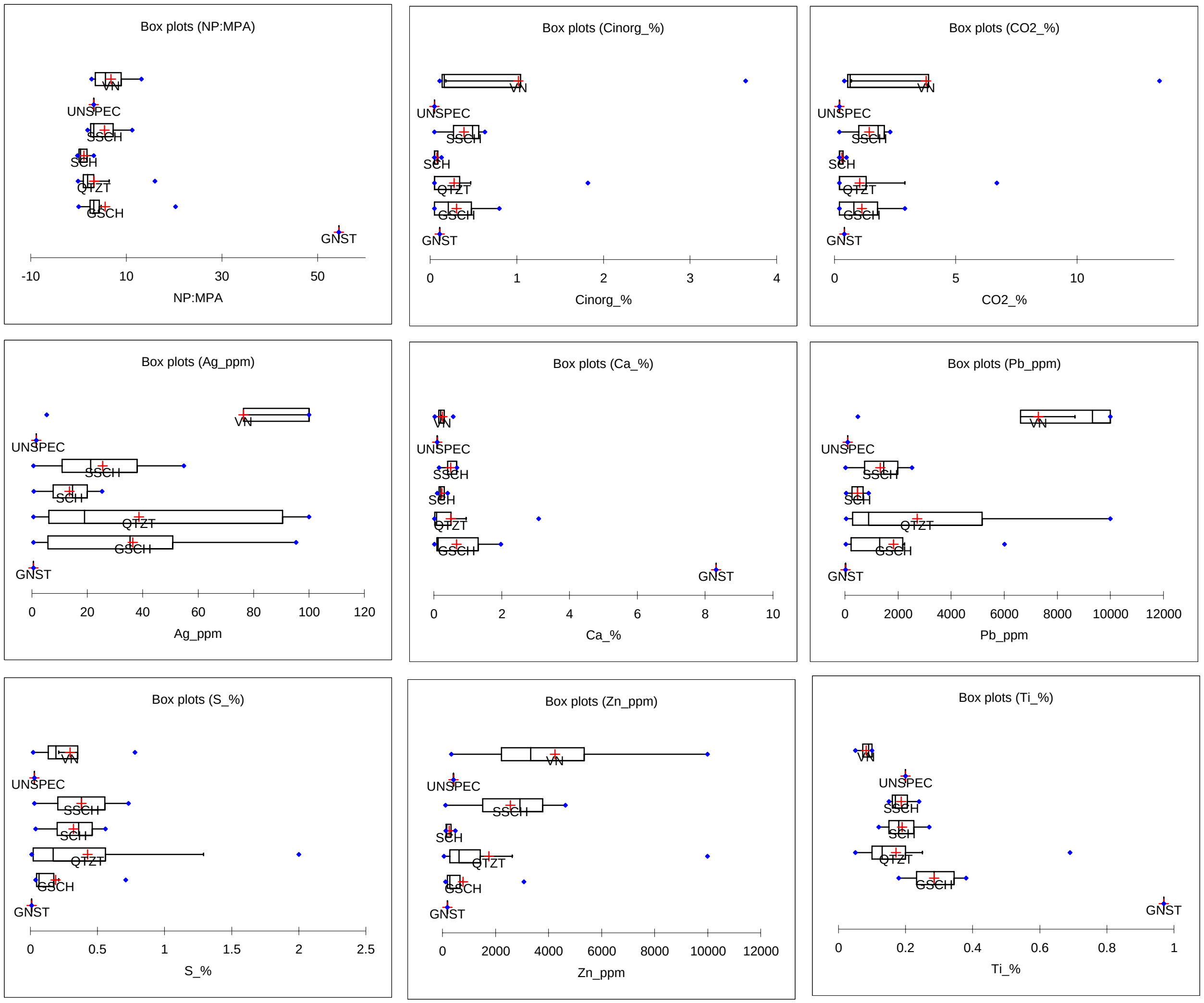








APPENDIX A6-1
Box Plots by Lithography



ATTACHMENT B

To: Dan Cornett, Rob McIntyre, Access Consulting Group

From: Diane Lister

Date: January 8, 2008

RE: **Geoenvironmental Rock Characterization, Bellekeno Zone**

1.0 Purpose and Scope

This report summarizes results of geoenvironmental rock characterization focussed on the Bellekeno zone at Keno Hill, Yukon.

The purpose of this evaluation is to review general characteristics of Bellekeno rock with respect to its potential for generation of net acidity and/or metal leaching ("AML"). The objective is to provide a technical basis to support management for rock to be excavated in the zone, by deriving: 1) AML geochemical screening criteria, 2) estimated proportions AML and Non-AML material by rock type for Bellekeno, and 3) potential field criteria for differentiating AML and Non-AML rock during excavation activities.

1.1 Study Approach

This geoenvironmental evaluation consisted of data analysis and integration of four specific data components: 1) site-wide studies on weathered rock (47 samples), 2) acid base accounting of 2006-2007 Bellekeno drill core (71samples), 3) Bellekeno drillhole multi-element and lithology database (6478 samples), and 4) mineralogy and alteration logging data on acid base accounting samples.

An overall flowchart of data review and synthesis is presented in Figure 1.

The evaluation utilized a previous review of site-wide geoenvironmental sampling conducted during 1995 to 1996 on weathered rock dump and pit samples; this study identified key geochemical and field diagnostic factors that appear to either control or correlate to the generation of net acidity and/or metal leaching in the Keno Hill rock suite (Altura, 2008a). These factors were then integrated into the review of the recent acid base accounting characterization analyses on the unweathered Bellekeno drill core samples, in order to determine any adjustments to be made to account for fresh rock relative to weathered samples. The adjusted factors served as geochemical screening criteria and were applied to the 6400-sample waste rock geochemical database for estimation of proportions of potential AML rock and Non-AML rock for each of the major Bellekeno rock types. Lastly, the acid base accounting and mineralogical/alteration information were reviewed to identify any potential correlations; potential field screening criteria were then identified for further development by site geologists.

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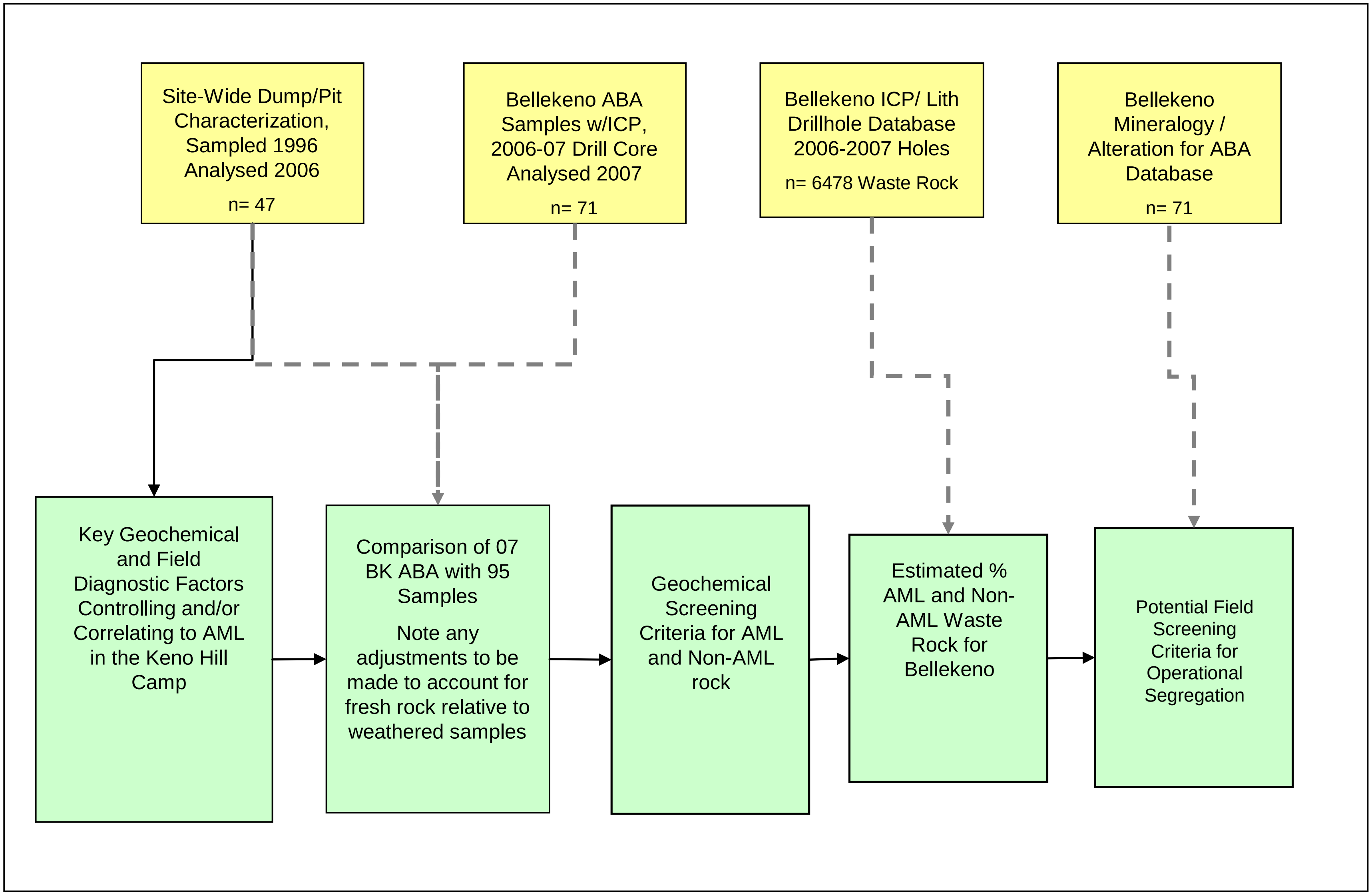
Telef. 1-867-660-4630 Fax: 1-604-608-4753
E-mail: dianelister@gmail.com

Figure 1.   Bellekeno Rock Characterization Study – Components and Study Synthesis



2.0 Methodology

All data were provided to the consultant by Alexco Resource Corp. Data were compiled and for statistical analysis purposes, results beyond minimum or maximum limits of detection were assigned a value equal to the respective detection limit. Analysis was carried out using Excel™ and XLStat™ software.

Samples in the 6478-sample waste rock drillhole database were analysed via 27-element ICP-AES with aqua regia digestion (including sulphur). The 71 acid base accounting samples were tested via the modified acid-base accounting methods including sulphate via both sodium carbonate leach and HCl digestion, total inorganic carbon via coulometer, and paste pH at a 1:1 solids to water ratio. All samples were analysed at ALS Chemex Labs in North Vancouver.

The sample's lithological, mineralogical and alteration information was determined by Alexco geologists at the time of logging and sampling. Of importance to note is the difference in lithological designation in the waste rock drillhole database versus the acid base accounting database. Due to the nature of the local geology, a specific lithology is typically intercalated with secondary lithologies over the scale of a few metres. Thus, when logging the core for deposit model purposes, over a given interval in the 10's of metres, the primary lithology is noted along with its percent proportion. Secondary lithologies are also designated along with their percent proportion. Thus, in the waste rock drillhole database a given lithology designation, for example quartzite (QTZT), should be interpreted as "predominantly quartzite". In contrast, the lithology designations in the acid base accounting database are specific to the given interval sampled.

3.0 Characterization Overview of Bellekeno Rock

3.1 Geology and Major rock types

The Keno Silver District is underlain by Yukon Group metasedimentary rocks, described in detail in the United Keno Hill Mines Limited Site Characterization Study (Access Mining Consultants, 1996).

The metasedimentary rocks have been divided locally into three formations; Upper Schist, Central Quartzite and Lower Schist. The Upper Schist (Hyland Group, pre-Cambrian to Cambrian age) consists of quartz-mica schist, quartzite, graphitic schist and minor limestone. The Central Quartzite (Keno Hill Quartzite, Mississippian age) contains thick-and thin-bedded quartzite, massive quartzite, graphitic phyllite, graphitic schist and calcareous schist. This unit is approximately 700 m (2300 ft) thick and hosts most of the major silver deposits in the area. The Lower Schist includes graphitic schist, argillite, thin-bedded quartzite, calcareous schist, phyllite, slate, sericite schist and minor thick-bedded quartzite. Conformable greenstone (altered diorite/gabbro) lenses and sills occur in places and narrow lamprophyre and quartz-feldspar porphyry dykes occur locally. Granite bodies have intruded the metasedimentary – greenstone package at several places to the north and south of the Keno Hill – Galena Hill area.

The Bellekeno zone is located approximately 1.5 km west of Keno City at Sourdough Hill, an area predominantly underlain by the Upper Schist above, and the mineralization-bearing Central Quartzite beneath. Near the schist-quartzite contact greenstone sills have been emplaced.

Principal rock units in approximate order of predominance at Bellekeno thus include quartzite, schist, and greenstone. Key aspects of these units and their respective sub-units are described in further detail below, as extracted from descriptions by Boyle (1962) in the 1996 Site Characterization Study.

Quartzite (QTZT): by far the most predominant unit at Bellekeno, quartzite may occur as either thinly bedded (inches to one foot or more thick) or thickly bedded (3 to 25 feet thick) sequences interbedded with assemblages of schist, argillite, and phyllite. Thin sections show that the quartzites consist essentially of quartz, with minor amounts of white mica (sericite) and, locally, carbonate minerals. Calcareous varieties contain up to 30 percent carbonate minerals (unit CQTZT). The black quartzites contain much carbonaceous material. Accessory minerals in all varieties include irregular patches and specks of leucoxene, tourmaline, zircon, apatite, and pyrite. The pyrite occurs mainly as cubes, distorted cubes, and crystal groups.

Schist (SCH): The predominant varieties of schist found in the area include graphitic schists (GSCH), quartz sericite schist (SSCH), and chlorite schist (CHSCH).

The graphitic schists are black or greyish black, weather easily to a crumbly mass of small black schistose fragments, and occur in beds ranging from a fraction of an inch to a few feet in thickness and are everywhere intercalated with phyllites, slates, or thin- and thick-bedded quartzites. Under the microscope the principal mineral constituents are dense opaque carbonaceous matter (graphite), quartz, sericite, carbonate minerals, feldspar, chlorite, isotropic colloidal material, and numerous metacrysts of pyrite. In some sections microcrystalline pyrite is strung out along the graphitic laminae.

The quartz-sericite and chlorite schists are greenish or mottled greenish yellow, and like the graphitic schist, weather easily and form few prominent outcrops. In thin sections the quartz-sericite schists are seen to consist essentially of quartz and sericite with subordinate amounts of carbonate minerals and leucoxene. The main accessories are apatite, zircon, and tourmaline, and a few pyrite metacrysts are also present in most sections.

Greenstone (GNST): The greenstones are schistose, greyish green to dark green rocks that occur in conformable elongated lenses and sills, principally in the schistose formations and to a lesser extent in the quartzite formations. The greenstones weather differentially compared with the schists and quartzites and form prominent precipices and knobs. In most occurrences they are jointed and present a slabby appearance. In some bodies narrow shear zones, joints, and irregular fractures contain small lenses and masses of quartz, epidote, and calcite. In thin sections the greenstones present considerable variety both in mineral composition and texture. All are highly altered, and it is rare to find bodies with any original minerals. The principal minerals now present in the greenstones are hornblende, actinolite, saussurite (zoisite, epidote, albite, sericite, carbonate), plagioclase (oligoclase to andesine), chlorite, stilpnomelane, biotite, white mica (sericite), leucoxene, and carbonate minerals. Quartz, potash feldspar, illuminate, magnetite, limonite, and apatite are common minor constituents, and pyrite is present in some bodies. All these minerals are not necessarily found in any one greenstone mass. Chlorite is generally present, commonly in considerable amounts, and biotite, sericite, quartz, and carbonate minerals are found in some bodies.

Vein (VN): Although strictly not a lithological unit, the economic mineralization in the Keno Silver District occurs in irregular shoots within vein systems developed along the vein faults, typically within the more brittle quartzite or greenstone units. Where the fault passes into soft phyllites or schists, the vein becomes less well defined and eventually dissipates. Two stages of vein mineralization are distinguished in the area. The first stage deposited quartz, pyrite, some arsenopyrite, trace gold and some sulphosalts in the vein faults. Following movement on the vein faults, a second stage of mineralization deposited siderite, galena, sphalerite, pyrite, freibergite, and pyrargyrite. Most of the economically mineable ore deposits to date have been stage two types. Supergene enrichment has occurred but is not believed to have been an important ore forming process. The oxidation zone extends from a few meters to 150 meters (10 - 500 feet) below surface. Within this zone, minerals such as limonite, pyrolusite, cerussite, and anglesite are common. Native silver, argentite and jarosite may occur locally. The principal gangue mineral is siderite.

3.2 Elemental characterization

Elemental characteristics of the Bellekeno waste rock were determined through analysis of an extensive multi-element exploration drillhole database and associated sample lithology. Table 1 shows the distribution of samples in the Bellekeno waste rock drillhole database.

Table 1. Distribution of Samples in the Bellekeno Waste Rock Drillhole Database

Lithology		
Description	**Code**	**Number of Samples**
Chloritic Schist	CHSCH	222
Calcareous Quartzite	CQTZT	505
Calcareous Schist	CSCH	36
Greenstone	GNST	567
Graphitic Schist	GSCH	870
Phyllite	PHY	5
Quartzite	QTZT	3293
Schist, Undifferentiated	SCH	775
Sericitic Schist	SSCH	205
	Total	**6478**

3.2.1 Results

Key statistical measures of the geochemistry are tabulated in Appendix C1, in accordance with major lithology.

Analysis of the results delineated certain elements of interest in the Bellekeno waste rock, and highlights are presented in the following text. Appendix C2 shows box plots of these selected elements in waste rock lithologies.

Aluminum (Al)

The more siliceous quartzite units show a tendency for relatively low aluminum values relative to the schist and greenstone units.

Arsenic (As)

A database-wide median value for arsenic of 9 ppm versus a mean of 45 ppm demonstrates the potential for significantly elevated values in a small subset of samples. As shown in the box plot for As in Appendix C2, elevated As in the several hundred to thousands ppm levels occur in most lithologies, however the quartzite units tend to show the most anomalous As occurrences.

Calcium (Ca)

Calcium content is relatively consistent across most units, tending to be below the 5 percent level. Greenstone is the exception, demonstrating a Ca tendency in the 5 to 10 percent range, likely due to the predominance of hornblende and actinolite.

Copper (Cu)

Median copper levels for most units are in the order of 50 ppm, with the exception of greenstone which shows a distinct tendency for slightly elevated copper in the 100 to 200 ppm range. Anomalous values above 400 ppm only occur within the greenstone and quartzite units.

Iron (Fe)

Most units show low iron content (less than 5%), with chloritic schist and greenstone slightly elevated, likely due to the presence of iron-bearing silicates such as chlorite and biotite.

Manganese (Mn)

Manganese occurs in a wide range of concentrations across all units, from a few hundred up to the hundreds of thousand ppm level. Greenstone units show a tendency for slightly higher manganese relative to other units.

Lead (Pb)

The median lead value for most units is relatively low in the 30 ppm range, however anomalously high values to the thousands ppm level also occur across all units. The quartzite unit demonstrates the greatest variation and most anomalous values. Greenstone shows the lowest median value for lead (5 ppm), however some anomalous outliers of several thousand ppm do occur even in this unit.

Sulphur (S)

Overall median sulphur value for the 6478 sample dataset is 0.32%, with a mean of 0.45%. Schist units tended to have medians above this value, including calcareous schist (0.46%), graphitic schist (0.72%), and undifferentiated schist (0.53%). Greenstone and phyllite units show a distinct tendency for low sulphur (medians of 0.03%), however it should be noted that the phyllite, with only 5 samples, is not sufficiently represented in the dataset, nor is this unit abundant in the Bellekeno zone.

Antimony (Sb)

Waste rock samples show an overall very low tendency for antimony, with the majority of median values at or close to the 5 ppm detection limit. Greenstone demonstrates the occurrence of some slightly elevated samples (albeit in the 10 ppm range). Rare anomalous values in the order of 100 to 200 ppm occur in the quartzite and calcareous quartzite units only.

Zinc (Zn)

Median zinc levels tend to slightly elevated, in the order 80 to 100 ppm for all units. Quartzite and calcareous quartzite show a wide range between upper and lower limits, potentially indicating sub-populations of distinctly lower and higher zinc contents. Most units have occasional occurrences of highly anomalous values over 5000 ppm.

3.2.2 Discussion of Results

Analysis of data from the 6,478 waste rock samples of the major Bellekeno units of quartzite, schist, and greenstone show that these units tend have overall low sulphur (less than 0.5%). The schist units demonstrate slightly higher values relative to the quartzite units, with the greenstone significantly lower in sulphur.

Most rock units, despite having overall low metals and sulphur, nonetheless demonstrate potential for occasional anomalous levels. All units demonstrate a weak zinc overprint in the order of 80 to 100 ppm.

3.3 Acid base accounting

A total of 71 Bellekeno waste rock and mineralized samples of varying lithology were submitted for acid base accounting analysis. The primary objective of this testing is to provide a quantitative determination of the balance between acid-producing (sulphide) and acid consuming minerals (namely carbonates) of materials in the Bellekeno zone. Samples were selected by Alexco geologists to provide both spatial and lithological representation of the entire Bellekeno zone. Table 2 shows the distribution of samples by lithology.

Table 2. Distribution of Acid Base Accounting Samples for Bellekeno

Lithology		Number of Samples		
Description	**Code**	**Waste Rock**	**Mineralized Rock**	**Total**
Calcareous Quartzite	CQTZT	12	0	12
Greenstone	GNST	12	0	12
Graphitic Schist	GSCH	13	0	13
Quartzite	QTZT	12	0	12
Sericitic Schist	SSCH	12	0	12
Vein	VN	4	6	10
	Total	**65**	**6**	**71**

3.3.1 Results

Acid base accounting results are tabulated in Appendix B1, and summary statistics in Appendix B3. Various relationships of the database with respect to lithology, zone, mineralized and non-mineralized samples are given in Appendix B4.

Paste pH

The 65 waste rock samples ranged in paste pH from 6.4 to 8.9 with a median of 8.3, and the majority in the range of 7.5 to 8.9, indicating that no samples were producing net acidity at the time of analysis. The six mineralized samples were distinctly lower slightly lower in pH (see Appendix B4-1c for box plot), ranging from 5.8 to 7.6.

Sulphur Species

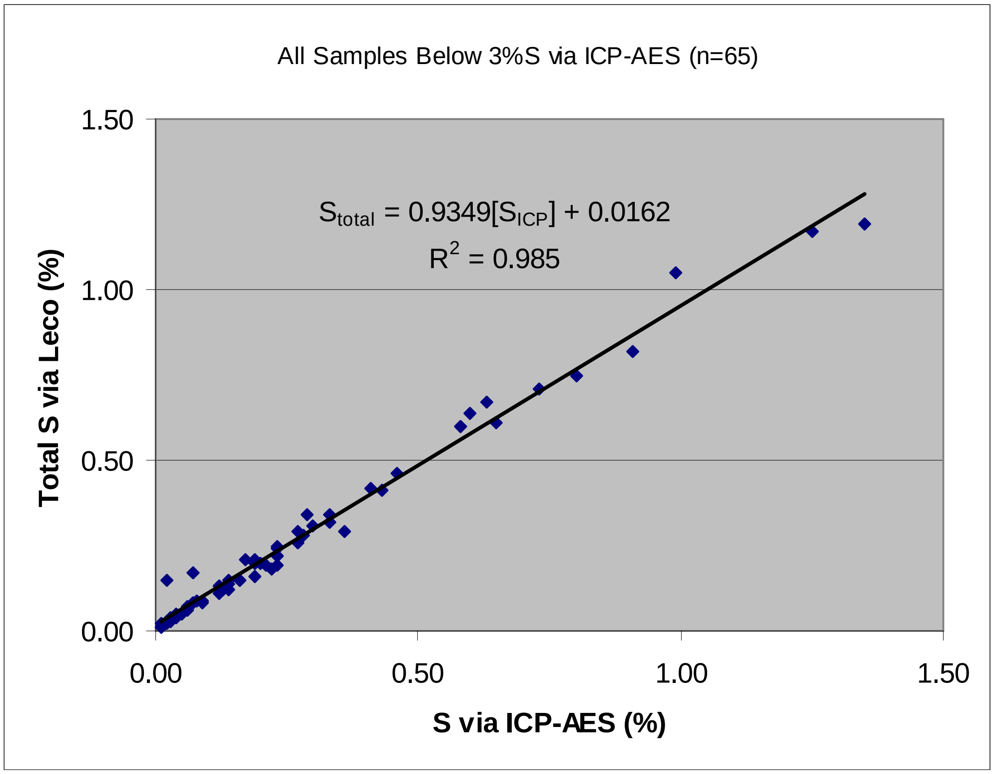
Total sulphur content of waste rock samples ranged from the 0.01 minimum detection limit to 1.19%, with a median value of 0.18%. As expected, the mineralized samples were significantly higher, ranging from 5.66 to 18.75%.

Sulphate were analysed using both carbonate leach and hydrochloric acid leach; aggregate results were very similar between the two methods, however upon reviewing sample-by sample results, there appears to be a greater sensitivity of the carbonate leach at near detection limit levels of sulphate. For future campaigns, Alexco may wish to consider deleting the hydrochloric acid leach method from the ABA suite.

Carbonate leach sulphate levels were low in the waste rock samples, ranging from the 0.01 minimum detection limit to 0.14%, indicating that on average 12% of the total sulphur is in the form of sulphate. While the mineralized samples show sulphate values up to 0.77%, sulphate accounts on average for just over 1% of the total contained sulphur. The relatively low proportion of sulphate may in part be due to the sulphides in the mineralized samples being mainly comprised of less-oxidizable galena and sphalerite.

Of interest for future analyses is the very good correlation between total sulphur via Leco and sulphur via ICP-AES, particularly at sulphur levels below 3% (eg. for typical waste rock). This indicates that sulphur values obtained as part of a multi-element ICP-AES scan, for example in the Bellekeno drillhole database, can be considered a reasonable estimate of total sulphur in a waste rock sample.

Figure 2. Correlation of Sulphur via ICP-AES and Sulphur via Leco, for samples below 3%S



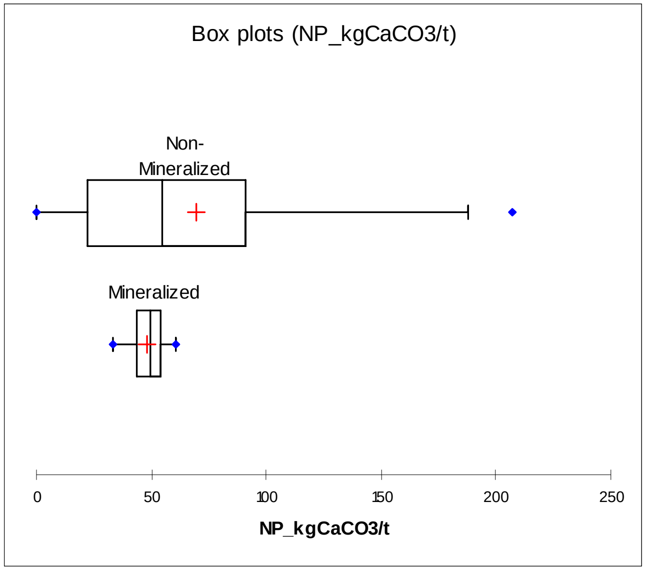
In order to assess ratios of sulphide to neutralizing potential, in acid base accounting analyses the sulphide value (calculated as the difference between total sulphur and sulphate) is multiplied by a factor of 31.25 for conversion to units of kg $CaCO_3$/t. This value is typically termed "maximum potential acidity", or MPA. Use of the MPA value allows direct comparison to the samples neutralizing potential, expressed in these same units, and also allows for calculation of the ratio of neutralizing potential to maximum potential acidity. MPA values for the Bellekeno samples are included in Appendix B1.

Neutralizing Potential

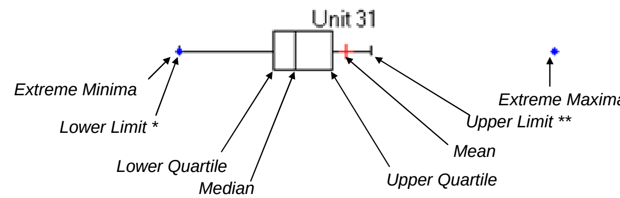
The 65 sample waste rock dataset returned a median NP of 55 kg $CaCO_3$/t, only slightly above the 49.5 kg $CaCO_3$/t median for mineralized samples. While mineralized samples show a very tight distribution around its respective median (Figure 3), waste rock samples show a much greater range of NP values, from 0 to 207 kg $CaCO_3$/t (the minimum value was from a sample of GSCH, the maximum from a calcareous GNST sample).

The similarity in median NP in the mineralized samples is attributed to the significant quantities of siderite ($FeCO_3$) in the veins. Siderite is capable of buffering net acidity only up to a slightly acidic pH range of 5 to 6, therefore would be measured in a neutralization potential analysis, but is a less efficient neutralizer than calcite ($CaCO_3$).

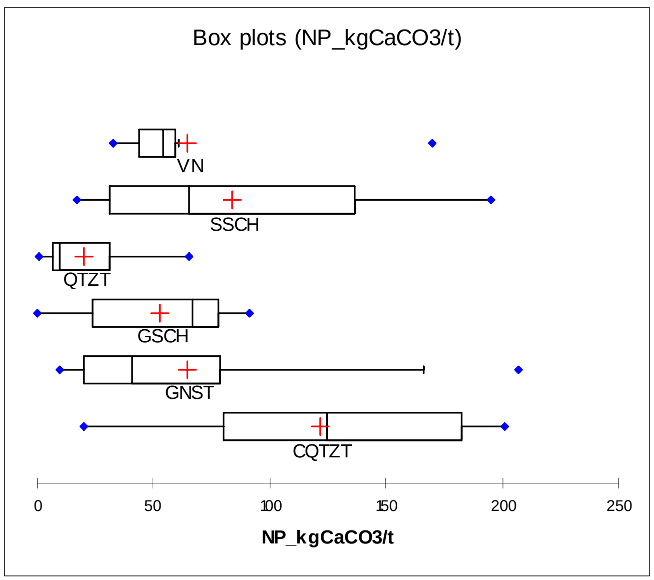
Figure 3. Box Plots for Neutralizing Potential and NP : MPA



LEGEND FOR BOX PLOTS:



*Lower limit: Linf = X(i) such that {X(i) – [Q1 – 1.5 (Q3 – Q1)]} is minimum and X(i) = Q1 – 1.5 (Q3 – Q1).
**Upper limit: Lsup = X(i) such that {X(i) - [Q3 + 1.5 (Q3 – Q1)]} is minimum and X(i) = Q3 + 1.5 (Q3 – Q1)



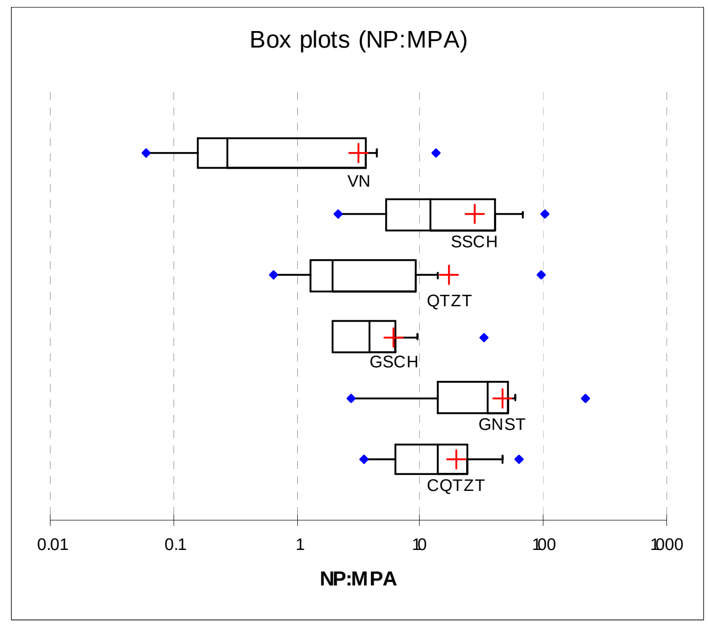
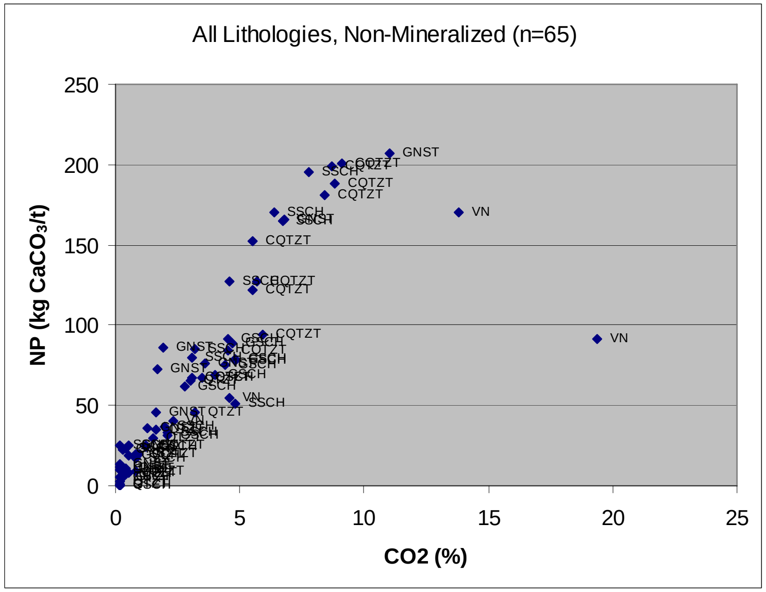
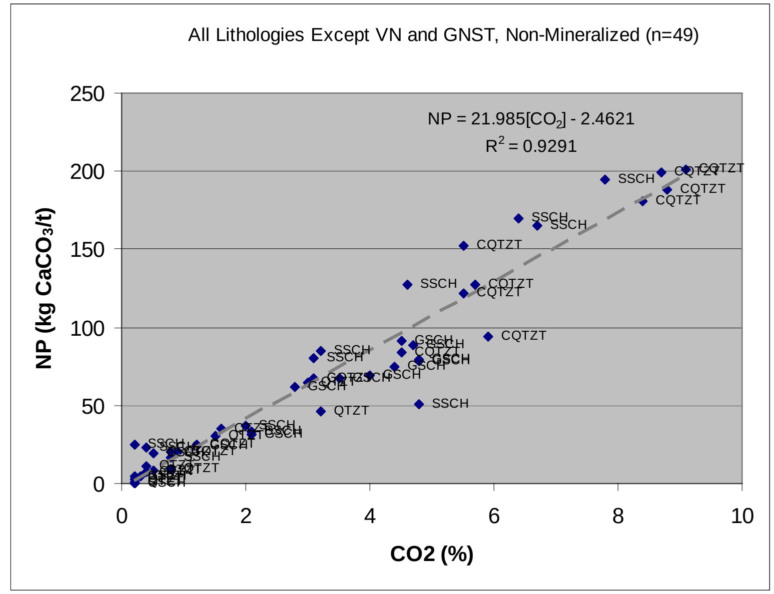
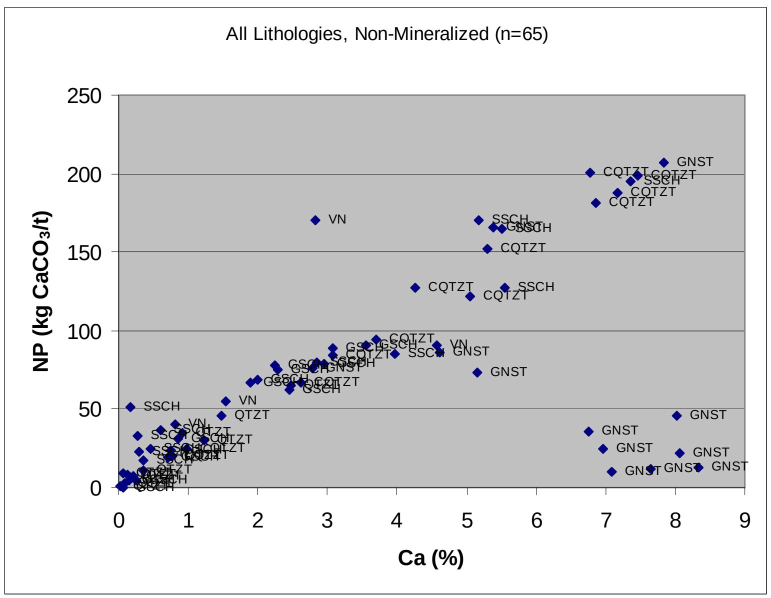
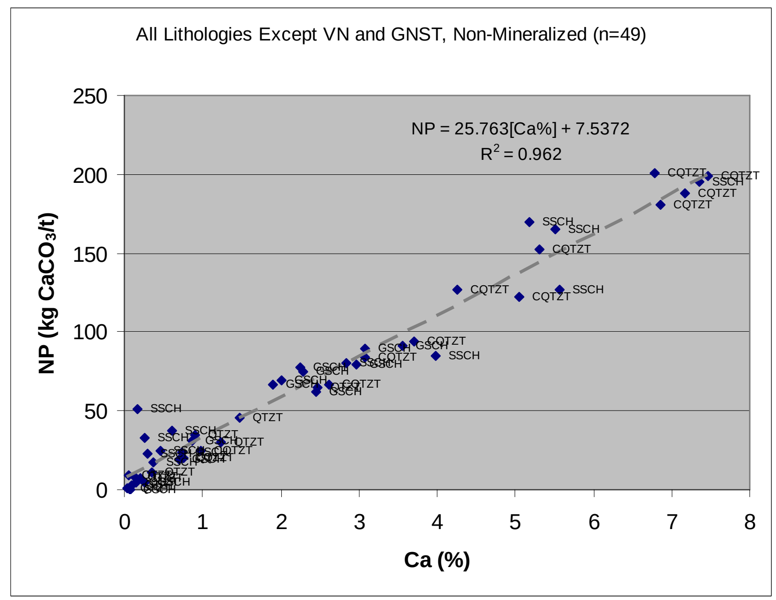


Figure 4. Relationships of Calcium and Carbonate with NP









By lithology, the calcareous quartzite unit has the tendency for the highest NP, with a median in the order of 125 kg $CaCO_3$/t (Figure 3). Quartzite, one of the more predominant units at Bellekeno, tends to have a relatively low NP, and appears to have a sub-population of very marginal NP samples in the 1 to 11 kg $CaCO_3$/t range, with the remaining samples between 20 and 65 kg $CaCO_3$/t.

The relationships between neutralizing potential and other geochemical parameters are important in: i) determining potential controls to buffering of net acidity, ii) evaluating the potential for correlation of the smaller acid base accounting database with the larger exploration drillhole database, and iii) determining potential correlations of NP to simple field screening parameters. Some key relationships are discussed in the following paragraphs, and shown in Figure 4.

Neutralizing potential of the Bellekeno ABA sample suite demonstrates a direct proportional relationship with both carbonate (as CO_2) and calcium (Figure 4). Of note in the left graphs of Figure 4 is that the VN and GNST units tend to be outliers in an otherwise linear trend. When samples of these units are filtered from the dataset, a very good correlation is derived ($r^2 > 0.9$), as shown in the right hand graphs. Moreover, the slopes of the NP:CO_2% and NP:Ca% trendlines correspond closely with the stoichiometric ratio of $CaCO_3$ to each of these constituents (22.7 and 25 respectively). These close relationships indicate that for the various quartzite and schist units at Bellekeno, that carbonate as calcite is the primary source of available neutralization. The vein units, on the other hand, have elevated carbonate attributable to its siderite gangue, and demonstrate the less effective neutralization by this mineral. Many of the greenstone units occur as a discrete group of outliers in the Ca versus NP graph, likely attributable to the occurrence of Ca in a non-neutralizing form such as hornblende, actinolite, and other amphibole minerals.

NP:MPA

As previously mentioned, the neutralizing to maximum potential acidity ratio, or NP:MPA is calculated by dividing the sample's neutralizing potential by its acid production potential expressed in kg CaCO3/t (% sulfide content x 31.25).

A common industry practice is to infer that samples with NP:MPA of greater than 3:1 are unlikely to produce net acidity, with no further testwork or study. British Columbia guidelines (BC Ministry of Energy and Mines, 1997) consider a 4:1 NP:MPA ratio. For samples with lower ratios, additional information (such as data from field and lab weathering studies) are indicated, in order to confirm any site-specific controls on net acid generation.

Distribution of the Bellekeno results across the NP:MPA ratio range are given in Table 3, and shown in the lower right-hand graph of Figure 3. A total of 49 of the 71 samples have NP:MPA ratios greater than 3, indicating minimal potential for net acidity. Removing the mineralized samples from the dataset (six vein samples all with NP:MPA of less than 1) and considering only the 65 waste rock samples, 75 percent of these show minimal potential for net acidity.

Greenstone, calcareous quartzite, and sericitic schist demonstrate a large proportion of samples with NP:MPA ratio greater than 3, indicating overall minimal concern for net acidity from these units. Quartzite and graphitic schist units show the have a larger proportion of samples in the “uncertain” range between 1 and 3, with one quartzite sample with NP:MPA of less than one, indicating that focus of site specific assessment and field screening should be directed to these units.

Table 3. Distribution of NP:MPA in Bellekeno Samples

Lithology		**NP : MPA**					
Description	**Code**	**≤ 1**	**>1 to 2**	**>2 to 3**	**>3 to 4**	**>4**	**Total**
Calcareous Quartzite	CQTZT	0	0	0	1	11	12
Greenstone	GNST	0	0	1	0	11	12
Graphitic Schist	GSCH	1	3	2	2	5	13
Quartzite	QTZT	1	6	0	0	5	12
Sericitic Schist	SSCH	0	0	1	0	11	12
Vein	VN	6	1	0	0	3	10
	Total	**8**	**10**	**4**	**3**	**46**	**71**

Fizz Rating

The 'fizz rating', a ranking from 1 to 4 of effervescence to 25% HCl, is assessed by the laboratory in order to determine the strength of acid to utilize for the neutralization potential titration. Fizz rating of the Bellekeno sample set ranged from 1 to 3, with a median of 2 (slight effervescence), and mean slightly over 2. When correlated with NP, it can be seen that samples with a fizz rating of 3 (moderate effervescence, continuous bubbling) demonstrate a neutralizing potential of at least 62 kg $CaCO_3$/t, and an NP:MPA of at least 4.76, with minimal potential for net acidity (Figures 5 and 6). This indicates that the fizz rating parameter could serve as a potential screening tool for field classification of rock – for example, a sample with a fizz rating of at least 3 may be classified as having minimal potential for net acidity.

Figure 5. Relationships of Fizz Rating and Neutralization Potential

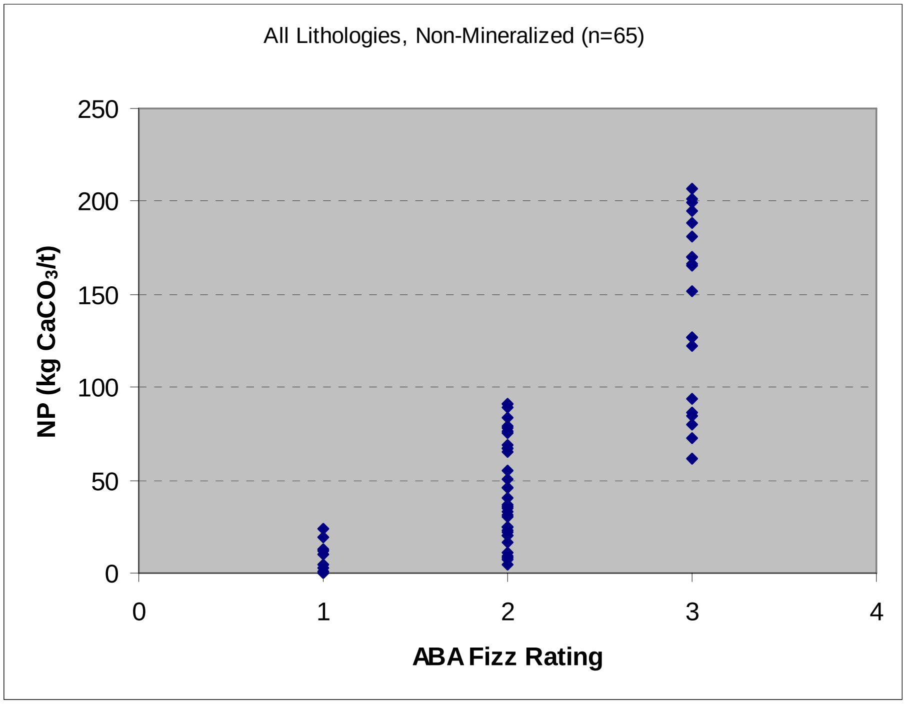
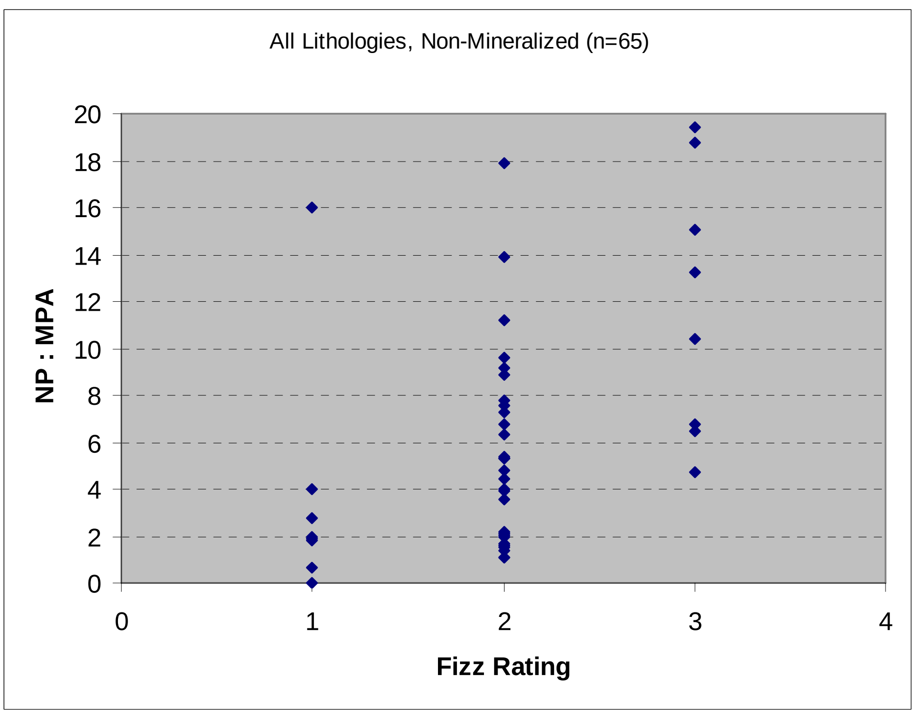


Figure 6. Relationships of Fizz Rating and NP : MPA



4.0 Analysis of Results

4.1 AML Geochemical Screening Criteria

An evaluation of testwork conducted on 47 1995-96 rock dump and pit wall samples in the Keno Silver District, rock excavated and left exposed for up to 80 years, concluded that samples showing net acidity and/or Pb and Zn metal leaching (AML) had the following geochemical characteristics (Altura Environmental Consulting, 2008a):

- Net Acidity: The two key aspects of samples demonstrating leachate pH ≤ 5.5, are either a calcium level in the rock of ≤0.51% or a CO_2 level of ≤0.6% , coupled with an ICP-sulphur level of ≥0.25%.
- Zinc Leaching: leaching of zinc to levels ≥ 10 mg/kg appears to occur under two differing conditions: i) solubilization of zinc under net acidic conditions – independent of zinc concentration in rock, and ii) solubilization of zinc under overall neutral to alkaline conditions where Zn concentrations in rock exceed 5000 ppm.
- Lead Leaching: leaching of lead to levels ≥ 3 mg/kg occurs only under neutral pH conditions, where Pb concentrations in rock exceed 5000 ppm.

The samples tested were taken from adit dump and pit samples at areas of previous mining activity in the Keno Hill area; and although occurring within the same geological units, most of the samples were comprised of material within or very close to the ore grade mineralization, and as such tend to demonstrate higher sulphur and sulphide content than the Bellekeno ABA sample suite. This relationship and other comparative graphs of the two datasets are presented in Appendix B4-4. Overall, the historic sample dataset also demonstrate lower paste pH, neutralization potential, carbonate and calcium. While this is no doubt in large part attributable to the weathered nature of the waste dump and pit wall samples versus the fresh rock of the Bellekeno dataset, due to the proximity of many of the samples to the main vein structure, differences in original sample lithology are also a likely factor.

The geochemical factors identified in the previous district-wide study provide valuable information with respect threshold criteria for determining, based on geochemical and visual characteristics, the potential for a fresh sample to generate AML.

Directly applying the above factors of ≤0.51% Ca, and ≥ 0.25% S (via ICP) to the Bellekeno dataset results in a few samples with NP:MPA marginally above 1 being classified into the category of having low potential for net acidity. This indicates that this threshold for calcium is too low for a “fresh sample” dataset. The lower calcium threshold in the weathered samples is likely attributable to the waste dump and pit wall samples experiencing solubilization and flushing of calcium under ambient site conditions. Thus an adjustment factor for fresh rock samples of 1.5 was applied to the calcium criteria, increasing the threshold to 0.75% Ca. Sulphur criteria is conservatively maintained at 0.25%; in addition, a 1.50% upper threshold is recommended, to ensure that any high sulphur samples, regardless of calcium content, are assigned as potential net acidity producers. The 5000 ppm Pb and Zn criteria from the district-wide study are maintained.

In summary, based on the review of the Bellekeno ABA dataset coupled with the AML evaluation district-wide, the following geochemical screening criteria are recommended to identify potentially AML rock:

a) Ca% ≤ 0.75% and $S_{\text{via ICP}} \geq 0.25$ %

b) or $S_{\text{via ICP}} \geq 1.50$ %

c) or Pb ≥ 5000 ppm

d) or Zn ≥ 5000 ppm

4.2 *Estimated Proportions of AML and Non-AML Rock for Bellekeno*

Utilizing the screening criteria presented above in section 4.1, the 6478-sample Bellekeno waste rock database was filtered to identify potentially AML samples.

Results are shown in Table 4. The graphitic schist unit is indicated to contain the highest proportion of potentially AML samples, while the greenstone samples show the least potential for AML.

Table 4. Results of % AML Samples Identified Using AML Geochemical Screening Criteria against Bellekeno Waste Rock Drillhole Database

Lithology		**Number of Samples in Database**	**# of Samples Screened as Potentially AML**	**% of Samples Screened as Potentially AML**
Description	**Code**			
Chloritic Schist	CHSCH	222	27	**12%**
Calcareous Quartzite	CQTZT	505	54	**11%**
Greenstone	GNST	567	10	**2%**
Graphitic Schist	GSCH	870	562	**65%**
Quartzite	QTZT	3293	719	**22%**
Schist, Undifferentiated	SCH	775	299	**39%**
Sericitic Schist	SSCH	205	37	**18%**

Note: Lithology units with less than 40 samples not included in calculation (units CSCH and PHY)

4.3 *Potential Field Screening Criteria*

Based on the geochemical screening criteria identified in section 4.1 and the results of the acid base accounting, a series of potential criteria may be used in field screening of Bellekeno waste rock, in order to permit reliable identification of potentially AML rock during routine mining or other rock excavation activities. A possible “field filter” for identifying potentially AML rock is as follows:

a) Slight or no effervescence of pulverized sample with 25% HCl (eg. presence of none or only a few bubbles), and visual estimated pyrite >0.5%, or;

b) Any sample with one or more of the following:

   i. visual estimated sphalerite >0.75%

   ii. visual estimated galena >0.5%

   iii. visual estimated pyrite >2%

   iv. any Vein material not deemed to be in “Mineralized” category

   v. paste pH $\leq$ 6.0 (to be measured on any highly altered/oxidized samples)

The above evaluations may be readily and rapidly conducted at a site in a basic field office facility, using simple instruments and materials such as a hand lens or binocular microscope, hydrochloric acid, distilled water, and pH meter.

As part of the development of a field program, the above criteria will require additional site testing, and should be modified as required to ensure and good correlation with geochemistry across all lithological units, and consistency in application between personnel.

5.0 Conclusions and Recommendations

This review of the Bellekeno geochemical and acid base accounting data, coupled with integration with studies and testwork done site-wide on exposed waste rock and pit walls, indicates that while much of the rock is geochemically benign, there is potential for a proportion of Bellekeno waste rock to produce net acidity and/or metal leaching.

To support waste rock management during future excavation activities, criteria have been derived to permit: i) estimation of expected quantities of potentially AML material for planning purposes, and ii) potential field screening criteria applicable to operation segregation of AML rock.

As part of the development of a field screening program for active rock excavation, field criteria will require additional site testing, and be modified as required to ensure and good correlation with geochemistry across all lithological units, and consistency in application between personnel.

Prepared By:

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Diane Lister, P.Eng.

References:

Access Mining Consultants, 1996. United Keno Hill Mines Limited Site Characterization Study, Report No. UKH/96/01.

Altura Environmental Consulting, 2008a. Review of Historic Keno Static Test Data to Define ARD/ML – Controlling and Correlating Factors. Prepared for Access Consulting Group.

BC Ministry of Energy and Mines, 1997. Draft Guidelines for and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Mine Sites in British Columbia.

<u>Attachments:</u>

Appendices B1 to B4, and C1 to C2

APPENDIX B1-1 Acid Base Accounting Data

Certificate #	Sample #	Hole ID	BK Area	From (m)	To (m)	Lith Unit	Description
VA07091928	C212117	K-06-0011	SW Zone	36.3	37.5	SSCT	Light green-grey, fine grained mica schist with intermitted boudinized vein quartz.
TR07092775	E600288	K-07-0081	East Zone	45.7	47.7	SSCT	Yellow-green fine grained mica-schist. Slightly oxidized
VA07091920	C212566	K-06-0016	SW Zone	207.3	208.4	SSCT	Yellow-green fine grained mica schist.
VA07091804	C462066	K-06-0023	SW Zone	356.8	358.5	SSCT	Sericite/Chloritic Schist Unit: Medium grey/green fine grained micaseous schist preceding a greenstone unit.
TR07093011	E600079	K-07-0078	East Zone	52.51	54.1	SSCT	Yellow-green fine grained mica-schist. Moderately friable.
TR07093907	E467959	K-07-0065	East Zone	180.96	182.08	SSCT	Yellow/green/grey fine grained mica-schist. Slightly calcareous. Quartz sweats and boudins are interbedded with the schist.
TR07093920	E599704	K-07-0066	East Zone	139.38	139.77	SSCT	Yellow/green/grey fine grained mica-schist. Slightly calcareous.
TR07093369	E775513	K-07-0067	East Zone	135.63	136.25	SSCT	Light yellow-grey, fine-grained mica schist. Slightly calcareous.
TR07092771	E600542	K-07-0086	East Zone	229.1	229.9	CHSCH	Medium gray-green chlorite-rich schist with local thin quartzite beds.
VA07091806	C462793	K-06-0035	SW Zone	65.1	67.45	SSCT	Medium Grey/Green Chlorite-rich fine grained mica-schist.
VA07091923	C212729	K-06-0020	SW Zone	44.2	45.7	SSCT	Medium Grey/Green Chlorite-rich fine grained mica-schist.
VA07091226	E776315	K-07-0091a	East Zone	286.9	288	SSCT	Light-medium grey-green chlorite rich fine grained mica-schist.
TR07085899	E768248	K-07-0094	Middle East Zone	142.63	144.51	GNST	Dark grey-green greenstone
VA07091804	C462069	K-06-0023	SW Zone	359.9	361.9	GNST	Medium-dark green greenstone with abundant beige phenocrysts. Moderately calcareous.
TR07092775	E600290	K-07-0081	East Zone	51.05	51.9	GNST	Small unit of greenstone with cross-cutting quartz/siderite veins and sweats. Moderately foliated.
TR07093364	E775819	K-07-0079	East Zone	86.87	89.03	GNST	Dark green, well-foliated, moderately calcareous greenstone.
VA07091921	C212639	K-06-0016	SW Zone	300.3	301.8	GNST	Medium-dark green, slightly calcareous greenstone. Slightly foliated with tiny, beige/white phenocrysts elongated approximately folitaion parallel.
VA07091225	E600631	K-07-0092	Middle East Zone	116.25	118.26	GNST	Light grey-green, weakly foliated with porphyroblasts of quartz and carbonate.
TR07093906	E599612	K-07-0066	East Zone	1.34	3.35	GNST	Dark green-grey calcareous greenstone.
TR07092773	E752010	K-07-0083	East Zone	88.74	90.74	GNST	Medium grey-green calcareous greenstone
TR07092957	E775866	K-07-0082	East Zone	1.44	3.4	GNST	Medium grey-green calcareous greenstone
VA07091927	C212917	K-06-0020	SW Zone	289.6	291.05	GNST	Medium Grey-green calcareous greenstone.
TR07086383	E600841	K-07-0093	Middle East Zone	182.27	185.32	GNST	Light to medium grey-green, calcareous greenstone with trace qtz/calcite veining and elongated porphyroblasts. Moderately foliated.
VA07091226	E776319	K-07-0091a	East Zone	290.7	291.8	GNST	Light grey-green calareous greenstone with undulating, boudinized qtz/calcite veins.
TR07092774	E600319	K-07-0081	East Zone	98.25	100.28	QTZT	Medium grey, moderately foliated quartzite.
VA07091804	C462078	K-06-0023	SW Zone	369.5	370.7	QTZT	Well foliated med-dark grey quartzite unit that has been cross cut by siderite stringers.
TR07093010	E600086	K-07-0078	East Zone	64.1	66.1	QTZT	Medium-grey, brittle quartzite with several cross-cutting qtz/siderite stringers.
TR07086383	E600846	K-07-0093	Middle East Zone	190.1	191.21	QTZT	Medium grey quartzite with slightly oxidized fractured surfaces and thin cross-cutting qtz stringers.
TR07087698	E768283	K-07-0094	Middle East Zone	196.84	197.8	QTZT	Light - Medium grey quartzite with iron/manganese oxide staining. Minor siderite and quartz stringers
TR07093363	E775833	K-07-0079	East Zone	111.56	113.56	QTZT	Medium grey, brittle quartzite. Cross-cutting quartz veins/veinlets.
TR07093908	C467832	K-07-0065	East Zone	28.34	29.34	QTZT	Bleached quartzite with maganese staining surrounding fractures and quartz stringers.
TR07093902	E599725	K-07-0066	East Zone	155.95	156.95	QTZT	Brittle, light grey quartzite. Moderately foliated with stringers of quartz x-cutting foliation.
VA07091229	E600593	K-07-0092	Middle East Zone	51.55	53.52	QTZT	Medium grey, foliated with cross-cutting oxidized quartz stringers with slightly oxidized fracture surfaces.
TR07092952	E751981	K-07-0083	East Zone	43	45	QTZT	Bleached, brittle quartzite with manganese staining surrounding fractures and limonite staining on fracture surfaces.
VA07091806	C462785	K-06-0035	SW Zone	53	55	QTZT	Dark grey, well foliated
VA07091926	C212949	K-06-0020	SW Zone	332.2	333.7	QTZT	Medium-dark grey brittle quartzite with qtz stringers cross-cutting foliation. Iron Oxide staining on fractured surfaces.
TR07093900	C466994	K-07-0067	East Zone	111.1	113.1	CQTZT	Medium-dark grey calcareous quartzite.
VA07091809	C462038	K-06-0023	SW Zone	323.1	324.6	CQTZT	Medium-dark grey calcareous quartzite unit with cross-cutting quartz and calcite stringers.
VA07091227	E600744	K-07-0092	Middle East Zone	258	260.03	CQTZT	Medium-dark grey calcaerous quarzite with minor x-cutting quartz and calcite stringers.
TR07092959	E751851	K-07-0076	East Zone	78.73	81.55	CQTZT	Medium grey calcareous quartzite with foliation parallel sweats of calcite as well as cross-cutting quartz/calcite stringers.
TR07093366	E775774	K-07-0079	East Zone	29.39	31.39	CQTZT	Medium-dark grey calcareous quartzite with a well developed foliation. Cross-cutting quartz and calcite stringers are present thru-out.
TR07093907	C467957	K-07-0065	East Zone	178.72	180.23	CQTZT	Well foliated, medium to dark grey calcareous quartzite.
TR07093904	E599687	K-07-0066	East Zone	110.75	112.75	CQTZT	Medium grey calcareous quartzite with cross-cutting quartz/calcite stringers. Slightly oxidized fractured surfaces.
TR07092951	E752037	K-07-0083	East Zone	131.41	133.5	CQTZT	Well foliated, medium to dark grey calcareous quartzite with several foliation parallel bands of extreme calcification. Stringers of qtz and calcite are present x-cutting throughout
TR07092954	E775965	K-07-0082	East Zone	154.92	157.12	CQTZT	Well foliated, medium to dark grey calcareous quartzite with several foliation parallel bands of extreme calcification. Stringers of qtz and calcite are present x-cutting throughout
VA07091805	C462958	K-06-0035	SW Zone	337	339	CQTZT	Dark grey, slightly porous calcareous quartzite with bands of more intense calcification parallel to foliation.
VA07091926	C212942	K-06-0020	SW Zone	323.1	324.6	CQTZT	Dark grey, well foliated, calcareous quartzite with stringers of qtz and calicite cross-cutting foliation. Limonite oxide stains fractured surfaces and some stringers.
TR07086384	E600885	K-07-0093	Middle East Zone	225	227	CQTZT	Medium to dark grey, banded calcareous schist. Some bands (cm scale) are more intensly calcareous than othres.
VA07091924	C215828	K-06-0023	SW Zone	45.7	47.3	GSCH	Med-dark grey moderately graphitic schistose unit with intermittent, thin beds of quartzite.
TR07093011	E600070	K-07-0078	East Zone	39.62	41.62	GSCH	Graphitic Schist unit with intermittent thin beds of quartzite. Slightly gougy at times. Slightly vuggy sweats of quartz.
TR07087698	E768289	K-07-0094	Middle East Zone	207.9	209.91	GSCH	Dark grey, slightly gougy, friable graphitic schist with intermittent qtz sweats. Slightly oxidized - limonite staining on fractured surfaces.
TR07092956	E751924	K-07-0076	East Zone	154.04	155.91	GSCH	Dark grey slightly graphitic schist with intermittent, thin beds of quartzite. Qtz sweats. Moderately oxidized.
TR07092957	E775865	K-07-0079	East Zone	160.83	163.37	GSCH	Dark grey, moderatley graphitic schist unit with intermittent, thin bedded quartzite.
TR07093905	C467893	K-07-0065	East Zone	102.41	103.89	GSCH	Dark grey, graphitic schist. Sweats of calcite and vein quartz intermittent throughout.
TR07093367	E775645	K-07-0066	East Zone	60.58	62.66	GSCH	Dark grey to black graphitic schist with sweats and intermittent layers of vein quartz.
TR07093901	E466965	K-07-0067	East Zone	64.91	66.98	GSCH	Dark grey to black graphitic schist with sweats of calcite and quartz. Trace limonite on fracture surfaced.
TR07092955	E775947	K-07-0082	East Zone	130.47	132.27	GSCH	Dark grey to black graphitic schist with sweats of calcite and quartz.
VA07091807	C462772	K-06-0035	SW Zone	31	33	GSCH	Dark grey to black graphitic schist with sweats of quartz.
VA07091930	C212705	K-06-0020	SW Zone	13.5	15.2	GSCH	Dark grey to black graphitic schist with sweats of vein quartz throughout. Slightly oxidized.

APPENDIX B1-1 Acid Base Accounting Data

Certificate #	Sample #	Hole ID	BK Area	From (m)	To (m)	Lith Unit	Description
TR07092772	E600774	K-07-0092	Middle East Zone	297.77	299.8	GSCH	Dark grey to black graphitic schist with sweats of vein quartz/calcite throughout.
VA07091228	E776285	K-07-0091a	East Zone	247.45	249.45	GSCH	Dark grey to black graphitic schist with sweats of vein quartz/calcite throughout.
TR07093903	C467919	K-07-0065	East Zone	129.84	130.12	VN	Mineralized Siderite vein (sphalerite + galena veinlets) - clay alteration.
TR07093920	E599708	K-07-0066	East Zone	142.46	143.1	VN	Mineralized Siderite vein (sphalerite and galena veinlets)
TR07093368	E775550	K-07-0067	East Zone	164.24	164.94	VN	Brecciated Quartzite with siderite matrix. Main mineralized lens contains sphalerite, galena, arsenopyrite.
TR07092958	E751883	K-07-0076	East Zone	114.5	115.21	VN	Fine grained galena and sphalerite within quartz and siderite stringers that cross-cut the quartzite unit.
TR07092953	E775989	K-07-0082	East Zone	195.96	196.4	VN	Trace Galena within fractures of a siderite vein.
VA07091240	E600657	K-07-0092	Middle East Zone	158.37	158.72	VN	Trace Galena within greenstone and siderite stringers.
VA07091931	C212406	K-06-0011	SW Zone	401.3	402	VN	Tetrahedrite, siderite, galena and sphalerite - breccia.
VA07091925	C462087	K-06-0023	SW Zone	377.45	378	VN	Massive sphalerite with minor abours of galena, pyrite and chalcopyrite within a siderite vein.
VA07091241	C463235	K-06-0038	SW Zone	310.6	311.05	VN	Fractured broken quartzite with trace siderite veining. Trace pyrite/sphalerite and possibly galena
TR07093365	E775799	K-07-0079	East Zone	61.82	61.96	VN	Massive sphalerite within a siderite vein. Massive pyrite and trace galena also present.

APPENDIX B1-1 Acid Base Accounting Data

Sample #	Hole ID	BK Area	From (m)	To (m)	Lith Unit	OA-VOL08	OA-VOL08	OA-VOL08	OA-VOL08	OA-ELE07	OA-VOL08	S-IR08	S-GRA06	S-GRA06a	S-CAL06	C-GAS05	C-GAS05
						MPA	FIZZ RATING	NNP	NP	pH	Ratio NP:MPA	Total S	SO4 (Cb Lch)	SO4 (HCl Lch)	S2- (calc)	C	CO2
						tCaCO3/1000t ore	Unity	tCaCO3/1000t ore	tCaCO3/1000t ore	Unity	Unity	%	%S	%S	%S	%	%
C212117	K-06-0011	SW Zone	36.3	37.5	SSCT	10.6	2	12	23	8.5	2.16	0.34	<0.01	<0.01	0.34	0.11	0.4
E600288	K-07-0081	East Zone	45.7	47.7	SSCT	2.5	2	15	17	8.5	6.8	0.08	0.01	<0.01	0.07	0.2	0.8
C212566	K-06-0016	SW Zone	207.3	208.4	SSCT	5.3	3	75	80	7.8	15.06	0.17	0.05	0.04	0.12	0.83	3.1
C462066	K-06-0023	SW Zone	356.8	358.5	SSCT	1.3	3	84	85	8.9	68	0.04	0.01	<0.01	0.03	0.86	3.2
E600079	K-07-0078	East Zone	52.51	54.1	SSCT	6.3	2	27	33	7.6	5.28	0.2	0.01	0.01	0.19	0.57	2.1
E467959	K-07-0065	East Zone	180.96	182.08	SSCT	1.3	3	126	127	8.6	101.6	0.04	<0.01	0.02	0.04	1.25	4.6
E599704	K-07-0066	East Zone	139.38	139.77	SSCT	8.8	3	161	170	8.3	19.43	0.28	0.01	<0.01	0.27	1.75	6.4
E775513	K-07-0067	East Zone	135.63	136.25	SSCT	2.5	3	163	165	8.4	66	0.08	<0.01	<0.01	0.08	1.83	6.7
E600542	K-07-0086	East Zone	229.1	229.9	CHSCH	10.6	2	40	51	8	4.8	0.34	<0.01	<0.01	0.34	1.31	4.8
C462793	K-06-0035	SW Zone	65.1	67.45	SSCT	6.9	2	30	37	8.6	5.38	0.22	0.03	0.06	0.19	0.54	2
C212729	K-06-0020	SW Zone	44.2	45.7	SSCT	2.8	2	22	25	8.3	8.89	0.09	0.03	0.03	0.06	0.06	0.2
E776315	K-07-0091a	East Zone	286.9	288	SSCT	5.9	3	189	195	8.4	32.84	0.19	0.01	0.03	0.18	2.13	7.8
E768248	K-07-0094	Middle East Zone	142.63	144.51	GNST	4.7	1	8	13	8.6	2.77	0.15	0.01	0.01	0.14	0.05	0.2
C462069	K-06-0023	SW Zone	359.9	361.9	GNST	2.2	3	84	86	8.8	39.31	0.07	<0.01	0.01	0.07	0.53	1.9
E600290	K-07-0081	East Zone	51.05	51.9	GNST	5	3	161	166	8.1	33.2	0.16	<0.01	<0.01	0.16	1.86	6.8
E775819	K-07-0079	East Zone	86.87	89.03	GNST	0.9	2	45	46	8	49.07	0.03	0.01	<0.01	0.02	0.44	1.6
C212639	K-06-0016	SW Zone	300.3	301.8	GNST	3.4	2	22	25	8.6	7.27	0.11	0.01	0.02	0.1	0.13	0.5
E600631	K-07-0092	Middle East Zone	116.25	118.26	GNST	0.6	2	35	36	8.3	57.6	0.02	<0.01	0.01	0.02	0.36	1.3
E599612	K-07-0066	East Zone	1.34	3.35	GNST	0.6	1	9	10	8.8	16	0.02	0.01	<0.01	0.01	<0.05	0.2
E752010	K-07-0083	East Zone	88.74	90.74	GNST	0.9	3	206	207	8.3	220.8	0.03	<0.01	<0.01	0.03	3.01	11
E775866	K-07-0082	East Zone	1.44	3.4	GNST	0.3	1	12	12	8.6	38.4	0.01	0.01	<0.01	<0.01	<0.05	<0.2
C212917	K-06-0020	SW Zone	289.6	291.05	GNST	0.9	2	21	22	8.4	23.47	0.03	0.01	<0.01	0.02	0.08	0.3
E600841	K-07-0093	Middle East Zone	182.27	185.32	GNST	10	2	66	76	8.2	7.6	0.32	0.03	0.01	0.29	0.99	3.6
E776319	K-07-0091a	East Zone	290.7	291.8	GNST	1.3	3	72	73	8.3	58.4	0.04	<0.01	0.02	0.04	0.47	1.7
E600319	K-07-0081	East Zone	98.25	100.28	QTZT	5.9	2	40	46	8.9	7.75	0.19	0.01	<0.01	0.18	0.86	3.2
C462078	K-06-0023	SW Zone	369.5	370.7	QTZT	20.9	2	14	35	8.2	1.67	0.67	0.01	<0.01	0.66	0.42	1.6
E600086	K-07-0078	East Zone	64.1	66.1	QTZT	4.1	2	4	8	8	1.97	0.13	0.01	0.01	0.12	0.14	0.5
E600846	K-07-0093	Middle East Zone	190.1	191.21	QTZT	0.3	2	30	30	8.6	96	0.01	<0.01	0.02	0.01	0.4	1.5
E768283	K-07-0094	Middle East Zone	196.84	197.8	QTZT	4.7	2	60	65	7.9	13.87	0.15	<0.01	0.01	0.15	0.83	3
E775833	K-07-0079	East Zone	111.56	113.56	QTZT	4.7	2	0	5	7.9	1.07	0.15	0.02	<0.01	0.13	0.08	0.3
C467832	K-07-0065	East Zone	28.34	29.34	QTZT	1.6	1	-1	1	6.4	0.64	0.05	0.02	0.03	0.03	<0.05	<0.2
E599725	K-07-0066	East Zone	155.95	156.95	QTZT	6.6	2	2	9	7.6	1.37	0.21	0.01	0.01	0.2	0.21	0.8
E600593	K-07-0092	Middle East Zone	51.55	53.52	QTZT	1.6	1	1	3	7.7	1.92	0.05	0.02	0.02	0.03	<0.05	<0.2
E751981	K-07-0083	East Zone	43	45	QTZT	<0.3	2	11	11	8.6	70.4	<0.01	0.01	<0.01	<0.01	0.11	0.4
C462785	K-06-0035	SW Zone	53	55	QTZT	6.3	2	1	7	8	1.12	0.2	0.02	<0.01	0.18	0.1	0.4
C212949	K-06-0020	SW Zone	332.2	333.7	QTZT	3.8	2	16	20	8.3	5.33	0.12	0.01	0.02	0.11	0.2	0.8
C466994	K-07-0067	East Zone	111.1	113.1	CQTZT	6.9	3	192	199	8.5	28.95	0.22	0.02	<0.01	0.2	2.38	8.7
C462038	K-06-0023	SW Zone	323.1	324.6	CQTZT	25.6	3	96	122	8.1	4.76	0.82	0.04	0.01	0.78	1.5	5.5
E600744	K-07-0092	Middle East Zone	258	260.03	CQTZT	9.1	3	85	94	8.2	10.37	0.29	0.01	<0.01	0.28	1.61	5.9
E751851	K-07-0076	East Zone	78.73	81.55	CQTZT	23.4	3	129	152	8.3	6.49	0.75	0.03	<0.01	0.72	1.49	5.5
E775774	K-07-0079	East Zone	29.39	31.39	CQTZT	2.8	3	178	181	8.5	64.36	0.09	<0.01	<0.01	0.09	2.29	8.4
C467957	K-07-0065	East Zone	178.72	180.23	CQTZT	4.4	3	197	201	8.7	45.94	0.14	0.01	0.01	0.13	2.49	9.1
E599687	K-07-0066	East Zone	110.75	112.75	CQTZT	10	3	178	188	8.3	18.8	0.32	0.01	<0.01	0.31	2.4	8.8
E752037	K-07-0083	East Zone	131.41	133.5	CQTZT	5.6	2	14	20	8.3	3.56	0.18	0.02	0.01	0.16	0.25	0.9
E775965	K-07-0082	East Zone	154.92	157.12	CQTZT	4.7	2	20	25	8.3	5.33	0.15	0.01	<0.01	0.14	0.32	1.2
C462958	K-06-0035	SW Zone	337	339	CQTZT	18.8	3	108	127	8.4	6.77	0.6	0.02	0.01	0.58	1.56	5.7
C212942	K-06-0020	SW Zone	323.1	324.6	CQTZT	3.8	2	80	84	8.3	22.4	0.12	0.01	0.01	0.11	1.23	4.5
E600885	K-07-0093	Middle East Zone	225	227	CQTZT	3.8	2	63	67	8.4	17.87	0.12	0.02	0.01	0.1	0.83	3.1
C215828	K-06-0023	SW Zone	45.7	47.3	GSCH	6.6	1	-7	0	7.8	0	0.21	0.01	0.01	0.2	<0.05	<0.2
E600070	K-07-0078	East Zone	39.62	41.62	GSCH	1.3	1	4	5	7.9	4	0.04	<0.01	<0.01	0.04	<0.05	<0.2
E768289	K-07-0094	Middle East Zone	207.9	209.91	GSCH	7.5	2	62	69	8.3	9.2	0.24	0.01	0.01	0.23	1.09	4
E751924	K-07-0076	East Zone	154.04	155.91	GSCH	20	2	58	78	8.4	3.9	0.64	0.03	<0.01	0.61	1.32	4.8
E775865	K-07-0079	East Zone	160.83	163.37	GSCH	32.8	2	34	67	8.4	2.04	1.05	0.04	<0.01	1.01	0.94	3.5
C467893	K-07-0065	East Zone	102.41	103.89	GSCH	14.4	2	77	91	8.3	6.33	0.46	0.02	<0.01	0.44	1.24	4.5
E775645	K-07-0066	East Zone	60.58	62.66	GSCH	1.9	3	60	62	8.4	33.07	0.06	0.01	<0.01	0.05	0.77	2.8
E466965	K-07-0067	East Zone	64.91	66.98	GSCH	7.8	2	67	75	8.8	9.6	0.25	0.01	0.01	0.24	1.19	4.4
E775947	K-07-0082	East Zone	130.47	132.27	GSCH	22.2	2	67	89	8.4	4.01	0.71	0.03	<0.01	0.68	1.28	4.7
C462772	K-06-0035	SW Zone	31	33	GSCH	19.1	2	12	31	7.9	1.63	0.61	0.02	0.01	0.59	0.57	2.1
C212705	K-06-0020	SW Zone	13.5	15.2	GSCH	9.7	1	9	19	8	1.96	0.31	0.14	0.16	0.17	0.13	0.5

APPENDIX B1-1 Acid Base Accounting Data

Sample #	Hole ID	BK Area	From (m)	To (m)	Lith Unit	OA-VOL08	OA-VOL08	OA-VOL08	OA-VOL08	OA-ELE07	OA-VOL08	S-IR08	S-GRA06	S-GRA06a	S-CAL06	C-GAS05	C-GAS05
						MPA	FIZZ RATING	NNP	NP	pH	Ratio NP:MPA	Total S	SO4 (Cb Lch)	SO4 (HCl Lch)	S2- (calc)	C	CO2
						tCaCO3/1000t ore	Unity	tCaCO3/1000t ore	tCaCO3/1000t ore	Unity	Unity	%	%S	%S	%S	%	%
E600774	K-07-0092	Middle East Zone	297.77	299.8	GSCH	13.1	1	11	24	8.3	1.83	0.42	0.01	<0.01	0.41	0.31	1.2
E776285	K-07-0091a	East Zone	247.45	249.45	GSCH	37.2	2	42	79	6.9	2.12	1.19	0.02	<0.01	1.17	1.32	4.8
C467919	K-07-0065	East Zone	129.84	130.12	VN	335.9	2	-282	54	6.7	0.16	10.75	0.04	0.03	10.7	6.23	22.8
E599708	K-07-0066	East Zone	142.46	143.1	VN	196.6	2	-152	45	6.7	0.23	6.29	0.05	0.04	6.24	6.83	25
E775550	K-07-0067	East Zone	164.24	164.94	VN	176.9	2	-123	54	6.9	0.31	5.66	0.02	<0.01	5.64	3.46	12.9
E751883	K-07-0076	East Zone	114.5	115.21	VN	9.1	2	31	40	8.2	4.41	0.29	<0.01	<0.01	0.29	0.62	2.3
E775989	K-07-0082	East Zone	195.96	196.4	VN	12.8	3	157	170	8.4	13.27	0.41	0.01	<0.01	0.4	3.78	13.8
E600657	K-07-0092	Middle East Zone	158.37	158.72	VN	8.1	2	83	91	8.3	11.2	0.26	0.02	<0.01	0.24	5.29	19.4
C212406	K-06-0011	SW Zone	401.3	402	VN	378.1	2	-317	61	7.6	0.16	12.1	0.07	0.03	12.05	6.86	25.1
C462087	K-06-0023	SW Zone	377.45	378	VN	557.8	2	-515	43	6.6	0.08	17.85	0.21	0.25	17.65	1.78	6.5
C463235	K-06-0038	SW Zone	310.6	311.05	VN	36.6	2	18	55	7.7	1.5	1.17	0.01	0.01	1.16	1.26	4.6
E775799	K-07-0079	East Zone	61.82	61.96	VN	582.8	2	-550	33	5.8	0.06	18.65	0.77	0.78	17.9	3.88	14.2

APPENDIX B1-2 ICP Metals for ABA Database

	Certificate #	Sample #	Hole ID	BK Area	From (m)	To (m)	Lith Unit	Au_ppm	Ag_ppm	Al_%	As_ppm	Ba_ppm	Be_ppm	Bi_ppm	Ca_%	Cd_ppm	Co_ppm	Cr_ppm
1	VA07091928	C212117	K-06-0011	SW Zone	36.3	37.5	SSCH	0.01	0.50	3.53	5	3130	0.9	2	0.3	0.5	10	33
2	TR07092775	E600288	K-07-0081	East Zone	45.7	47.7	SSCH	0.01	2.00	5.31	37	2290	1.6	2	0.36	4.1	13	47
3	VA07091920	C212566	K-06-0016	SW Zone	207.3	208.4	SSCH	0.01	0.50	5.6	6	920	1.3	2	2.84	0.5	9	38
4	VA07091804	C462066	K-06-0023	SW Zone	356.8	358.5	SSCH	0.01	0.50	8.49	5	3200	1.9	2	3.98	0.5	10	99
5	TR07093011	E600079	K-07-0078	East Zone	52.51	54.1	SSCH	0.01	2.90	4.32	46	1880	1.3	2	0.26	16.3	8	38
6	TR07093907	C467959	K-07-0065	East Zone	180.96	182.08	SSCH	0.01	0.50	7.5	5	360	0.6	2	5.56	0.5	31	131
7	TR07093920	E599704	K-07-0066	East Zone	139.38	139.77	SSCH	0.01	11.80	7.25	30	310	0.8	2	5.18	19.7	35	168
8	TR07093369	E775513	K-07-0067	East Zone	135.63	136.25	SSCH	0.01	1.00	4.66	5	260	0.5	2	5.51	0.5	26	129
9	TR07092771	E600542	K-07-0086	East Zone	229.1	229.9	SSCH	0.02	0.80	1.55	262	210	0.5	2	0.17	47.3	3	37
10	VA07091806	C462793	K-06-0035	SW Zone	65.1	67.45	SSCH	0.01	0.50	5.58	5	7620	1.8	2	0.61	0.5	16	48
11	VA07091923	C212729	K-06-0020	SW Zone	44.2	45.7	SSCH	0.01	0.50	5.32	5	6800	1.9	2	0.46	0.5	14	50
12	VA07091226	E776315	K-07-0091a	East Zone	286.9	288	SSCH	0.01	1.40	6.53	20	410	0.7	2	7.35	0.5	29	112
13	TR07085899	E768248	K-07-0094	Middle East Zone	142.63	144.51	GNST	0.01	0.50	8.65	7	40	0.5	2	8.34	0.5	41	98
14	VA07091804	C462069	K-06-0023	SW Zone	359.9	361.9	GNST	0.02	0.50	7.13	13	1150	1.2	2	4.61	0.5	19	10
15	TR07092775	E600290	K-07-0081	East Zone	51.05	51.9	GNST	0.01	3.00	7.94	47	170	1.2	2	5.38	10.8	35	112
16	TR07093364	E775819	K-07-0079	East Zone	86.87	89.03	GNST	0.01	0.50	7.98	13	10	0.5	2	8.02	0.5	38	94
17	VA07091921	C212639	K-06-0016	SW Zone	300.3	301.8	GNST	0.01	0.50	8.45	18	30	0.6	2	6.97	0.5	43	46
18	VA07091225	E600631	K-07-0092	Middle East Zone	116.25	118.26	GNST	0.01	0.50	6.94	5	220	0.7	2	6.75	0.5	48	13
19	TR07093906	E599612	K-07-0066	East Zone	1.34	3.35	GNST	0.01	0.50	7.41	5	170	0.5	4	7.09	0.7	38	136
20	TR07092773	E752010	K-07-0083	East Zone	88.74	90.74	GNST	0.01	0.70	6.84	8	140	0.5	3	7.83	0.5	36	74
21	TR07092957	E775866	K-07-0082	East Zone	1.44	3.4	GNST	0.01	0.50	8.21	11	60	0.5	2	7.64	0.5	42	190
22	VA07091927	C212917	K-06-0020	SW Zone	289.6	291.05	GNST	0.02	0.50	8.18	8	250	0.5	2	8.06	0.5	41	455
23	TR07086383	E600841	K-07-0093	Middle East Zone	182.27	185.32	GNST	0.02	0.60	4	10	570	1	2	2.78	0.5	5	82
24	VA07091226	E776319	K-07-0091a	East Zone	290.7	291.8	GNST	0.02	0.50	8.53	5	380	0.6	2	5.15	0.5	46	166
25	TR07092774	E600319	K-07-0081	East Zone	98.25	100.28	QTZT	0.01	0.50	1.48	5	190	0.5	2	1.48	0.5	1	45
26	VA07091804	C462078	K-06-0023	SW Zone	369.5	370.7	QTZT	0.02	2.60	1.62	35	710	0.5	2	0.91	39.8	2	38
27	TR07093010	E600086	K-07-0078	East Zone	64.1	66.1	QTZT	0.01	0.80	1.12	13	180	0.5	2	0.12	1.1	2	42
28	TR07086383	E600846	K-07-0093	Middle East Zone	190.1	191.21	QTZT	0.01	1.30	1.43	5	70	0.5	2	1.23	0.5	2	58
29	TR07087698	E768283	K-07-0094	Middle East Zone	196.84	197.8	QTZT	0.02	1.60	0.43	37	50	0.5	2	2.47	3.0	1	26
30	TR07093363	E775833	K-07-0079	East Zone	111.56	113.56	QTZT	0.01	0.70	0.37	52	100	0.5	2	0.15	0.5	1	40
31	TR07093908	C467832	K-07-0065	East Zone	28.34	29.34	QTZT	0.01	1.80	0.29	121	40	0.5	2	0.03	1.4	1	42
32	TR07093902	E599725	K-07-0066	East Zone	155.95	156.95	QTZT	0.01	2.20	0.88	28	210	0.5	2	0.06	6.3	2	54
33	VA07091229	E600593	K-07-0092	Middle East Zone	51.55	53.52	QTZT	0.01	0.50	0.39	5	60	0.5	2	0.09	0.5	1	63
34	TR07092952	E751981	K-07-0083	East Zone	43	45	QTZT	0.01	0.50	1.32	13	190	0.5	2	0.35	1.5	2	44
35	VA07091806	C462785	K-06-0035	SW Zone	53	55	QTZT	0.01	0.50	0.75	5	150	0.5	2	0.21	0.5	1	24
36	VA07091926	C212949	K-06-0020	SW Zone	332.2	333.7	QTZT	0.01	0.50	0.31	38	50	0.5	2	0.76	0.5	1	41
37	TR07093900	C466994	K-07-0067	East Zone	111.1	113.1	CQTZT	0.01	0.50	1.36	6	310	0.5	2	7.47	0.5	3	35
38	VA07091809	C462038	K-06-0023	SW Zone	323.1	324.6	CQTZT	0.01	1.20	1.37	12	420	0.5	2	5.05	0.7	3	36
39	VA07091227	E600744	K-07-0092	Middle East Zone	258	260.03	CQTZT	0.01	0.50	0.51	5	230	0.5	2	3.71	0.5	1	30
40	TR07092959	E751851	K-07-0076	East Zone	78.73	81.55	CQTZT	0.01	2.30	2.2	15	340	0.6	2	5.3	6.5	2	48
41	TR07093366	E775774	K-07-0079	East Zone	29.39	31.39	CQTZT	0.01	0.50	0.8	5	200	0.5	2	6.85	0.5	4	33
42	TR07093907	C467957	K-07-0065	East Zone	178.72	180.23	CQTZT	0.01	0.50	1.31	5	390	0.5	2	6.78	0.5	1	29
43	TR07093904	E599687	K-07-0066	East Zone	110.75	112.75	CQTZT	0.01	0.70	1.83	12	340	0.5	2	7.17	0.8	3	38
44	TR07092951	E752037	K-07-0083	East Zone	131.41	133.5	CQTZT	0.01	0.50	0.5	5	140	0.5	2	0.74	0.5	1	44
45	TR07092954	E775965	K-07-0082	East Zone	154.92	157.12	CQTZT	0.01	0.50	0.41	7	90	0.5	2	0.98	0.5	1	29
46	VA07091805	C462958	K-06-0035	SW Zone	337	339	CQTZT	0.01	0.70	1.05	9	270	0.5	2	4.26	0.5	3	47
47	VA07091926	C212942	K-06-0020	SW Zone	323.1	324.6	CQTZT	0.01	0.50	2.03	21	210	0.5	2	3.07	0.6	11	56
48	TR07086384	E600885	K-07-0093	Middle East Zone	225	227	CQTZT	0.01	0.50	0.47	5	240	0.5	2	2.61	0.5	1	24
49	VA07091924	C215828	K-06-0023	SW Zone	45.7	47.3	GSCH	0.01	2.50	5.42	7	1420	1.3	2	0.07	0.6	5	60
50	TR07093011	E600070	K-07-0078	East Zone	39.62	41.62	GSCH	0.01	0.50	7.13	24	790	1.8	2	0.25	0.5	9	96
51	TR07087698	E768289	K-07-0094	Middle East Zone	207.9	209.91	GSCH	0.01	0.50	9.01	10	1360	2.5	2	2	0.5	14	117
52	TR07092956	E751924	K-07-0076	East Zone	154.04	155.91	GSCH	0.01	0.50	6.51	16	880	1.8	2	2.25	0.5	9	88
53	TR07092957	E775865	K-07-0079	East Zone	160.83	163.37	GSCH	0.10	0.60	7.51	16	1000	1.9	2	1.9	0.5	10	112

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	Certificate #	Sample #	Hole ID	BK Area	From (m)	To (m)	Lith Unit	Au_ppm	Ag_ppm	Al_%	As_ppm	Ba_ppm	Be_ppm	Bi_ppm	Ca_%	Cd_ppm	Co_ppm	Cr_ppm
54	TR07093905	C467893	K-07-0065	East Zone	102.41	103.89	GSCH	0.01	0.50	5.16	7	870	1.3	2	3.56	0.5	6	81
55	TR07093367	E775645	K-07-0066	East Zone	60.58	62.66	GSCH	0.01	0.70	0.56	7	140	0.5	2	2.45	0.5	2	36
56	TR07093901	C466965	K-07-0067	East Zone	64.91	66.98	GSCH	0.01	0.70	9.16	13	1410	2.4	2	2.28	0.7	13	123
57	TR07092955	E775947	K-07-0082	East Zone	130.47	132.27	GSCH	0.01	0.50	8.25	5	1370	2	2	3.07	0.6	8	113
58	VA07091807	C462772	K-06-0035	SW Zone	31	33	GSCH	0.01	6.10	6.94	11	2240	1.8	2	0.86	0.5	9	90
59	VA07091930	C212705	K-06-0020	SW Zone	13.5	15.2	GSCH	0.01	0.50	10.35	10	3490	2.6	2	0.7	0.5	13	141
60	TR07092772	E600774	K-07-0092	Middle East Zone	297.77	299.8	GSCH	0.01	0.50	11.25	18	1360	2.9	2	0.74	0.5	15	125
61	VA07091228	E776285	K-07-0091a	East Zone	247.45	249.45	GSCH	0.01	0.60	9.21	64	1090	2.2	2	2.96	0.8	13	133
65	TR07092958	E751883	K-07-0076	East Zone	114.5	115.21	VN	0.01	2.10	2.23	34	350	0.7	2	0.81	8.3	4	46
66	TR07092953	E775989	K-07-0082	East Zone	195.96	196.4	VN	0.01	8.80	1.32	13	330	0.5	2	2.83	47.4	4	30
67	VA07091240	E600657	K-07-0092	Middle East Zone	158.37	158.72	VN	0.01	30.50	4.77	42	60	1.5	4	4.57	30.6	25	7
70	VA07091241	C463235	K-06-0038	SW Zone	310.6	311.05	VN	0.13	9.40	0.84	1810	100	0.5	2	1.53	36.5	7	27
62	TR07093903	C467919	K-07-0065	East Zone	129.84	130.12	VN	4.28	42.40	0.06	10000	10	0.5	18	0.25	1000.0	77	1
63	TR07093920	E599708	K-07-0066	East Zone	142.46	143.1	VN	0.73	1340.00	0.16	842	10	0.5	69	0.52	806.0	7	1
64	TR07093368	E775550	K-07-0067	East Zone	164.24	164.94	VN	0.12	175.00	0.62	10000	30	0.5	2	0.29	795.0	81	17
68	VA07091931	C212406	K-06-0011	SW Zone	401.3	402	VN	1.13	79.80	0.01	1710	10	0.5	38	0.2	1000.0	24	1
69	VA07091925	C462087	K-06-0023	SW Zone	377.45	378	VN	2.23	735.00	0.32	6550	10	0.5	86	0.15	1000.0	29	3
71	TR07093365	E775799	K-07-0079	East Zone	61.82	61.96	VN	0.60	1770.00	0.01	698	10	0.5	22	0.18	1000.0	5	1

APPENDIX B1-2 ICP Metals for ABA Database

	Certificate #	Sample #	Cu_ppm	Fe_%	Ga_ppm	K_%	La_ppm	Mg_%	Mn_ppm	Mo_ppm	Na_%	Ni_ppm	P_ppm	Pb_ppm	S_%	Sb_ppm	Sc_ppm	Sr_ppm	Th_ppm	Ti_%
1	VA07091928	C212117	96	2.43		0.89		0.84	1845	1	0.05	36	290	9	0.29	5		60		0.16
2	TR07092775	E600288	93	3.36	10	1.55	20	0.99	1810	1	0.07	45	350	62	0.09	8	12	46	20	0.22
3	VA07091920	C212566	18	2.37		1.99		0.67	635	1	0.84	13	240	17	0.07	5		122		0.21
4	VA07091804	C462066	27	4.26		2.47		2.02	844	1	2.96	41	1160	2	0.03	5		253		0.58
5	TR07093011	E600079	47	3.65	10	1.67	20	0.27	9170	2	0.04	21	320	217	0.19	5	9	30	20	0.18
6	TR07093907	C467959	145	7.16	20	0.39	20	3.11	989	1	0.25	79	670	9	0.04	6	28	379	20	0.78
7	TR07093920	E599704	142	6.77	20	0.61	10	1.99	3430	2	0.23	80	680	172	0.28	15	31	292	20	0.63
8	TR07093369	E775513	106	5.21	10	0.26	10	1.91	819	1	0.09	53	450	3	0.07	5	22	315	20	0.55
9	TR07092771	E600542	14	5.14	10	0.46	10	0.21	16050	1	0.07	7	290	65	0.33	5	5	17	20	0.11
10	VA07091806	C462793	62	3.29		1.8		1.24	3980	1	0.09	59	420	12	0.23	6		131		0.18
11	VA07091923	C212729	77	2.85		1.78		1.21	2550	1	0.03	48	400	6	0.08	5		103		0.21
12	VA07091226	E776315	178	7.17	20	0.33	10	2.87	934	1	0.15	67	750	7	0.23	5	24	281	20	0.56
13	TR07085899	E768248	233	8.14	20	0.08	10	3.67	1350	1	1.6	87	590	3	0.02	7	35	239	20	0.9
14	VA07091804	C462069	230	8.25		0.76		1.68	1545	1	2.69	11	1370	4	0.06	5		361		0.96
15	TR07092775	E600290	163	8.84	20	1.22	10	3.36	4670	1	0.02	86	650	594	0.19	10	34	64	20	0.93
16	TR07093364	E775819	180	8.37	20	0.01	10	3.61	1400	1	0.76	71	630	7	0.02	5	34	323	20	0.87
17	VA07091921	C212639	158	8.14		0.01		4.15	1330	1	1.46	89	680	2	0.12	9		293		0.96
18	VA07091225	E600631	306	10.75	20	0.05	10	3.07	1710	1	1.41	39	970	2	0.02	5	39	221	20	1.44
19	TR07093906	E599612	178	8.38	20	0.1	10	3.61	1305	1	1.58	80	590	3	0.01	5	35	219	20	0.9
20	TR07092773	E752010	140	7.53	20	0.11	10	3.77	1215	1	0.21	76	570	4	0.02	5	33	555	20	0.7
21	TR07092957	E775866	136	7.79	20	0.07	10	4	1410	1	1.32	100	510	7	0.01	7	36	242	20	0.78
22	VA07091927	C212917	120	7.07		0.29		5.17	1140	1	1.36	173	510	2	0.03	10		346		0.6
23	TR07086383	E600841	11	2.02	10	0.69	20	0.33	182	1	0.15	20	490	16	0.33	5	7	168	20	0.23
24	VA07091226	E776319	177	10.05	20	0.18	10	4.02	1500	1	0.02	99	970	4	0.03	5	36	361	20	1.4
25	TR07092774	E600319	7	1.29	10	0.31	10	0.39	111	1	0.06	10	370	3	0.21	5	3	40	20	0.11
26	VA07091804	C462078	12	2.27		0.47		0.25	3770	1	0.05	12	280	418	0.63	5		32		0.1
27	TR07093010	E600086	6	1.06	10	0.39	10	0.06	2300	1	0.03	8	240	131	0.12	5	2	23	20	0.1
28	TR07086383	E600846	6	0.93	10	0.18	10	0.22	241	1	0.15	7	190	5	0.01	5	2	52	20	0.1
29	TR07087698	E768283	10	0.84	10	0.14	10	0.1	763	2	0.01	4	390	39	0.16	12	1	48	20	0.04
30	TR07093363	E775833	4	0.54	10	0.11	10	0.04	221	1	0.01	5	80	13	0.14	5	1	8	20	0.07
31	TR07093908	C467832	11	0.55	10	0.09	10	0.01	568	1	0.01	4	60	71	0.04	5	1	5	20	0.04
32	TR07093902	E599725	6	1.06	10	0.32	10	0.04	2030	1	0.01	7	180	119	0.19	5	1	11	20	0.11
33	VA07091229	E600593	2	0.63	10	0.06	10	0.04	40	1	0.01	4	70	3	0.05	5	1	6	20	0.03
34	TR07092952	E751981	6	0.72	10	0.3	10	0.09	556	1	0.03	8	160	53	0.01	5	2	23	20	0.1
35	VA07091806	C462785	4	0.69		0.09		0.09	75	1	0.05	6	140	4	0.2	5		33		0.08
36	VA07091926	C212949	4	0.62		0.06		0.09	113	1	0.01	5	180	4	0.14	5		11		0.04
37	TR07093900	C466994	8	1.09	10	0.38	20	0.4	164	1	0.05	9	470	3	0.23	5	3	187	20	0.1
38	VA07091809	C462038	8	1.1		0.43		0.24	170	1	0.07	9	550	77	0.91	5		110		0.09
39	VA07091227	E600744	3	0.82	10	0.11	10	0.17	194	1	0.01	3	520	7	0.36	5	1	146	20	0.04
40	TR07092959	E751851	11	1.8	10	0.65	10	0.37	3030	1	0.06	16	560	327	0.8	6	4	150	20	0.1
41	TR07093366	E775774	5	0.81	10	0.22	10	0.41	127	1	0.05	9	560	10	0.09	5	2	156	20	0.05
42	TR07093907	C467957	9	1.28	10	0.36	10	0.66	161	1	0.05	9	540	9	0.14	5	3	137	20	0.06
43	TR07093904	E599687	8	1.28	10	0.61	10	0.38	333	1	0.06	14	540	19	0.33	5	4	172	20	0.11
44	TR07092951	E752037	3	0.55	10	0.14	10	0.08	63	1	0.02	5	250	4	0.22	5	1	31	20	0.06
45	TR07092954	E775965	6	0.44	10	0.12	10	0.06	181	1	0.01	5	230	12	0.16	5	1	31	20	0.05
46	VA07091805	C462958	9	0.97		0.35		0.39	202	1	0.04	13	470	28	0.58	5		81		0.08
47	VA07091926	C212942	30	2.2		0.25		0.49	334	1	0.04	24	380	6	0.13	5		82		0.21
48	TR07086384	E600885	1	0.41	10	0.13	10	0.12	83	1	0.01	1	250	3	0.12	5	1	144	20	0.05
49	VA07091924	C215828	47	1.96		0.76		0.25	155	1	0.36	24	320	18	0.17	13		162		0.27
50	TR07093011	E600070	19	3.37	10	1.21	30	0.28	152	1	0.27	40	720	14	0.03	5	12	145	20	0.3
51	TR07087698	E768289	26	5.03	20	1.69	40	0.75	289	2	0.34	56	1250	9	0.23	7	16	288	20	0.24
52	TR07092956	E751924	24	3.47	10	1.44	30	0.66	388	3	0.2	37	700	18	0.6	5	11	206	20	0.24
53	TR07092957	E775865	27	3.77	20	1.43	30	0.68	253	2	0.37	40	1050	27	0.99	6	13	269	20	0.32

APPENDIX B1-2 ICP Metals for ABA Database

	Certificate #	Sample #	Cu_ppm	Fe_%	Ga_ppm	K_%	La_ppm	Mg_%	Mn_ppm	Mo_ppm	Na_%	Ni_ppm	P_ppm	Pb_ppm	S_%	Sb_ppm	Sc_ppm	Sr_ppm	Th_ppm	Ti_%
54	TR07093905	C467893	19	2.41	20	1.18	30	0.52	213	1	0.21	29	710	17	0.46	5	9	220	20	0.28
55	TR07093367	E775645	6	0.77	10	0.13	10	0.16	552	1	0.04	4	280	49	0.06	5	2	60	20	0.07
56	TR07093901	C466965	28	5.11	20	1.65	30	0.83	372	1	0.36	53	1310	24	0.23	6	16	268	20	0.42
57	TR07092955	E775947	27	3.7	20	1.73	30	0.75	196	1	0.28	42	850	17	0.73	5	14	249	20	0.38
58	VA07091807	C462772	112	3.41		1.27		0.72	343	2	0.4	59	520	23	0.65	15		218		0.33
59	VA07091930	C212705	38	4.95		1.93		0.62	252	1	0.46	67	910	12	0.3	8		235		0.4
60	TR07092772	E600774	29	5.36	30	1.84	40	0.81	226	1	0.35	65	1210	24	0.41	7	19	256	20	0.31
61	VA07091228	E776285	26	5.04	20	1.58	30	0.91	358	1	0.47	53	1550	30	1.35	13	15	268	20	0.45
65	TR07092958	E751883	10	2.86	10	0.57	10	0.51	3510	1	0.05	16	320	394	0.27	5	5	30	20	0.14
66	TR07092953	E775989	3	5.07	10	0.44	10	0.96	18800	1	0.03	6	510	2680	0.43	10	3	36	20	0.05
67	VA07091240	E600657	165	13.5	10	1.47	10	1.43	40900	1	0.02	27	450	3540	0.27	51	25	43	20	0.67
70	VA07091241	C463235	15	4.15		0.26		0.11	10950	1	0.03	12	180	1600	1.25	22		10		0.04
62	TR07093903	C467919	620	24.5	10	0.01	10	0.42	69800	1	0.01	83	10	974	8.28	202	1	3	20	0.01
63	TR07093920	E599708	3340	22.6	10	0.05	10	0.27	80000	1	0.01	3	40	10000	5.59	1520	1	11	20	0.01
64	TR07093368	E775550	248	14.7	10	0.18	10	0.32	39300	1	0.01	43	70	6710	5.98	176	1	4	20	0.02
68	VA07091931	C212406	962	27.8		0.01		0.24	84300	1	0.01	11	10	6060	9.52	64		1		0.01
69	VA07091925	C462087	1760	16.2		0.07		0.15	36000	1	0.01	11	20	10000	10	661		2		0.01
71	TR07093365	E775799	4090	18.65	10	0.01	10	0.3	54300	1	0.01	1	10	1460	10	1730	1	1	20	0.01

APPENDIX B1-2 ICP Metals for ABA Database

	Certificate #	Sample #	Tl_ppm	U_ppm	V_ppm	W_ppm	Zn_ppm
1	VA07091928	C212117			63	10	85
2	TR07092775	E600288	10	10	98	10	483
3	VA07091920	C212566			45	10	47
4	VA07091804	C462066			88	10	54
5	TR07093011	E600079	10	10	94	10	1250
6	TR07093907	C467959	10	10	261	10	86
7	TR07093920	E599704	10	10	254	10	1500
8	TR07093369	E775513	10	10	192	10	67
9	TR07092771	E600542	10	10	29	10	3320
10	VA07091806	C462793			91	10	110
11	VA07091923	C212729			105	10	100
12	VA07091226	E776315	10	10	269	10	105
13	TR07085899	E768248	10	10	308	10	96
14	VA07091804	C462069			184	10	101
15	TR07092775	E600290	10	10	316	10	1095
16	TR07093364	E775819	10	10	296	10	93
17	VA07091921	C212639			355	10	87
18	VA07091225	E600631	10	10	411	10	127
19	TR07093906	E599612	10	10	318	10	90
20	TR07092773	E752010	10	10	269	10	79
21	TR07092957	E775866	10	10	311	10	99
22	VA07091927	C212917			289	10	78
23	TR07086383	E600841	10	10	66	10	61
24	VA07091226	E776319	10	10	414	10	139
25	TR07092774	E600319	10	10	29	10	28
26	VA07091804	C462078			34	10	2960
27	TR07093010	E600086	10	10	22	10	223
28	TR07086383	E600846	10	10	25	10	26
29	TR07087698	E768283	10	10	8	10	246
30	TR07093363	E775833	10	10	5	10	96
31	TR07093908	C467832	10	10	4	10	250
32	TR07093902	E599725	10	10	14	10	620
33	VA07091229	E600593	10	10	10	10	34
34	TR07092952	E751981	10	10	22	10	181
35	VA07091806	C462785			13	10	14
36	VA07091926	C212949			5	10	49
37	TR07093900	C466994	10	20	27	10	30
38	VA07091809	C462038			32	10	70
39	VA07091227	E600744	10	10	10	10	25
40	TR07092959	E751851	10	10	44	10	709
41	TR07093366	E775774	10	10	20	10	31
42	TR07093907	C467957	10	10	28	10	38
43	TR07093904	E599687	10	10	38	10	61
44	TR07092951	E752037	10	10	8	10	8
45	TR07092954	E775965	10	10	7	10	35
46	VA07091805	C462958			26	10	79
47	VA07091926	C212942			67	10	104
48	TR07086384	E600885	10	10	8	10	12
49	VA07091924	C215828			95	10	64
50	TR07093011	E600070	10	10	103	10	74
51	TR07087698	E768289	10	10	161	10	119
52	TR07092956	E751924	10	10	107	10	83
53	TR07092957	E775865	10	10	133	10	93

APPENDIX B1-2 ICP Metals for ABA Database

	Certificate #	Sample #	Tl_ppm	U_ppm	V_ppm	W_ppm	Zn_ppm
54	TR07093905	C467893	10	10	93	10	74
55	TR07093367	E775645	10	10	15	10	54
56	TR07093901	C466965	10	10	167	10	144
57	TR07092955	E775947	10	10	137	10	105
58	VA07091807	C462772			170	10	125
59	VA07091930	C212705			181	10	161
60	TR07092772	E600774	10	10	179	10	126
61	VA07091228	E776285	10	10	166	10	145
65	TR07092958	E751883	10	10	42	10	764
66	TR07092953	E775989	10	10	27	10	5810
67	VA07091240	E600657	20	10	250	10	3500
70	VA07091241	C463235			19	10	3620
62	TR07093903	C467919	40	10	1	10	10000
63	TR07093920	E599708	10	10	2	50	10000
64	TR07093368	E775550	20	10	10	10	10000
68	VA07091931	C212406			1	20	10000
69	VA07091925	C462087			3	50	10000
71	TR07093365	E775799	10	10	1	50	10000

APPENDIX B2-1 Mineralogy / Alteration Data for ABA Database

	Certificate #	Sample #	Hole ID	BK Area	From (m)	To (m)	Lith Unit	Lith Unit Minl'gy Log	Description	Assay Notes	Mineralogy Comments
1	VA07091928	C212117	K-06-0011	SW Zone	36.3	37.5	SSCH	SSCH	Light green-grey, fine grained mica schist with intermitted boudinized vein quartz.		tetrahedrite/siderite/galena/sphalerite
2	TR07092775	E600288	K-07-0081	East Zone	45.7	47.7	SSCH	SSCH	Yellow-green fine grained mica-schist. Slightly oxidized		
3	VA07091920	C212566	K-06-0016	SW Zone	207.3	208.4	SSCH	SSCH	Yellow-green fine grained mica schist.		208.25 - 208.4 Quartz veinlet with chlorite-rich stringers cutting perp. To CA.
4	VA07091804	C462066	K-06-0023	SW Zone	356.8	358.5	SSCH	SSCH	Sericite/Chloritic Schist Unit: Medium grey/green fine grained micaseous schist preceding a greenstone unit.		
5	TR07093011	E600079	K-07-0078	East Zone	52.51	54.1	SSCH	SSCH	Yellow-green fine grained mica-schist. Moderately friable.		trace clay @ 53.95
6	TR07093907	C467959	K-07-0065	East Zone	180.96	182.08	SSCH	SSCH	Yellow/green/grey fine grained mica-schist. Slightly calcareous. Quartz sweats and boudins are interbedded with the schist.		180.96-182.08: sericite schist with increased amount of clay on fractures. Clay is green-grey
7	TR07093920	E599704	K-07-0066	East Zone	139.38	139.77	SSCH	SSCH	Yellow/green/grey fine grained mica-schist. Slightly calcareous.	Sample adjacent to vein zone	
8	TR07093369	E775513	K-07-0067	East Zone	135.63	136.25	SSCH	SSCH	Light yellow-grey, fine-grained mica schist. Slightly calcareous.		
9	TR07092771	E600542	K-07-0086	East Zone	229.1	229.9	SSCH	CHSCH	Medium gray-green chlorite-rich schist with local thin quartzite beds.		
10	VA07091806	C462793	K-06-0035	SW Zone	65.1	67.45	SSCH	SSCH	Medium Grey/Green Chlorite-rich fine grained mica-schist.		
11	VA07091923	C212729	K-06-0020	SW Zone	44.2	45.7	SSCH	SSCH	Medium Grey/Green Chlorite-rich fine grained mica-schist.		
12	VA07091226	E776315	K-07-0091a	East Zone	286.9	288	SSCH	SSCH	Light-medium grey-green chlorite rich fine grained mica-schist.		
13	TR07085899	E768248	K-07-0094	Middle East Zone	142.63	144.51	GNST	GNST	Dark grey-green greenstone		Large amount of massive pyrite on a fracture surface at 144.21m.
14	VA07091804	C462069	K-06-0023	SW Zone	359.9	361.9	GNST	GNST	Medium-dark green greenstone with abundant beige phenocrysts. Moderately calcareous.		Primary qtz and secondary calcite stringer zone in mafic tuff like greenstone w/interbedded clays-silts Min in tuff.
15	TR07092775	E600290	K-07-0081	East Zone	51.05	51.9	GNST	GNST	Small unit of greenstone with cross-cutting quartz/siderite veins and sweats. Moderately foliated.		51.05-51.90: Quartz, calcite and siderite stringers are present throughout greenstone. Calcite and siderite seem secondary to quartz. Spalerite, pyrite and trace galena are present within siderite stringers.
16	TR07093364	E775819	K-07-0079	East Zone	86.87	89.03	GNST	GNST	Dark green, well-foliated, moderately calcareous greenstone.		
17	VA07091921	C212639	K-06-0016	SW Zone	300.3	301.8	GNST	GNST	Medium-dark green, slightly calcareous greenstone. Slightly foliated with tiny, beige/white phenocrysts elongated approximately folitaion parallel.		
18	VA07091225	E600631	K-07-0092	Middle East Zone	116.25	118.26	GNST	GNST	Light grey-green, weakly foliated with porphyroblasts of quartz and carbonate.		
19	TR07093906	E599612	K-07-0066	East Zone	1.34	3.35	GNST	GNST	Dark green-grey calcareous greenstone.		trace carb on fractures
20	TR07092773	E752010	K-07-0083	East Zone	88.74	90.74	GNST	GNST	Medium grey-green calcareous greenstone		
21	TR07092957	E775866	K-07-0082	East Zone	1.44	3.4	GNST	GNST	Medium grey-green calcareous greenstone		
22	VA07091927	C212917	K-06-0020	SW Zone	289.6	291.05	GNST	GNST	Medium Grey-green calcareous greenstone.		
23	TR07086383	E600841	K-07-0093	Middle East Zone	182.27	185.32	GNST	GNST	Light to medium grey-green, calcareous greenstone with trace qtz/calcite veining and elongated porphyroblasts. Moderately foliated.		
24	VA07091226	E776319	K-07-0091a	East Zone	290.7	291.8	GNST	GNST	Light grey-green calareous greenstone with undulating, boudinized qtz/calcite veins.		carb stringer // to foliation
25	TR07092774	E600319	K-07-0081	East Zone	98.25	100.28	QTZT	QTZT	Medium grey, moderately foliated quartzite.		
26	VA07091804	C462078	K-06-0023	SW Zone	369.5	370.7	QTZT	QTZT	Well foliated med-dark grey quartzite unit that has been cross cut by siderite stringers.	Sample adjacent to vein zone	
27	TR07093010	E600086	K-07-0078	East Zone	64.1	66.1	QTZT	QTZT	Medium-grey, brittle quartzite with several cross-cutting qtz/siderite stringers.		qtz and siderite veinlet, trace sphalerite @ 65.9
28	TR07086383	E600846	K-07-0093	Middle East Zone	190.1	191.21	QTZT	QTZT	Medium grey quartzite with slightly oxidized fractured surfaces and thin cross-cutting qtz stringers.		
29	TR07087698	E768283	K-07-0094	Middle East Zone	196.84	197.8	QTZT	QTZT	Light - Medium grey quartzite with iron/manganese oxide staining. Minor siderite and quartz stringers	Possible minor contamination. Sample occurs after high silver standard	
30	TR07093363	E775833	K-07-0079	East Zone	111.56	113.56	QTZT	QTZT	Medium grey, brittle quartzite. Cross-cutting quartz veins/veinlets.		Large amount of disseminated pyrite within QTZT.
31	TR07093908	C467832	K-07-0065	East Zone	28.34	29.34	QTZT	QTZT	Bleached quartzite with maganese staining surrounding fractures and quartz stringers.		28.34-29.34: manganese oxide in quartz veinlets
32	TR07093902	E599725	K-07-0066	East Zone	155.95	156.95	QTZT	QTZT	Brittle, light grey quartzite. Moderately foliated with stringers of quartz x-cutting foliation.		greenish clay on fractures
33	VA07091229	E600593	K-07-0092	Middle East Zone	51.55	53.52	QTZT	QTZT	Medium grey, foliated with cross-cutting oxidized quartz stringers with slightly oxidized fracture surfaces.		

APPENDIX B2-1 Mineralogy / Alteration Data for ABA Database

	Certificate #	Sample #	Hole ID	BK Area	From (m)	To (m)	Lith Unit	Lith Unit Minl'gy Log	Description	Assay Notes	Mineralogy Comments
34	TR07092952	E751981	K-07-0083	East Zone	43	45	QTZT	QTZT	Bleached, brittle quartzite with manganese staining surrounding fractures and limonite staining on fracture surfaces.		
35	VA07091806	C462785	K-06-0035	SW Zone	53	55	QTZT	QTZT	Dark grey, well foliated		
36	VA07091926	C212949	K-06-0020	SW Zone	332.2	333.7	QTZT	QTZT	Medium-dark grey brittle quartzite with qtz stringers cross-cutting foliation. Iron Oxide staining on fractured surfaces.		
37	TR07093900	C466994	K-07-0067	East Zone	111.1	113.1	CQTZT	CQTZT	Medium-dark grey calcareous quartzite.		111.10-115.10m: Pervasive CaCO3 throughout section. Perhaps some of QTZT is CaCO3 rich from origin and has been put into sweats/veinlets through metamorphism.
38	VA07091809	C462038	K-06-0023	SW Zone	323.1	324.6	CQTZT	CQTZT	Medium-dark grey calcareous quartzite unit with cross-cutting quartz and calcite stringers.		
39	VA07091227	E600744	K-07-0092	Middle East Zone	258	260.03	CQTZT	CQTZT	Medium-dark grey calcaerous quarzite with minor x-cutting quartz and calcite stringers.		
40	TR07092959	E751851	K-07-0076	East Zone	78.73	81.55	CQTZT	CQTZT	Medium grey calcareous quartzite with foliation parallel sweats of calcite as well as cross-cutting quartz/calcite stringers.	Possible minor contamination. Sample occurs after high silver standard	
41	TR07093366	E775774	K-07-0079	East Zone	29.39	31.39	CQTZT	CQTZT	Medium-dark grey calcareous quartzite with a well developed foliation. Cross-cutting quartz and calcite stringers are present thru-out.		No qtz veining, all carbonate veinlets and sweats, only limonite mineralization.
42	TR07093907	C467957	K-07-0065	East Zone	178.72	180.23	CQTZT	CQTZT	Well foliated, medium to dark grey calcareous quartzite.		178.72-180.23: calcite-bearing quartz veinlets
43	TR07093904	E599687	K-07-0066	East Zone	110.75	112.75	CQTZT	CQTZT	Medium grey calcareous quartzite with cross-cutting quartz/calcite stringers. Slightly oxidized fractured surfaces.		
44	TR07092951	E752037	K-07-0083	East Zone	131.41	133.5	CQTZT	CQTZT	Well foliated, medium to dark grey calcareous quartzite with several foliation parallel bands of extreme calcification. Stringers of qtz and calcite are present x-cutting throughout		
45	TR07092954	E775965	K-07-0082	East Zone	154.92	157.12	CQTZT	CQTZT	Well foliated, medium to dark grey calcareous quartzite with several foliation parallel bands of extreme calcification. Stringers of qtz and calcite are present x-cutting throughout		Large qtz veins crosscut by several smaller qtz veinlets.
46	VA07091805	C462958	K-06-0035	SW Zone	337	339	CQTZT	CQTZT	Dark grey, slightly porous calcareous quartzite with bands of more intense calcification parallel to foliation.		335.0-339.0 - Calcareous, white, vuggy stringers that cross cut perpindicular to foliation (~40 degrees TCA) and are often fractured, showing limonite staining +/- pyrite on fractured surfaces.
47	VA07091926	C212942	K-06-0020	SW Zone	323.1	324.6	CQTZT	CQTZT	Dark grey, well foliated, calcareous quartzite with stringers of qtz and calicite cross-cutting foliation. Limonite oxide stains fractured surfaces and some stringers.		
48	TR07086384	E600885	K-07-0093	Middle East Zone	225	227	CQTZT	CQTZT	Medium to dark grey, banded calcareous schist. Some bands (cm scale) are more intensly calcareous than othres.		225.00-_____m:chlorite along fractures.
49	VA07091924	C215828	K-06-0023	SW Zone	45.7	47.3	GSCH	GSCH	Med-dark grey moderately graphitic schistose unit with intermittent, thin beds of quartzite.	Possible minor contamination. Sample occurs after high silver standard	
50	TR07093011	E600070	K-07-0078	East Zone	39.62	41.62	GSCH	GSCH	Graphitic Schist unit with intermittent thin beds of quartzite. Slightly gougy at times. Slightly vuggy sweats of quartz.		qtz slightly vuggy
51	TR07087698	E768289	K-07-0094	Middle East Zone	207.9	209.91	GSCH	GSCH	Dark grey, slightly gougy, friable graphitic schist with intermittent qtz sweats. Slightly oxidized - limonite staining on fractured surfaces.		
52	TR07092956	E751924	K-07-0076	East Zone	154.04	155.91	GSCH	GSCH	Dark grey slightly graphitic schist with intermittent, thin beds of quartzite. Qtz sweats. Moderately oxidized.		154.04-155.91m: schist with broken siderite in a small fault zone. Increased disseminated pyrite.
53	TR07092957	E775865	K-07-0079	East Zone	160.83	163.37	GSCH	GSCH	Dark grey, moderatley graphitic schist unit with intermittent, thin bedded quartzite.		
54	TR07093905	C467893	K-07-0065	East Zone	102.41	103.89	GSCH	GSCH	Dark grey, graphitic schist. Sweats of calcite and vein quartz intermittent throughout.		
55	TR07093367	E775645	K-07-0066	East Zone	60.58	62.66	GSCH	GSCH	Dark grey to black graphitic schist with sweats and intermittent layers of vein quartz.		
56	TR07093901	C466965	K-07-0067	East Zone	64.91	66.98	GSCH	GSCH	Dark grey to black graphitic schist with sweats of calcite and quartz. Trace limonite on fracture surfaced.		
57	TR07092955	E775947	K-07-0082	East Zone	130.47	132.27	GSCH	GSCH	Dark grey to black graphitic schist with sweats of calcite and quartz.		

APPENDIX B2-1 Mineralogy / Alteration Data for ABA Database

	Certificate #	Sample #	Hole ID	BK Area	From (m)	To (m)	Lith Unit	Lith Unit Minl'gy Log	Description	Assay Notes	Mineralogy Comments
58	VA07091807	C462772	K-06-0035	SW Zone	31	33	GSCH	GSCH	Dark grey to black graphitic schist with sweats of quartz.	Possible minor contamination. Sample occurs after high silver standard	
59	VA07091930	C212705	K-06-0020	SW Zone	13.5	15.2	GSCH	GSCH	Dark grey to black graphitic schist with sweats of vein quartz throughout. Slightly oxidized.	Sample adjacent to vein zone	
60	TR07092772	E600774	K-07-0092	Middle East Zone	297.77	299.8	GSCH	GSCH	Dark grey to black graphitic schist with sweats of vein quartz/calcite throughout.		
61	VA07091228	E776285	K-07-0091a	East Zone	247.45	249.45	GSCH	GSCH	Dark grey to black graphitic schist with sweats of vein quartz/calcite throughout.		
65	TR07092958	E751883	K-07-0076	East Zone	114.5	115.21	VN	VN	Fine grained galena and sphalerite within quartz and siderite stringers that cross-cut the quartzite unit.		
66	TR07092953	E775989	K-07-0082	East Zone	195.96	196.4	VN	VN	Trace Galena within fractures of a siderite vein.		Galena within a fracture in a siderite vein, coating parts of the fracture.
67	VA07091240	E600657	K-07-0092	Middle East Zone	158.37	158.72	VN	VN	Trace Galena within greenstone and siderite stringers.		158.37-158.72: siderite vein about 4cm in width with galena. Galena within quartz veinlet and within greenstone.
70	VA07091241	C463235	K-06-0038	SW Zone	310.6	311.05	VN	VN	Fractured broken quartzite with trace siderite veining. Trace pyrite/sphalerite and possibly galena		311.05-311.9 - fractutred/broken qtzt and qtz with limonite on fractured surfaces possibly siderite? Tr py/sphalerite
62	TR07093903	C467919	K-07-0065	East Zone	129.84	130.12	VN	VN	Mineralized Siderite vein (sphalerite + galena veinlets) - clay alteration.		129.84-130.12: strongly altered siderite vein that crumbles to a fine grained breccia. Sphalerite and galena veinlets. White clay alteration. sphalerite vein in siderite. Less alteration and more intact rock. Pyrite throughout
63	TR07093920	E599708	K-07-0066	East Zone	142.46	143.1	VN	VN	Mineralized Siderite vein (sphalerite and galena veinlets)		142.46-146.9: ORE ZONE. Ore zone can be divided into 4 sections. 1. 142.46-143.9 - massive siderite vein with 2 smaller 15-20 cm spalerite and gn vns (mostly spahlerite) 143.58-143.63- sphalerite vein is brecciated by siderite. Siderite also has minor am
64	TR07093368	E775550	K-07-0067	East Zone	164.24	164.94	VN	VN	Brecciated Quartzite with siderite matrix. Main mineralized lens contains sphalerite, galena, arsenopyrite.		
68	VA07091931	C212406	K-06-0011	SW Zone	401.3	402	VN	VN	Tetrahedrite, siderite, galena and sphalerite - breccia.		
69	VA07091925	C462087	K-06-0023	SW Zone	377.45	378	VN	VN	Massive sphalerite with minor abours of galena, pyrite and chalcopyrite within a siderite vein.		
71	TR07093365	E775799	K-07-0079	East Zone	61.82	61.96	VN	VN	Massive sphalerite within a siderite vein. Massive pyrite and trace galena also present.		Massive sphalerite body begins here, within a siderite vein. Small amounts of massive pyrite also present.

APPENDIX B2-1 Mineralogy / Alteration Data for ABA Database

				Vein - Gangue Minerals			Vein-Sulphide Minerals						Disseminated Sulphide Minerals					Oxide Minerals	
	Certificate #	Sample #	Alteration Comments	VG_Quartz1	VG_Siderite	VG_Carbonate	VS_Pyrite	VS_Galena	VS_Sphalerite	VS_Sulphosalts	VS_Arsenopyrite	VS_Pyrite_Syn	DS_Pyrite	DS_Galena	DS_Sphalerite	DS_Arsenopyrite	DS_Pyrite_Syn	OT_Limonite	OT_Gypsum
1	VA07091928	C212117		5	0.01	0	0	0	0	0	0	0			0			0.01	0
2	TR07092775	E600288	35.34-86.15: Minor oxidiztion that is mainly present on fracture surfaces.	1														0.5	
3	VA07091920	C212566		20	0	0	0	0	0	0	0							0	0
4	VA07091804	C462066		5	0	1	0.1	0	0	0	0							0	0
5	TR07093011	E600079	minor clay on fractures	5														0.5	
6	TR07093907	C467959	180.96-182.02: moderate greenish-white clay alteration of fractures. Weak calcification in white calcite bands	15		0.1													
7	TR07093920	E599704	section of clay gouge 8cm 137.57-137.65	3		1		0	0.3										
8	TR07093369	E775513		3		8											0.01		
9	TR07092771	E600542	229.38-233.45: slightly bleached quartzite (at times chloritic).	20	10		0.5		0.5										
10	VA07091806	C462793		10	0	0	0.1	0	0	0	0							0	0
11	VA07091923	C212729		5	0	0	0.01	0	0	0	0							0	0
12	VA07091226	E776315	no alteration notes, however carbonate minerals denoted in intervals before and after sample	20		0.5													
13	TR07085899	E768248				0.1	0.2												
14	VA07091804	C462069		5	0	5	1	0.1	0.1	0	0							0	0
15	TR07092775	E600290	35.34-86.15: Minor oxidiztion that is mainly present on fracture surfaces.	0.5	5	1	0.5	0.1	1									0.5	
16	TR07093364	E775819				5												0.1	
17	VA07091921	C212639		1	0	0	0.1	0	0	0	0							0	0
18	VA07091225	E600631	114.39-120.41m: carbonate along fractures that has been oxidized and is an orangey colour	0.5		0.5													
19	TR07093906	E599612				0.01												0.01	
20	TR07092773	E752010	calcareous greenstone. Porphyroblasts are calcareous as are qtz veins. Iron oxide staining on fractures and weak clay alteration.	6		0.5												0.01	
21	TR07092957	E775866																	
22	VA07091927	C212917		1	0	1	0.01	0	0	0	0							0	0
23	TR07086383	E600841		0.01		0.01												0.01	
24	VA07091226	E776319		3		0.1													
25	TR07092774	E600319	92.28-121.30: Bands of Calcareous Quartzite	1		0.01													
26	VA07091804	C462078		5	1	0.1	1	0	0	0	0							0	0
27	TR07093010	E600086		1	0.1				0.01									0.01	
28	TR07086383	E600846		0.01	0.1	0.01												0.01	
29	TR07087698	E768283	QTZT here is a milky white colour because of calcitic alteration. Reacts to acid.	2	0.1	0.5	0.2											0.01	
30	TR07093363	E775833		6			0.01						0.1					0.05	
31	TR07093908	C467832		3			0.01												
32	TR07093902	E599725			0.3	0.1			0.01								0.1		
33	VA07091229	E600593	3.61-109.74m: iron, probably some limonite oxidation along fractures and within some qtz veins	2		0.01	0.01										0.01	0.01	

APPENDIX B2-1 Mineralogy / Alteration Data for ABA Database

				Vein - Gangue Minerals			Vein-Sulphide Minerals						Disseminated Sulphide Minerals					Oxide Minerals	
	Certificate #	Sample #	Alteration Comments	VG_Quartz1	VG_Siderite	VG_Carbonate	VS_Pyrite	VS_Galena	VS_Sphalerite	VS_Sulphosalts	VS_Arsenopyrite	VS_Pyrite_Syn	DS_Pyrite	DS_Galena	DS_Sphalerite	DS_Arsenopyrite	DS_Pyrite_Syn	OT_Limonite	OT_Gypsum
34	TR07092952	E751981	hematite and limonite on fractures. Suspected Mn oxides as stringers.															0.01	
35	VA07091806	C462785		10	0	0	0.01	0	0	0	0							0.1	0
36	VA07091926	C212949		2	0	2	2	0	0	0	0							0	0
37	TR07093900	C466994	109.00-160.00m: section has abundant carbonate veining. Veins (stringers) are often very small and abundant giving QTZT a pervasive CaCO3 alteration appearance. In other areas however it is clearly visible that CaCO3 is confined to stringers and QTZT i	0.5		3											0.01		
38	VA07091809	C462038		5	0	5	0.1	0	0.1	0	0							0	0
39	VA07091227	E600744		1		0.1							0.01						
40	TR07092959	E751851				0.01							0.01						
41	TR07093366	E775774	Strong carbonate mineralization/alteration as sweats from QTZT, gives homogenous look although foliation oriented at 45 degrees TCA.			2												0.1	
42	TR07093907	C467957	176.53-180.96: light to medium grey with white calcareous speckles. No reaction in schist beds	1		0.1							0.1						
43	TR07093904	E599687	weakly calcareous quartzite. CaCO3 alteration varies within unit. Sometimes seen in coarse grain bands (lighter grey) rangin from 1cm-30cm. Calcareous bands stronger reaction to HCL than rest of rock. Some section do not appear calcareous 75.15- 77.15 is	0.1		0.1											0.01		
44	TR07092951	E752037	calcareous zones in the QTZT appear as speckled areas 1-20cm wide or as qtz-carbonate stringers. Weak oxidation on some fractures.	1		0.05													
45	TR07092954	E775965		10		1	0.05						0.01					0.01	
46	VA07091805	C462958		1	0	5	0.1	0	0	0	0							0.1	0
47	VA07091926	C212942		5	0	1	0.01	0	0	0	0							0	0
48	TR07086384	E600885											0.01						
49	VA07091924	C215828		30	0	0	0	0	0	0	0							0	0
50	TR07093011	E600070		15															
51	TR07087698	E768289		3			0.1						0.01				0.1		
52	TR07092956	E751924	154.04-179.43m: calcareous QTZT. CQTZT has a lighter, speckled appearance. CaCO3 is also found in stringers parallel to foliation. Weak grey to grey-green clay is found on some fractures.		1	0.1							0.05						
53	TR07092957	E775865	Clay is fairly prominent throughout most of this interval, particularly on fracture surfaces.	7		2							0.01			0	0.1		
54	TR07093905	C467893	101.02-103.89: weak calcification occuring in 1-5 mm bands throughout interval. White to yellow-grey clay	5			0.01						0.01						
55	TR07093367	E775645		5	0	0.5											0.1		
56	TR07093901	C466965		6			0.01										0.01		
57	TR07092955	E775947		2		0.2							0.01				0.05	0.01	

APPENDIX B2-1 Mineralogy / Alteration Data for ABA Database

	Certificate #	Sample #	Alteration Comments	Vein - Gangue Minerals VG_Quartz1	VG_Siderite	VG_Carbonate	Vein-Sulphide Minerals VS_Pyrite	VS_Galena	VS_Sphalerite	VS_Sulphosalts	VS_Arsenopyrite	VS_Pyrite_Syn	Disseminated Sulphide Minerals DS_Pyrite	DS_Galena	DS_Sphalerite	DS_Arsenopyrite	DS_Pyrite_Syn	Oxide Minerals OT_Limonite	OT_Gypsum
58	VA07091807	C462772		20	0	0	0.01	0	0	0	0							1	0
59	VA07091930	C212705		5	0	0	0	0	0	0	0							0	0
60	TR07092772	E600774		4		0.01											0.1		
61	VA07091228	E776285		1		0.1	0.01										0.3		
65	TR07092958	E751883	108.57-119.98m: minor clay alteration (white, grey-green) on some fractures. Minor oxidation in localized blebs throughout unit.		0.5			0.05											
66	TR07092953	E775989		0	0.4			0.5	0.01				0.01						
67	VA07091240	E600657		14	10	5	0.01							0.01					
70	VA07091241	C463235		25	0.1	1	0.1	0	0.01	0	0							0.1	0
62	TR07093903	C467919			65	0	1		30										
63	TR07093920	E599708			50	0.1	2	3	15										
64	TR07093368	E775550		2	20			1	8		4								
68	VA07091931	C212406			35	0	10	10	35	0	0							0	0
69	VA07091925	C462087		10	20	0	10	15	30	0	0							0	0
71	TR07093365	E775799	Strong oxidation present with a lot of pervasive hematite, along with what might be some MnO, a dark grey to black metallic mineral that is present on fractures.		45				50								2		

			Total Sulphides						Carbonate Alteration
	Certificate #	Sample #	Total_Pyrite	Total_Galena	Total_Sphalerite	Total_Arsenopyrite	Total_Pyrite_Syn	Calc_Total_Sx	CaCO3_Int
1	VA07091928	C212117	0	0	0	0	0	*0*	
2	TR07092775	E600288	0	0	0	0	0	*0*	
3	VA07091920	C212566	0	0	0	0	0	*0*	
4	VA07091804	C462066	0.1	0	0	0	0	*0.1*	
5	TR07093011	E600079	0	0	0	0	0	*0*	
6	TR07093907	C467959	0	0	0	0	0	*0*	1
7	TR07093920	E599704	0	0	0.3	0	0	*0.3*	
8	TR07093369	E775513	0	0	0	0	0.01	*0.01*	
9	TR07092771	E600542	0.5	0	0.5	0	0	*1*	
10	VA07091806	C462793	0.1	0	0	0	0	*0.1*	
11	VA07091923	C212729	0.01	0	0	0	0	*0.01*	
12	VA07091226	E776315	0	0	0	0	0	*0*	
13	TR07085899	E768248	0.2	0	0	0	0	*0.2*	
14	VA07091804	C462069	1	0.1	0.1	0	0	*1.2*	
15	TR07092775	E600290	0.5	0.1	1	0	0	*1.6*	
16	TR07093364	E775819	0	0	0	0	0	*0*	
17	VA07091921	C212639	0.1	0	0	0	0	*0.1*	
18	VA07091225	E600631	0	0	0	0	0	*0*	1
19	TR07093906	E599612	0	0	0	0	0	*0*	
20	TR07092773	E752010	0	0	0	0	0	*0*	2
21	TR07092957	E775866	0	0	0	0	0	*0*	
22	VA07091927	C212917	0.01	0	0	0	0	*0.01*	
23	TR07086383	E600841	0	0	0	0	0	*0*	
24	VA07091226	E776319	0	0	0	0	0	*0*	
25	TR07092774	E600319	0	0	0	0	0	*0*	3
26	VA07091804	C462078	1	0	0	0	0	*1*	
27	TR07093010	E600086	0	0	0.01	0	0	*0.01*	
28	TR07086383	E600846	0	0	0	0	0	*0*	
29	TR07087698	E768283	0.2	0	0	0	0	*0.2*	2
30	TR07093363	E775833	0.11	0	0	0	0	*0.11*	
31	TR07093908	C467832	0.01	0	0	0	0	*0.01*	
32	TR07093902	E599725	0	0	0.01	0	0.1	*0.11*	
33	VA07091229	E600593	0.01	0	0	0	0.01	*0.02*	

APPENDIX B2-1 Mineralogy / Alteration Data for ABA Database

	Certificate #	Sample #	Total Sulphides						Carbonate Alteration
			Total_Pyrite	Total_Galena	Total_Sphalerite	Total_Arsenopyrite	Total_Pyrite_Syn	Calc_Total_Sx	CaCO3_Int
34	TR07092952	E751981	0	0	0	0	0	*0*	
35	VA07091806	C462785	0.01	0	0	0	0	*0.01*	
36	VA07091926	C212949	2	0	0	0	0	*2*	
37	TR07093900	C466994	0	0	0	0	0.01	*0.01*	2
38	VA07091809	C462038	0.1	0	0.1	0	0	*0.2*	
39	VA07091227	E600744	0.01	0	0	0	0	*0.01*	1
40	TR07092959	E751851	0.01	0	0	0	0	*0.01*	2
41	TR07093366	E775774	0	0	0	0	0	*0*	3
42	TR07093907	C467957	0.1	0	0	0	0	*0.1*	3
43	TR07093904	E599687	0	0	0	0	0.01	*0.01*	1
44	TR07092951	E752037	0	0	0	0	0	*0*	1
45	TR07092954	E775965	0.06	0	0	0	0	*0.06*	
46	VA07091805	C462958	0.1	0	0	0	0	*0.1*	
47	VA07091926	C212942	0.01	0	0	0	0	*0.01*	
48	TR07086384	E600885	0.01	0	0	0	0	*0.01*	2
49	VA07091924	C215828	0	0	0	0	0	*0*	
50	TR07093011	E600070	0	0	0	0	0	*0*	
51	TR07087698	E768289	0.11	0	0	0	0.1	*0.21*	
52	TR07092956	E751924	0.05	0	0	0	0	*0.05*	2
53	TR07092957	E775865	0.01	0	0	0	0.1	*0.11*	
54	TR07093905	C467893	0.02	0	0	0	0	*0.02*	1
55	TR07093367	E775645	0	0	0	0	0.1	*0.1*	
56	TR07093901	C466965	0.01	0	0	0	0.01	*0.02*	
57	TR07092955	E775947	0.01	0	0	0	0.05	*0.06*	

APPENDIX B2-1 Mineralogy / Alteration Data for ABA Database

			Total Sulphides						Carbonate Alteration
	Certificate #	Sample #	Total_Pyrite	Total_Galena	Total_Sphalerite	Total_Arsenopyrite	Total_Pyrite_Syn	Calc_Total_Sx	CaCO3_Int
58	VA07091807	C462772	0.01	0	0	0	0	*0.01*	
59	VA07091930	C212705	0	0	0	0	0	*0*	
60	TR07092772	E600774	0	0	0	0	0.1	*0.1*	
61	VA07091228	E776285	0.01	0	0	0	0.3	*0.31*	
65	TR07092958	E751883	0	0.05	0	0	0	*0.05*	
66	TR07092953	E775989	0.01	0.5	0.01	0	0	*0.52*	
67	VA07091240	E600657	0.01	0.01	0	0	0	*0.02*	1
70	VA07091241	C463235	0.1	0	0.01	0	0	*0.11*	
62	TR07093903	C467919	1	0	30	0	0	*31*	
63	TR07093920	E599708	2	3	15	0	0	*20*	
64	TR07093368	E775550	0	1	8	4	0	*13*	
68	VA07091931	C212406	10	10	35	0	0	*55*	
69	VA07091925	C462087	10	15	30	0	0	*55*	
71	TR07093365	E775799	0	0	50	0	2	*52*	

APPENDIX B3-1 Summary Statistics for ABA Database

All Samples

Sample	FIZZ RATING	paste_pH	NP_kgCaCO3/t	MPA_kgCaCO3/t	NNP_kgCaCO3/t	NP:MPA	St_%	SO4_CbLch %	SO4_HCl%	S2-_%	Cinorg_%	CO2_%	Au_ppm	Ag_ppm
No. of observations	71	71	71	71	71	71	71	71	71	71	71	71	71	71
No. of missing values	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum	1.000	5.800	0.000	0.300	-550.000	0.000	0.010	0.010	0.010	0.010	0.050	0.200	0.010	0.500
Maximum	3.000	8.900	207.000	582.800	206.000	220.800	18.650	0.770	0.780	17.900	6.860	25.100	4.280	1770.000
1st Quartile	2.000	7.950	23.500	2.650	11.000	2.005	0.085	0.010	0.010	0.075	0.205	0.800	0.010	0.500
Median	2.000	8.300	54.000	6.300	34.000	6.770	0.200	0.010	0.010	0.180	0.830	3.100	0.010	0.600
3rd Quartile	3.000	8.400	87.500	12.950	81.500	22.935	0.415	0.020	0.010	0.405	1.585	5.800	0.010	2.050
Mean	2.155	8.113	67.817	38.924	28.859	20.280	1.245	0.032	0.030	1.216	1.289	4.731	0.141	60.025
Standard deviation (n)	0.620	0.602	57.659	111.213	130.028	33.488	3.559	0.093	0.096	3.493	1.536	5.621	0.583	272.005
Variation coefficient	0.288	0.074	0.850	2.857	4.506	1.651	2.858	2.893	3.177	2.872	1.192	1.188	4.128	4.531
Skewness (Pearson)	-0.115	-1.756	1.008	3.790	-2.545	3.525	3.790	7.167	6.961	3.752	2.105	2.105	5.780	5.174
Kurtosis (Pearson)	-0.500	3.135	-0.030	13.762	8.366	16.289	13.762	53.234	50.393	13.411	4.403	4.394	35.349	26.441
Geometric mean	2.053	8.088		6.762			0.216	0.016	0.014	0.196	0.606	2.253	0.017	1.467
Geometric standard deviation	1.389	1.084		5.195			5.175	2.252	2.220	5.460	4.051	3.973	3.822	6.801

Non-Mineralized Samples

Sample	FIZZ RATING	paste_pH	NP_kgCaCO3/t	MPA_kgCaCO3/t	NNP_kgCaCO3/t	NP:MPA	St_%	SO4_CbLch %	SO4_HCl%	S2-_%	Cinorg_%	CO2_%	Au_ppm	Ag_ppm
No. of observations	65	65	65	65	65	65	65	65	65	65	65	65	65	65
No. of missing values	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum	1.000	6.400	0.000	0.300	-7.000	0.000	0.010	0.010	0.010	0.010	0.050	0.200	0.010	0.500
Maximum	3.000	8.900	207.000	37.200	206.000	220.800	1.190	0.140	0.160	1.170	5.290	19.400	0.130	30.500
1st Quartile	2.000	8.000	22.000	2.500	14.000	3.560	0.080	0.010	0.010	0.070	0.200	0.800	0.010	0.500
Median	2.000	8.300	55.000	5.600	40.000	7.600	0.180	0.010	0.010	0.160	0.770	2.800	0.010	0.500
3rd Quartile	3.000	8.500	91.000	10.000	84.000	28.950	0.320	0.020	0.010	0.290	1.320	4.800	0.010	1.300
Mean	2.169	8.242	69.615	8.238	61.354	22.137	0.263	0.017	0.015	0.249	0.961	3.529	0.014	1.840
Standard deviation (n)	0.646	0.417	59.879	8.569	59.343	34.412	0.274	0.018	0.020	0.269	0.982	3.590	0.018	4.165
Variation coefficient	0.298	0.051	0.860	1.040	0.967	1.554	1.041	1.031	1.295	1.083	1.022	1.017	1.286	2.263
Skewness (Pearson)	-0.176	-1.765	0.899	1.772	1.021	3.405	1.772	5.234	6.084	1.816	1.853	1.860	5.375	5.384
Kurtosis (Pearson)	-0.672	5.305	-0.326	2.765	-0.096	15.134	2.759	32.436	40.100	2.940	4.683	4.740	28.322	32.322
Geometric mean	2.058	8.230		4.715			0.151	0.014	0.012	0.136	0.505	1.880	0.012	0.893
Geometric standard deviation	1.410	1.055		3.248			3.229	1.725	1.663	3.405	3.710	3.635	1.591	2.541

APPENDIX B3-1 Summary Statistics for ABA Database

All Samples

Sample	Al_%	As_ppm	Ba_ppm	Be_ppm	Bi_ppm	Ca_%	Cd_ppm	Co_ppm	Cr_ppm	Cu_ppm	Fe_%	Ga_ppm	K_%	La_ppm
No. of observations	71	71	71	71	71	71	71	71	71	71	71	71	71	71
No. of missing values	0	0	0	0	0	0	0	0	0	0	0	20	0	20
Minimum	0.010	5.000	10.000	0.500	2.000	0.030	0.500	1.000	1.000	1.000	0.410	10.000	0.010	10.000
Maximum	11.250	10000.000	7620.000	2.900	86.000	8.340	1000.000	81.000	455.000	4090.000	27.800	30.000	2.470	40.000
1st Quartile	0.820	5.000	100.000	0.500	2.000	0.410	0.500	2.000	33.000	8.000	1.095	10.000	0.115	10.000
Median	3.530	12.000	250.000	0.500	2.000	2.280	0.500	9.000	46.000	27.000	3.410	10.000	0.350	10.000
3rd Quartile	7.190	34.500	875.000	1.300	2.000	5.165	3.550	24.500	97.000	141.000	7.165	20.000	1.195	20.000
Mean	4.041	464.113	761.972	0.921	5.211	2.922	83.206	15.155	67.901	209.254	5.230	13.725	0.633	14.902
Standard deviation (n)	3.364	1819.749	1344.129	0.643	13.413	2.685	259.995	17.546	64.303	647.976	5.712	5.225	0.651	8.716
Variation coefficient	0.832	3.921	1.764	0.698	2.574	0.919	3.125	1.158	0.947	3.097	1.092	0.381	1.028	0.585
Skewness (Pearson)	0.315	4.577	3.416	1.383	4.826	0.607	3.035	1.702	3.228	4.815	2.069	0.935	1.005	1.540
Kurtosis (Pearson)	-1.413	20.013	12.894	0.716	23.293	-1.041	7.351	2.889	16.101	23.291	4.400	-0.293	-0.316	1.016
Geometric mean	2.033	20.825	253.186	0.762	2.528	1.385	1.892	7.223	42.606	33.521	3.048	12.874	0.301	13.140
Geometric standard deviation	4.683	6.488	5.019	1.786	2.193	4.460	10.199	3.771	3.376	6.034	2.979	1.419	4.265	1.595

Non-Mineralized Samples

Sample	Al_%	As_ppm	Ba_ppm	Be_ppm	Bi_ppm	Ca_%	Cd_ppm	Co_ppm	Cr_ppm	Cu_ppm	Fe_%	Ga_ppm	K_%	La_ppm
No. of observations	65	65	65	65	65	65	65	65	65	65	65	65	65	65
No. of missing values	0	0	0	0	0	0	0	0	0	0	0	18	0	18
Minimum	0.290	5.000	10.000	0.500	2.000	0.030	0.500	1.000	7.000	1.000	0.410	10.000	0.010	10.000
Maximum	11.250	1810.000	7620.000	2.900	4.000	8.340	47.400	48.000	455.000	306.000	13.500	30.000	2.470	40.000
1st Quartile	1.310	5.000	150.000	0.500	2.000	0.740	0.500	2.000	37.000	8.000	1.060	10.000	0.140	10.000
Median	4.660	11.000	310.000	0.500	2.000	2.610	0.500	8.000	48.000	24.000	3.290	10.000	0.390	10.000
3rd Quartile	7.410	21.000	920.000	1.300	2.000	5.300	0.800	16.000	99.000	106.000	5.210	20.000	1.220	20.000
Mean	4.396	48.492	831.077	0.960	2.077	3.167	4.717	13.123	73.800	59.031	3.798	14.043	0.686	15.319
Standard deviation (n)	3.297	223.032	1384.536	0.659	0.364	2.676	10.994	14.136	64.044	72.397	3.066	5.323	0.654	8.956
Variation coefficient	0.750	4.599	1.666	0.686	0.175	0.845	2.331	1.077	0.868	1.226	0.807	0.379	0.953	0.585
Skewness (Pearson)	0.190	7.589	3.279	1.253	4.777	0.485	2.883	1.137	3.386	1.360	0.916	0.810	0.899	1.414
Kurtosis (Pearson)	-1.445	56.876	11.744	0.356	21.592	-1.151	7.189	-0.105	16.809	0.966	0.153	-0.510	-0.529	0.624
Geometric mean	2.753	13.183	335.465	0.792	2.056	1.626	1.068	6.488	56.704	24.028	2.559	13.153	0.374	13.449
Geometric standard deviation	3.074	2.982	3.939	1.807	1.138	4.288	4.064	3.658	2.075	4.278	2.626	1.428	3.575	1.615

APPENDIX B3-1 Summary Statistics for ABA Database

All Samples

Sample	Mg_%	Mn_ppm	Mo_ppm	Na_%	Ni_ppm	P_ppm	Pb_ppm	S_%	Sb_ppm	Sc_ppm	Sr_ppm	Th_ppm	Ti_%	Tl_ppm
No. of observations	71	71	71	71	71	71	71	71	71	71	71	71	71	71
No. of missing values	0	0	0	0	0	0	0	0	0	20	0	20	0	20
Minimum	0.010	40.000	1.000	0.010	1.000	10.000	2.000	0.010	5.000	1.000	1.000	20.000	0.010	10.000
Maximum	5.170	84300.000	3.000	2.960	173.000	1550.000	10000.000	10.000	1730.000	39.000	555.000	20.000	1.440	40.000
1st Quartile	0.230	217.000	1.000	0.020	8.000	245.000	5.500	0.070	5.000	1.500	31.000	20.000	0.065	10.000
Median	0.490	819.000	1.000	0.060	21.000	470.000	17.000	0.200	5.000	5.000	131.000	20.000	0.180	10.000
3rd Quartile	1.225	2425.000	1.000	0.310	54.500	660.000	74.000	0.420	8.000	20.500	240.500	20.000	0.435	10.000
Mean	1.065	7313.408	1.113	0.319	34.634	495.915	652.070	0.937	67.915	12.118	142.606	20.000	0.309	10.980
Standard deviation (n)	1.295	17995.246	0.358	0.588	33.389	349.441	1978.207	2.295	278.188	12.633	123.622	0.000	0.337	4.540
Variation coefficient	1.216	2.461	0.322	1.845	0.964	0.705	3.034	2.448	4.096	1.043	0.867	0.000	1.090	0.413
Skewness (Pearson)	1.512	3.065	3.323	2.763	1.361	0.933	3.700	3.168	5.136	0.862	0.735		1.477	5.420
Kurtosis (Pearson)	1.034	8.590	11.081	7.709	2.347	0.575	13.160	8.664	25.697	-0.757	0.027		1.603	30.358
Geometric mean	0.486	986.764	1.077	0.083	19.555	336.640	29.957	0.197	8.896	5.694	70.353	20.000	0.156	10.559
Geometric standard deviation	3.958	6.657	1.258	5.347	3.300	3.064	10.098	5.271	3.612	3.906	4.644	1.000	3.691	1.263

Non-Mineralized Samples

Sample	Mg_%	Mn_ppm	Mo_ppm	Na_%	Ni_ppm	P_ppm	Pb_ppm	S_%	Sb_ppm	Sc_ppm	Sr_ppm	Th_ppm	Ti_%	Tl_ppm
No. of observations	65	65	65	65	65	65	65	65	65	65	65	65	65	65
No. of missing values	0	0	0	0	0	0	0	0	0	18	0	18	0	18
Minimum	0.010	40.000	1.000	0.010	1.000	60.000	2.000	0.010	5.000	1.000	5.000	20.000	0.030	10.000
Maximum	5.170	40900.000	3.000	2.960	173.000	1550.000	3540.000	1.350	51.000	39.000	555.000	20.000	1.440	20.000
1st Quartile	0.220	202.000	1.000	0.030	8.000	290.000	4.000	0.060	5.000	2.000	40.000	20.000	0.090	10.000
Median	0.620	568.000	1.000	0.070	24.000	510.000	13.000	0.190	5.000	9.000	145.000	20.000	0.210	10.000
3rd Quartile	1.430	1710.000	1.000	0.350	56.000	680.000	49.000	0.330	7.000	23.000	249.000	20.000	0.550	10.000
Mean	1.137	2393.108	1.123	0.348	35.492	539.231	170.662	0.264	7.215	13.064	155.431	20.000	0.336	10.213
Standard deviation (n)	1.330	5882.948	0.372	0.607	33.614	333.367	572.609	0.291	6.316	12.719	121.431	0.000	0.339	1.443
Variation coefficient	1.169	2.458	0.332	1.747	0.947	0.618	3.355	1.101	0.875	0.974	0.781	0.000	1.008	0.141
Skewness (Pearson)	1.380	4.885	3.142	2.619	1.373	1.042	4.660	1.904	5.386	0.750	0.668		1.399	6.635
Kurtosis (Pearson)	0.629	26.724	9.773	6.811	2.440	0.704	21.725	3.508	33.102	-0.937	0.043		1.346	42.022
Geometric mean	0.513	678.023	1.084	0.101	20.721	437.764	18.966	0.140	6.264	6.602	95.620	20.000	0.199	10.149
Geometric standard deviation	4.150	4.449	1.270	5.042	3.141	2.010	6.078	3.558	1.546	3.729	3.240	1.000	2.921	1.106

APPENDIX B3-1 Summary Statistics for ABA Database

All Samples

Sample	U_ppm	V_ppm	W_ppm	Zn_ppm
No. of observations	71	71	71	71
No. of missing values	20	0	0	0
Minimum	10.000	1.000	10.000	8.000
Maximum	20.000	414.000	50.000	10000.000
1st Quartile	10.000	17.000	10.000	65.500
Median	10.000	63.000	10.000	100.000
3rd Quartile	10.000	174.500	10.000	366.500
Mean	10.196	108.380	11.831	1272.423
Standard deviation (n)	1.386	114.677	8.103	2836.453
Variation coefficient	0.136	1.058	0.685	2.229
Skewness (Pearson)	6.930	1.036	4.420	2.487
Kurtosis (Pearson)	46.020	-0.093	17.818	4.708
Geometric mean	10.137	45.790	10.809	184.078
Geometric standard deviation	1.102	4.931	1.397	6.191

Non-Mineralized Samples

Sample	U_ppm	V_ppm	W_ppm	Zn_ppm
No. of observations	65	65	65	65
No. of missing values	18	0	0	0
Minimum	10.000	4.000	10.000	8.000
Maximum	20.000	414.000	10.000	5810.000
1st Quartile	10.000	25.000	10.000	61.000
Median	10.000	88.000	10.000	96.000
3rd Quartile	10.000	181.000	10.000	161.000
Mean	10.213	118.108	10.000	466.800
Standard deviation (n)	1.443	115.083	0.000	1052.599
Variation coefficient	0.141	0.974	0.000	2.255
Skewness (Pearson)	6.635	0.936		3.290
Kurtosis (Pearson)	42.022	-0.294		10.866
Geometric mean	10.149	61.195	10.000	127.306
Geometric standard deviation	1.106	3.695	1.000	4.115

APPENDIX B3-1 Summary Statistics for ABA Database

Mineralized Samples

Sample	FIZZ RATING	paste_pH	NP_kgCaCO3/t	MPA_kgCaCO3/t	NNP_kgCaCO3/t	NP:MPA	St_%	SO4_CbLch%	SO4_HCl%	S2-_%	Cinorg_%	CO2_%	Au_ppm	Ag_ppm
No. of observations	6	6	6	6	6	6	6	6	6	6	6	6	6	6
No. of missing values	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum	2.000	5.800	33.000	176.900	-550.000	0.060	5.660	0.020	0.010	5.640	1.780	6.500	0.120	42.400
Maximum	2.000	7.600	61.000	582.800	-123.000	0.310	18.650	0.770	0.780	17.900	6.860	25.100	4.280	1770.000
1st Quartile	2.000	6.625	43.500	231.425	-465.500	0.100	7.405	0.043	0.030	7.355	3.565	13.225	0.633	103.600
Median	2.000	6.700	49.500	357.000	-299.500	0.160	11.425	0.060	0.035	11.375	5.055	18.500	0.930	455.000
3rd Quartile	2.000	6.850	54.000	512.875	-184.500	0.213	16.413	0.175	0.198	16.250	6.680	24.450	1.955	1188.750
Mean	2.000	6.717	48.333	371.350	-323.167	0.167	11.883	0.193	0.190	11.697	4.840	17.750	1.515	690.367
Standard deviation (n)	0.000	0.527	9.123	157.652	162.968	0.085	5.045	0.265	0.276	4.856	1.922	7.009	1.397	664.314
Variation coefficient	0.000	0.079	0.189	0.425	-0.504	0.511	0.425	1.372	1.454	0.415	0.397	0.395	0.922	0.962
Skewness (Pearson)		-0.087	-0.307	0.136	-0.217	0.360	0.136	1.591	1.488	0.093	-0.314	-0.327	1.070	0.509
Kurtosis (Pearson)		-0.163	-0.978	-1.497	-1.472	-1.024	-1.497	0.795	0.551	-1.511	-1.434	-1.408	-0.214	-1.355
Geometric mean	2.000	6.696	47.412	335.883		0.144	10.748	0.088	0.064	10.619	4.371	16.041	0.910	317.904
Geometric standard deviation	1.000	1.091	1.245	1.656		1.865	1.656	3.726	4.991	1.642	1.699	1.697	3.424	4.722

APPENDIX B3-1 Summary Statistics for ABA Database

Mineralized Samples

Sample	Al_%	As_ppm	Ba_ppm	Be_ppm	Bi_ppm	Ca_%	Cd_ppm	Co_ppm	Cr_ppm	Cu_ppm	Fe_%	Ga_ppm	K_%	La_ppm
No. of observations	6	6	6	6	6	6	6	6	6	6	6	6	6	6
No. of missing values	0	0	0	0	0	0	0	0	0	0	0	2	0	2
Minimum	0.010	698.000	10.000	0.500	2.000	0.150	795.000	5.000	1.000	248.000	14.700	10.000	0.010	10.000
Maximum	0.620	10000.000	30.000	0.500	86.000	0.520	1000.000	81.000	17.000	4090.000	27.800	10.000	0.180	10.000
1st Quartile	0.023	1059.000	10.000	0.500	19.000	0.185	854.500	11.250	1.000	705.500	16.813	10.000	0.010	10.000
Median	0.110	4130.000	10.000	0.500	30.000	0.225	1000.000	26.500	1.000	1361.000	20.625	10.000	0.030	10.000
3rd Quartile	0.280	9137.500	10.000	0.500	61.250	0.280	1000.000	65.000	2.500	2945.000	24.025	10.000	0.065	10.000
Mean	0.197	4966.667	13.333	0.500	39.167	0.265	933.500	37.167	4.000	1836.667	20.742	10.000	0.055	10.000
Standard deviation (n)	0.218	4062.350	7.454	0.000	29.464	0.123	94.099	30.803	5.859	1420.832	4.635	0.000	0.060	0.000
Variation coefficient	1.107	0.818	0.559	0.000	0.752	0.464	0.101	0.829	1.465	0.774	0.223	0.000	1.100	0.000
Skewness (Pearson)	1.005	0.190	1.789		0.413	1.275	-0.711	0.478	1.730	0.486	0.147		1.268	
Kurtosis (Pearson)	-0.389	-1.761	1.200		-1.275	0.274	-1.490	-1.493	1.084	-1.363	-1.386		0.194	
Geometric mean	0.076	2949.403	12.009	0.500	23.731	0.243	928.504	23.100	1.926	1235.474	20.221	10.000	0.029	10.000
Geometric standard deviation	5.754	3.421	1.566	1.000	3.888	1.554	1.122	3.222	3.171	2.899	1.282	1.000	3.489	1.000

APPENDIX B3-1 Summary Statistics for ABA Database

Mineralized Samples

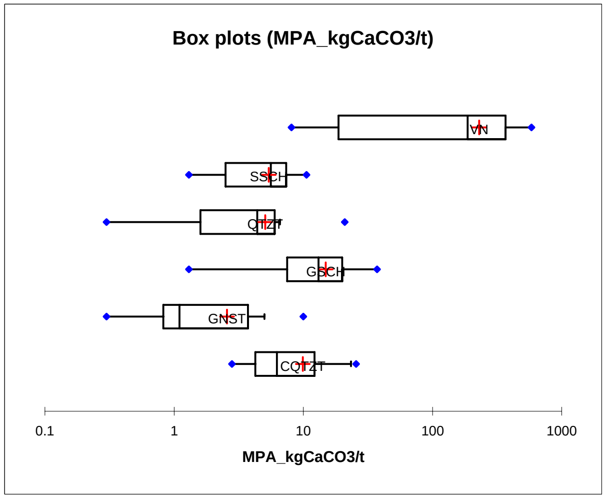
Sample	Mg_%	Mn_ppm	Mo_ppm	Na_%	Ni_ppm	P_ppm	Pb_ppm	S_%	Sb_ppm	Sc_ppm	Sr_ppm	Th_ppm	Ti_%	Tl_ppm
No. of observations	6	6	6	6	6	6	6	6	6	6	6	6	6	6
No. of missing values	0	0	0	0	0	0	0	0	0	2	0	2	0	2
Minimum	0.150	36000.000	1.000	0.010	1.000	10.000	974.000	5.590	64.000	1.000	1.000	20.000	0.010	10.000
Maximum	0.420	84300.000	1.000	0.010	83.000	70.000	10000.000	10.000	1730.000	1.000	11.000	20.000	0.020	40.000
1st Quartile	0.248	43050.000	1.000	0.010	5.000	10.000	2610.000	6.555	182.500	1.000	1.250	20.000	0.010	10.000
Median	0.285	62050.000	1.000	0.010	11.000	15.000	6385.000	8.900	431.500	1.000	2.500	20.000	0.010	15.000
3rd Quartile	0.315	77450.000	1.000	0.010	35.000	35.000	9177.500	9.880	1305.250	1.000	3.750	20.000	0.010	25.000
Mean	0.283	60616.667	1.000	0.010	25.333	26.667	5867.333	8.228	725.500	1.000	3.667	20.000	0.012	20.000
Standard deviation (n)	0.082	18802.608	0.000	0.000	29.267	22.111	3611.887	1.824	665.582	0.000	3.448	0.000	0.004	12.247
Variation coefficient	0.289	0.310	0.000	0.000	1.155	0.829	0.616	0.222	0.917	0.000	0.940	0.000	0.319	0.612
Skewness (Pearson)	0.046	-0.088			1.103	1.072	-0.216	-0.452	0.518		1.429		1.789	0.816
Kurtosis (Pearson)	-0.503	-1.616			-0.310	-0.356	-1.497	-1.547	-1.493		0.539		1.200	-1.000
Geometric mean	0.271	57505.755	1.000	0.010	10.441	19.560	4236.604	8.007	397.670	1.000	2.533	20.000	0.011	16.818
Geometric standard deviation	1.412	1.438	1.000	1.000	5.129	2.305	2.748	1.300	3.734	1.000	2.494	1.000	1.327	1.942

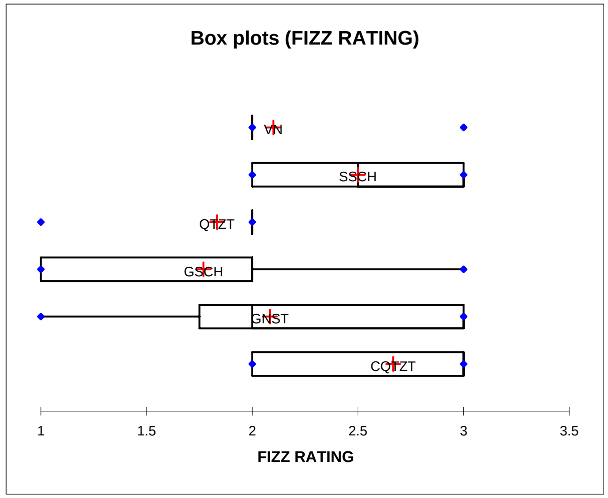
APPENDIX B3-1 Summary Statistics for ABA Database

Mineralized Samples

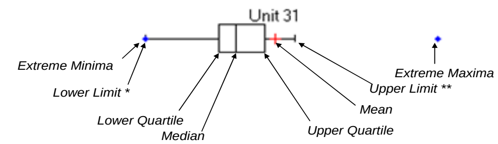
Sample	U_ppm	V_ppm	W_ppm	Zn_ppm
No. of observations	6	6	6	6
No. of missing values	2	0	0	0
Minimum	10.000	1.000	10.000	10000.000
Maximum	10.000	10.000	50.000	10000.000
1st Quartile	10.000	1.000	12.500	10000.000
Median	10.000	1.500	35.000	10000.000
3rd Quartile	10.000	2.750	50.000	10000.000
Mean	10.000	3.000	31.667	10000.000
Standard deviation (n)	0.000	3.215	18.634	0.000
Variation coefficient	0.000	1.072	0.588	0.000
Skewness (Pearson)		1.596	-0.089	
Kurtosis (Pearson)		0.824	-1.897	
Geometric mean	10.000	1.979	25.099	10000.000
Geometric standard deviation	1.000	2.499	2.217	1.000

APPENDIX B4-1a Acid Base Accounting Parameters by Lithology -- All Samples

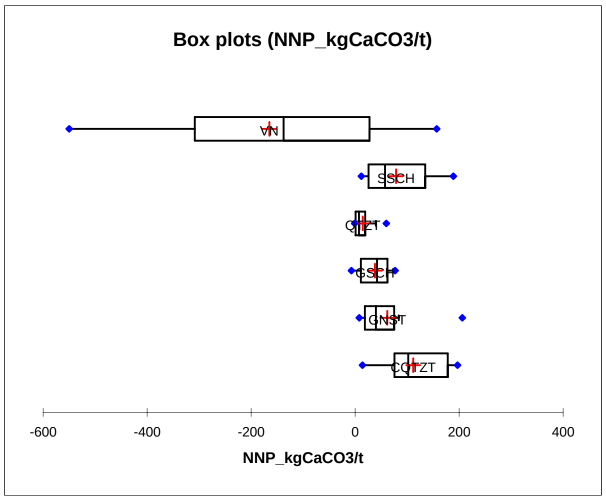


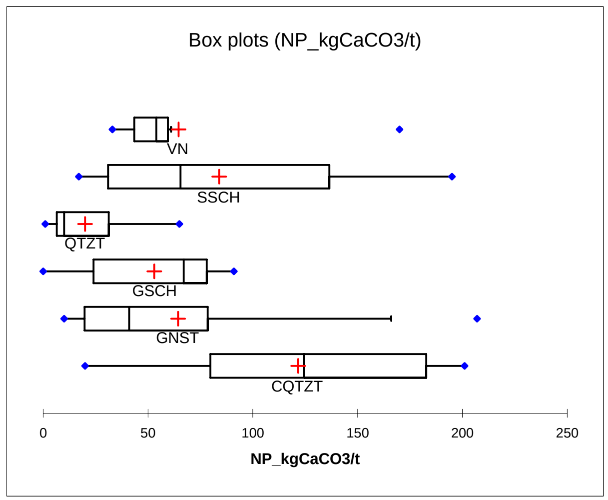


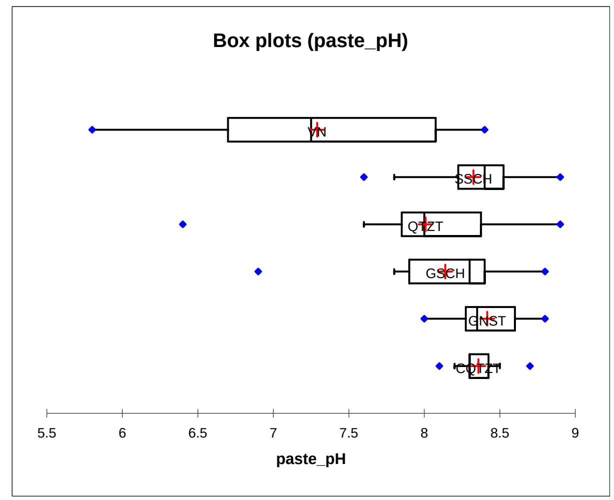
LEGEND FOR BOX PLOTS:



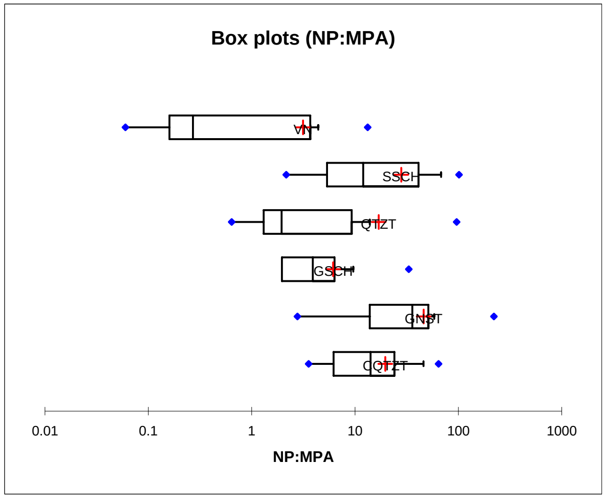
**Lower limit:* Linf = X(i) such that {X(i) – [Q1 – 1.5 (Q3 – Q1)]} is minimum and X(i) = Q1 – 1.5 (Q3 – Q1).
***Upper limit:* Lsup = X(i) such that {X(i) - [Q3 + 1.5 (Q3 – Q1)]} is minimum and X(i) = Q3 + 1.5 (Q3 – Q1)

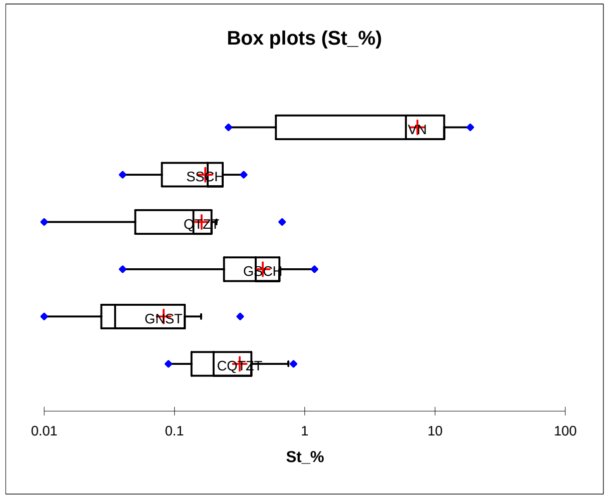


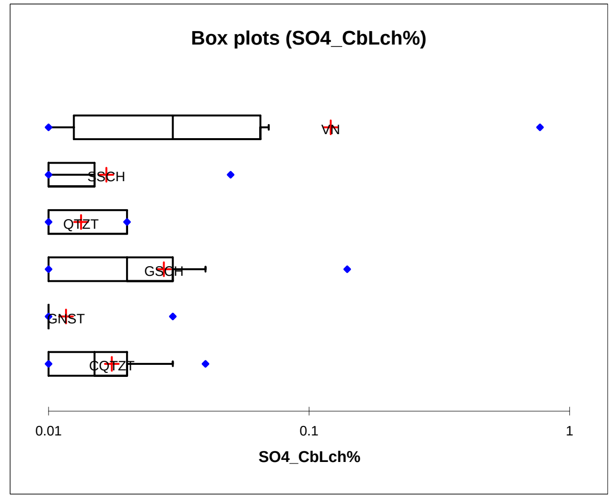


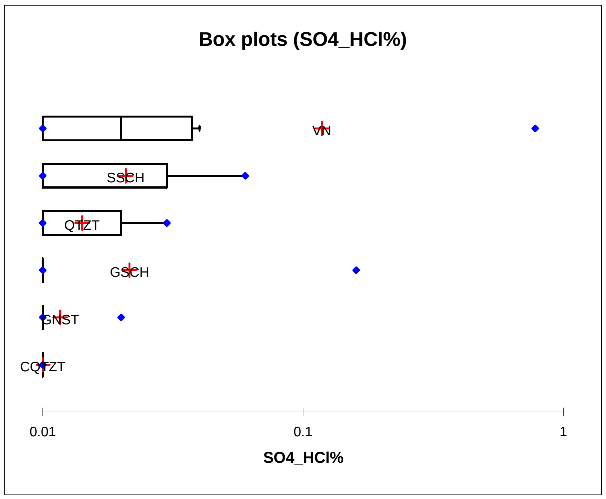


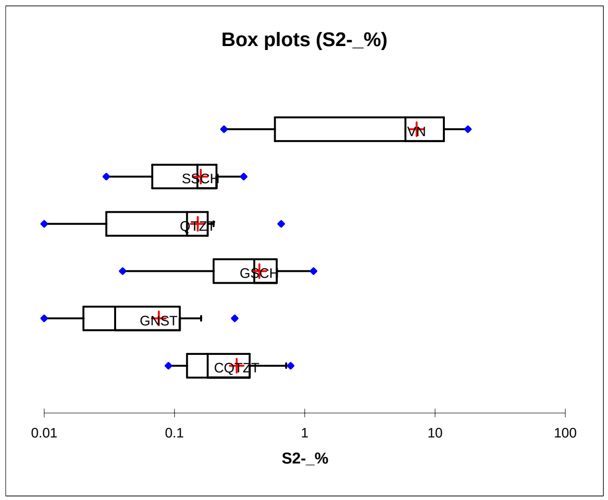
APPENDIX B4-1a Acid Base Accounting Parameters by Lithology -- All Samples

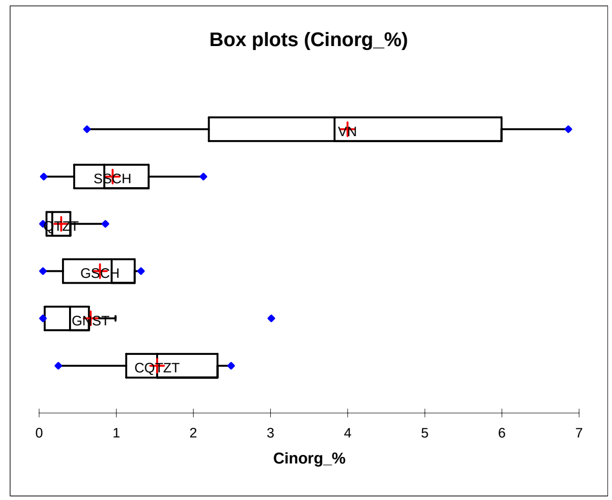




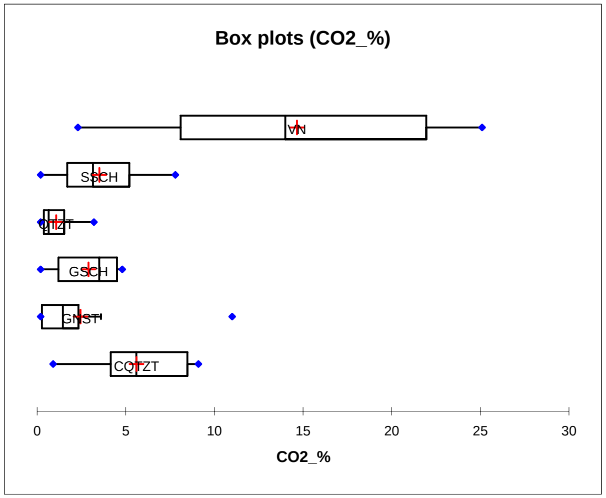




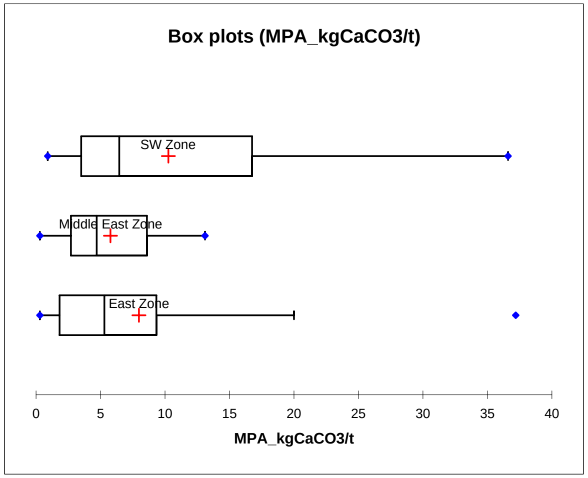


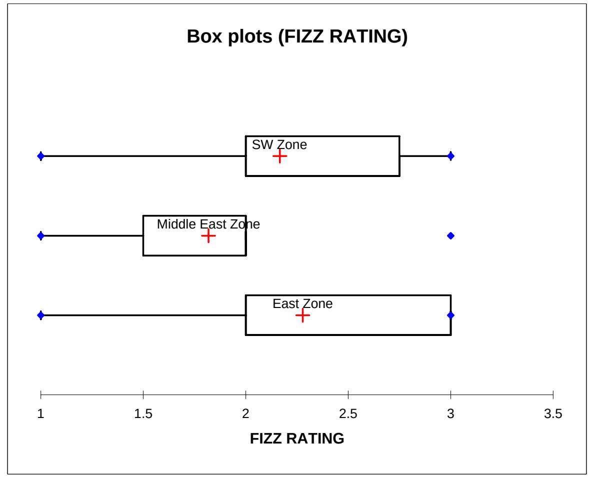


APPENDIX B4-1a Acid Base Accounting Parameters by Lithology -- All Samples

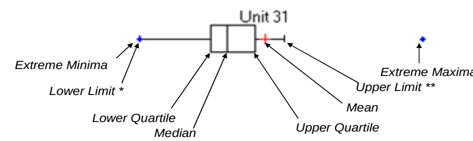


APPENDIX B4-1a Acid Base Accounting Parameters by Bellekeno Zone -- Waste Rock Samples

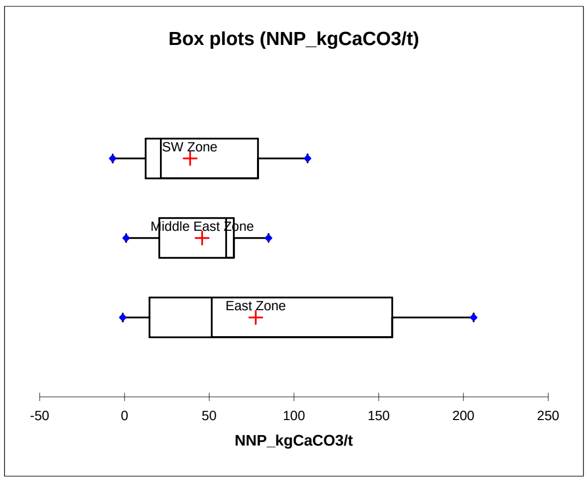


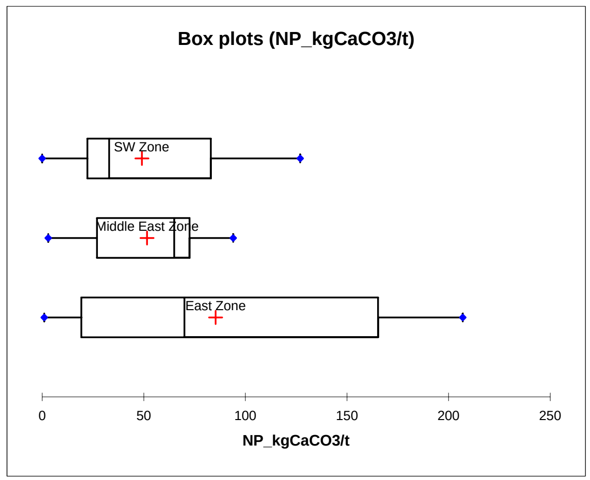


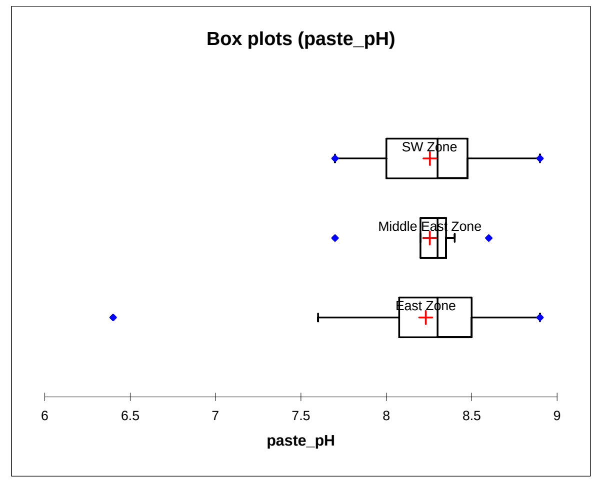
LEGEND FOR BOX PLOTS:



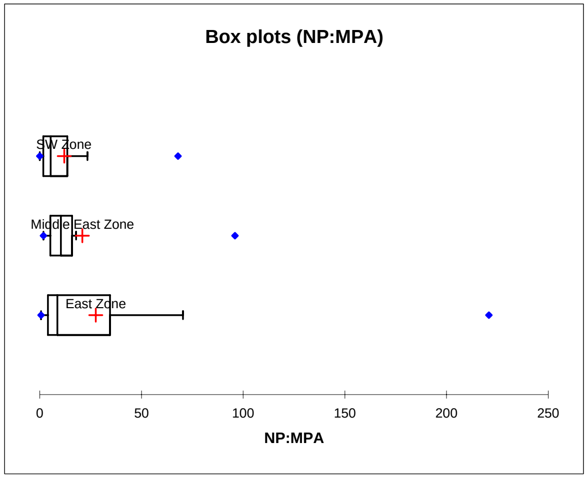
**Lower limit:* Linf = X(i) such that {X(i) – [Q1 – 1.5 (Q3 – Q1)]} is minimum and X(i) = Q1 – 1.5 (Q3 – Q1).
***Upper limit:* Lsup = X(i) such that {X(i) - [Q3 + 1.5 (Q3 – Q1)]} is minimum and X(i) = Q3 + 1.5 (Q3 – Q1)

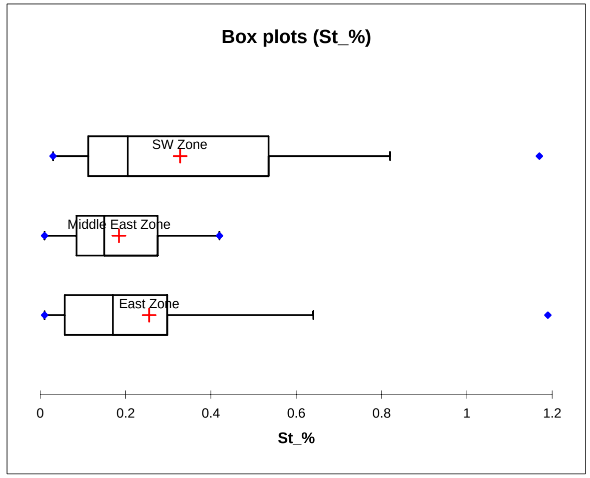


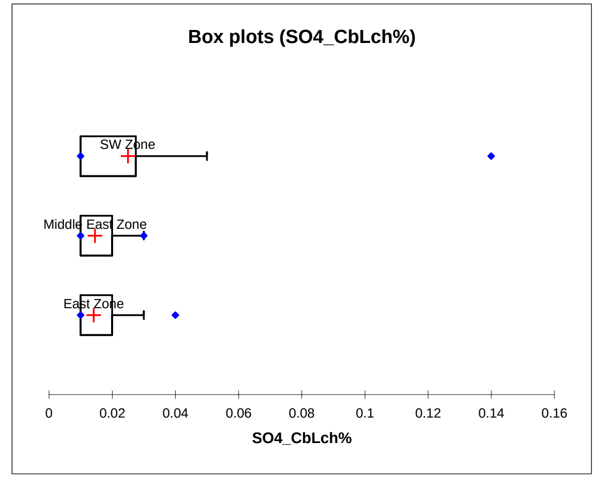


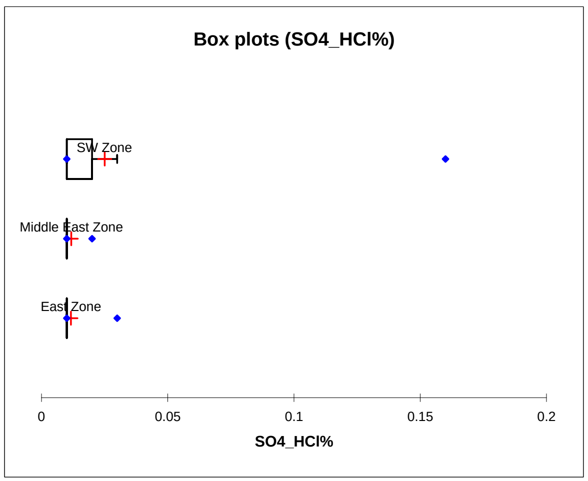


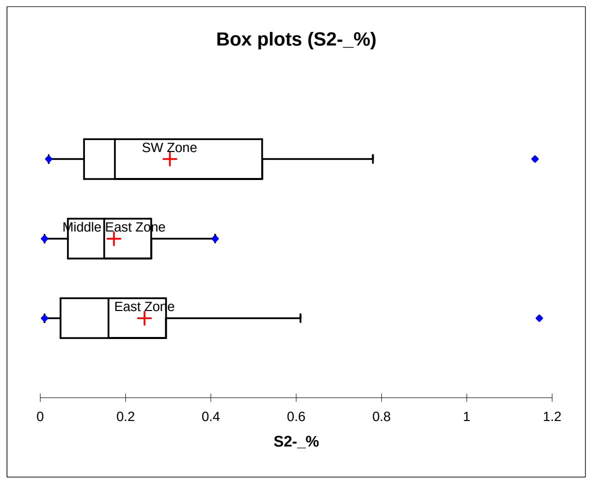
APPENDIX B4-1a Acid Base Accounting Parameters by Bellekeno Zone -- Waste Rock Samples

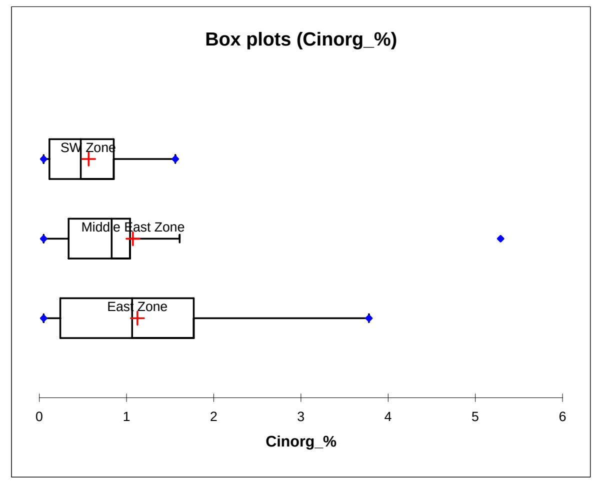




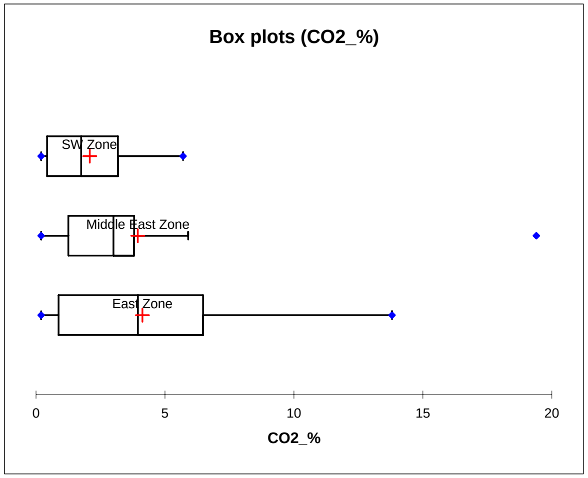




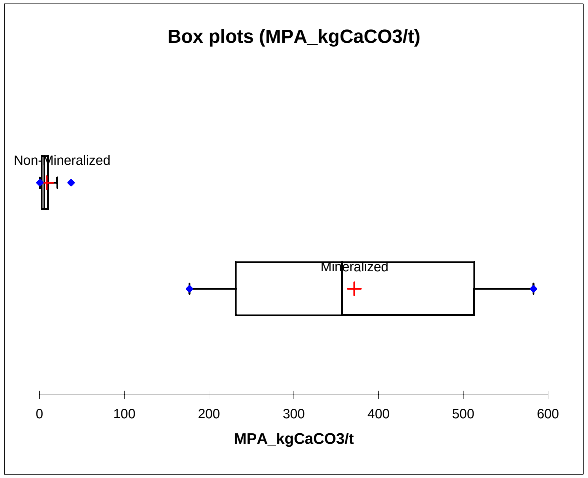


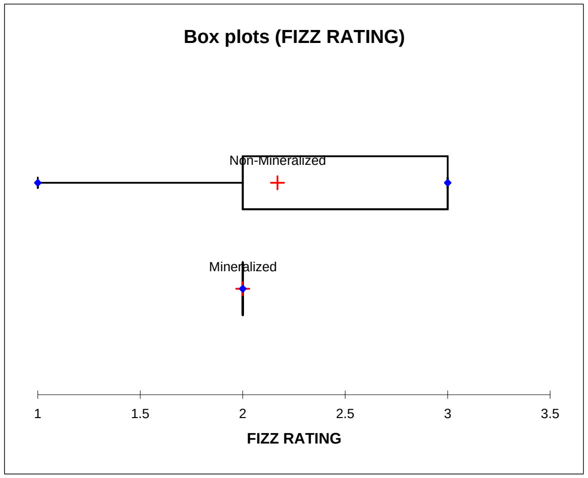


APPENDIX B4-1a Acid Base Accounting Parameters by Bellekeno Zone -- Waste Rock Samples

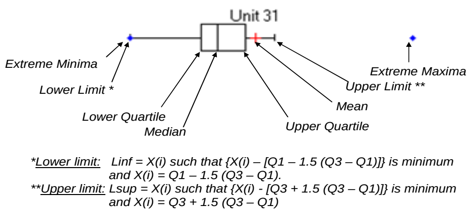


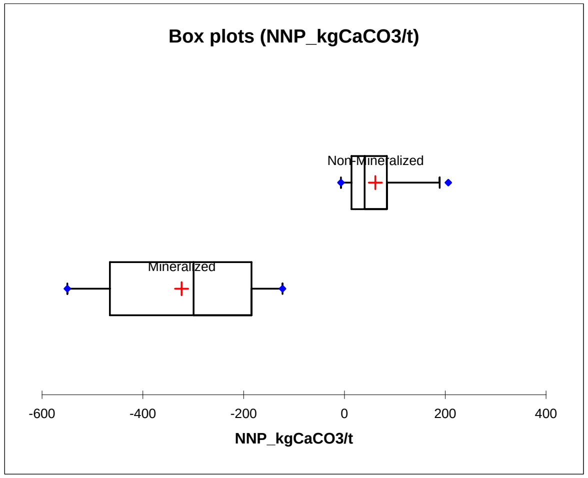
APPENDIX B4-1c Acid Base Accounting Parameters, Mineralized versus Waste Rock

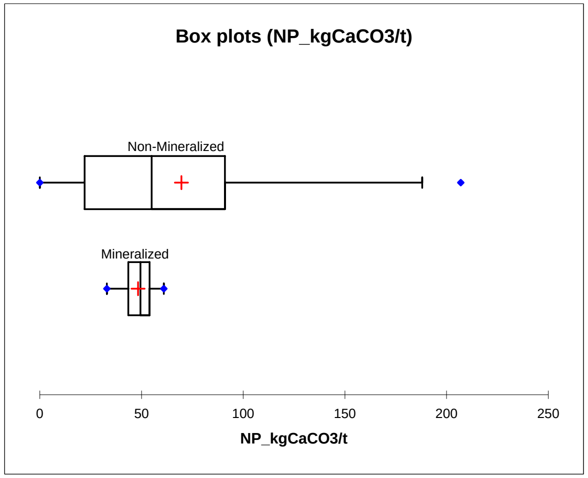


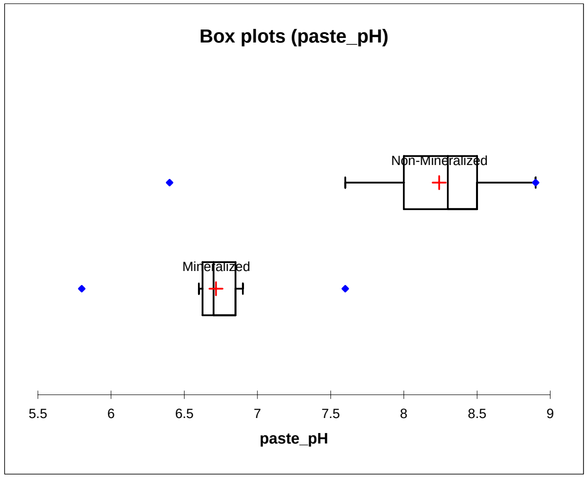


LEGEND FOR BOX PLOTS:

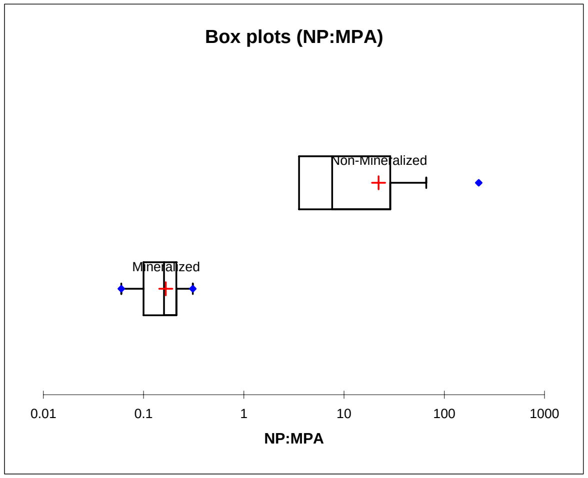


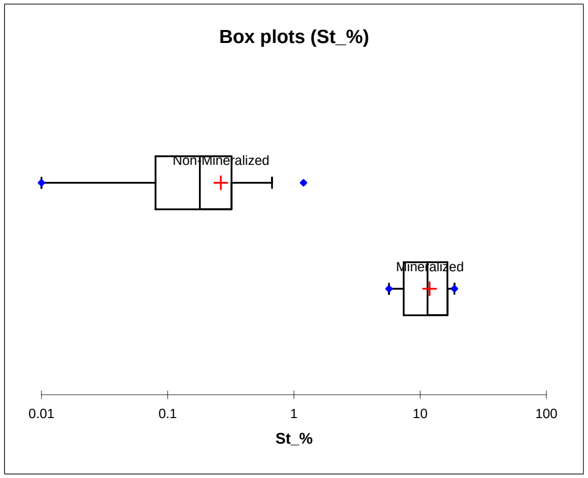


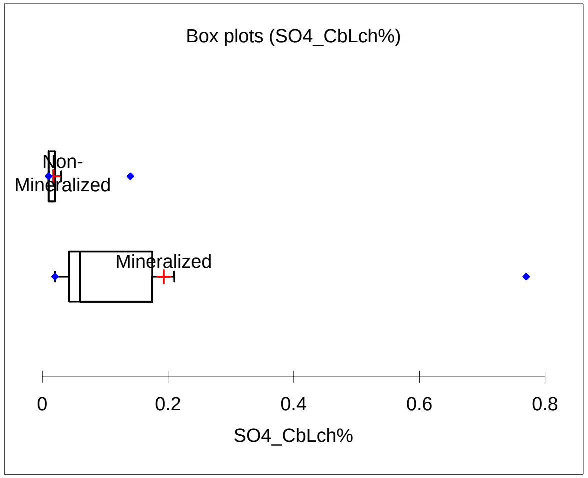


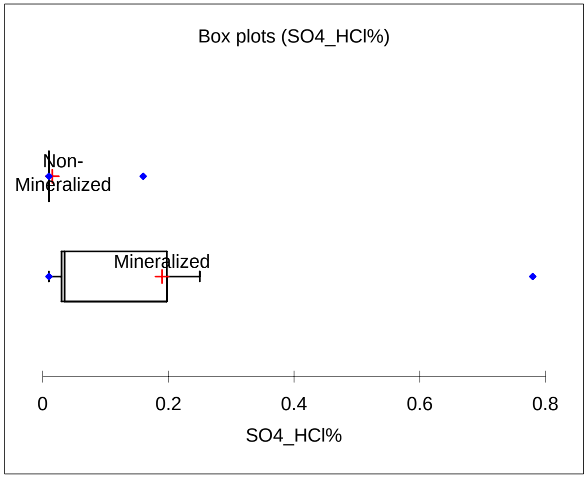


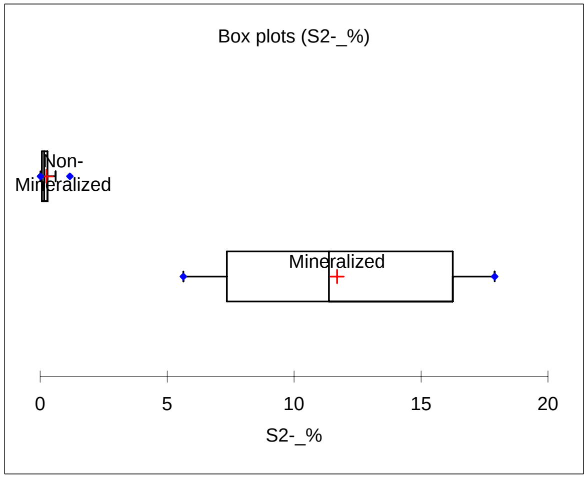
APPENDIX B4-1c Acid Base Accounting Parameters, Mineralized versus Waste Rock

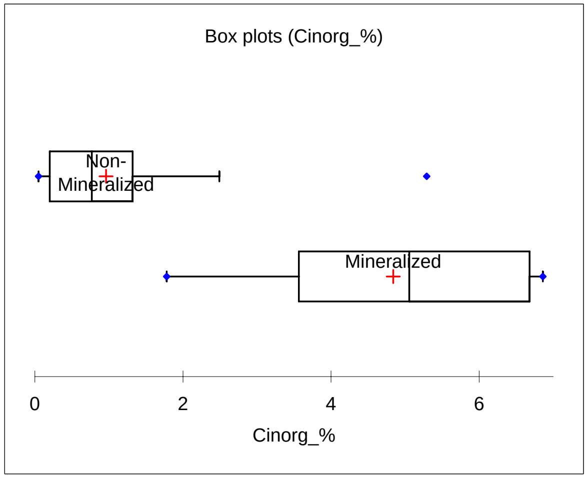




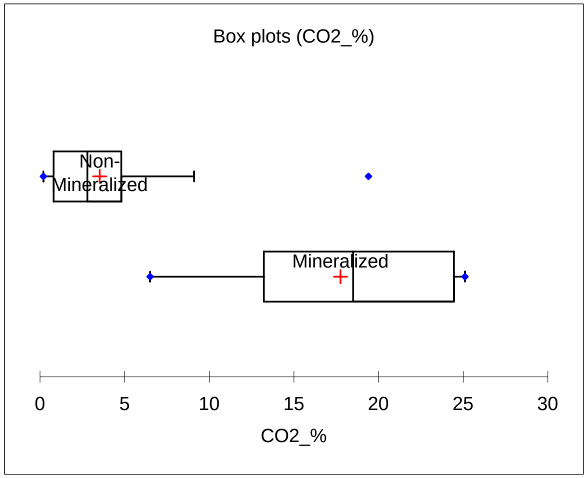


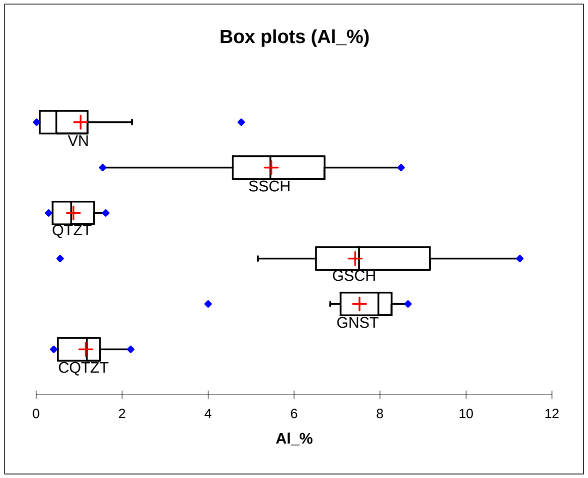


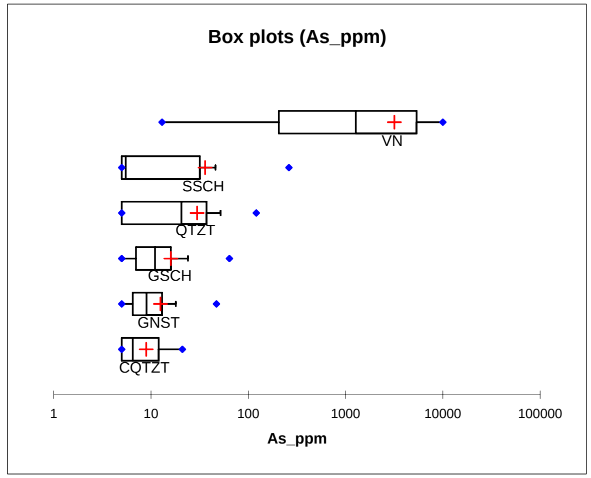




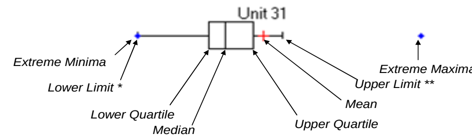
APPENDIX B4-1c Acid Base Accounting Parameters, Mineralized versus Waste Rock





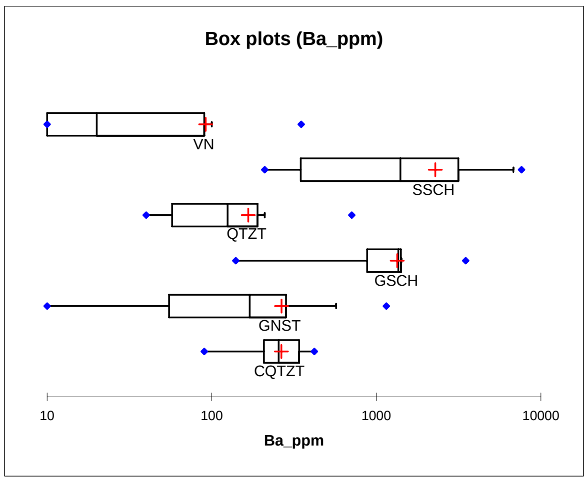


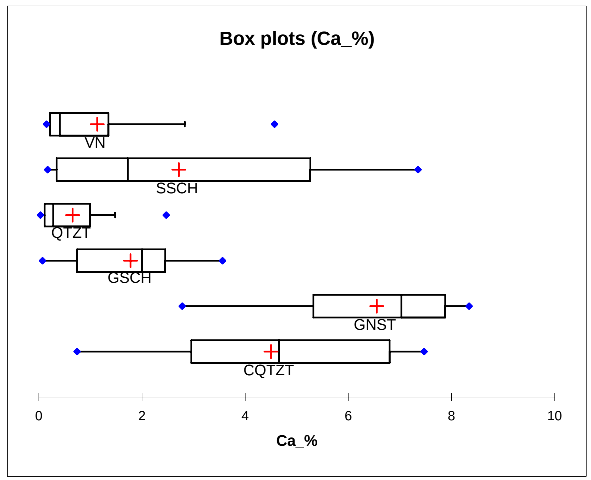
LEGEND FOR BOX PLOTS:

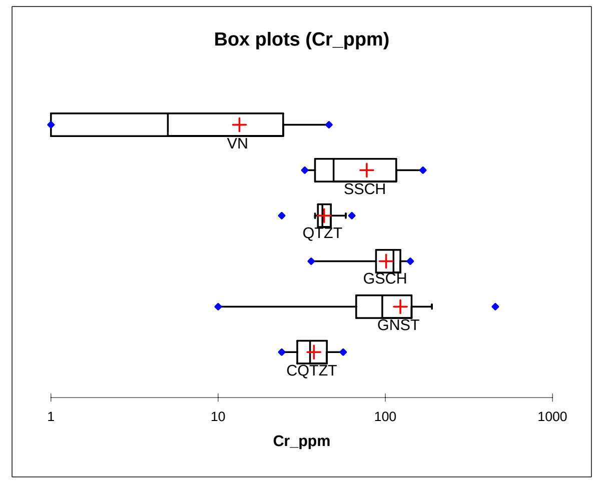


*<u>Lower limit:</u> *Linf = X(i) such that {X(i) – [Q1 – 1.5 (Q3 – Q1)]} is minimum and X(i) = Q1 – 1.5 (Q3 – Q1).*

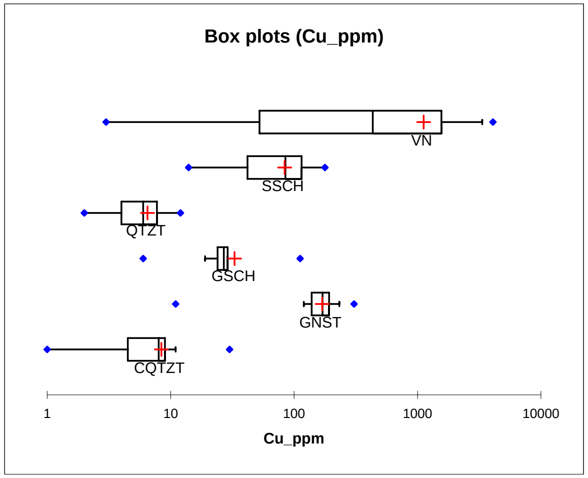
**<u>Upper limit:</u> *Lsup = X(i) such that {X(i) - [Q3 + 1.5 (Q3 – Q1)]} is minimum and X(i) = Q3 + 1.5 (Q3 – Q1)*

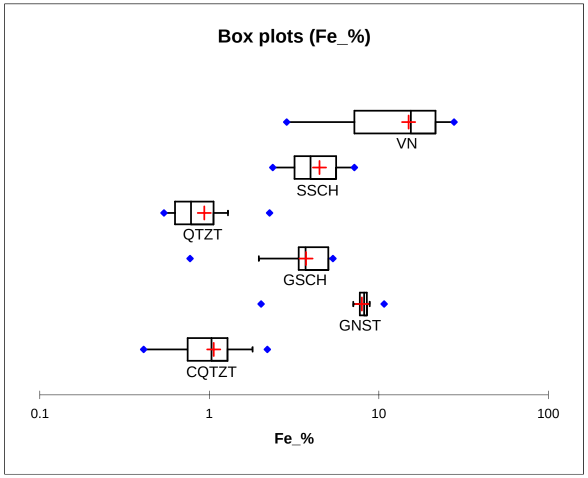


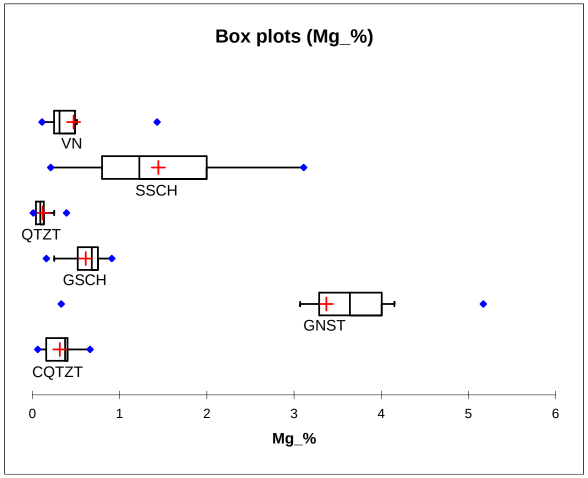


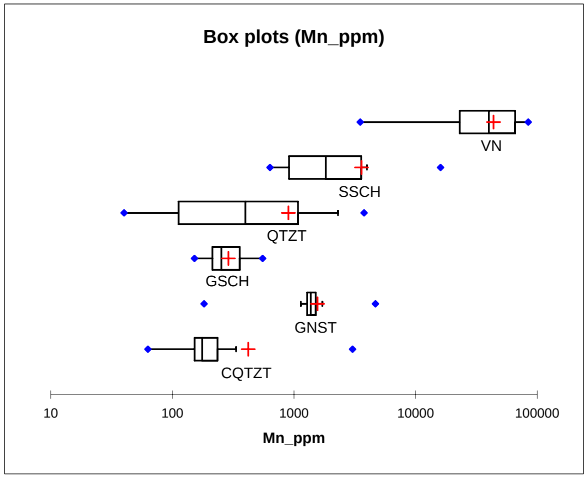


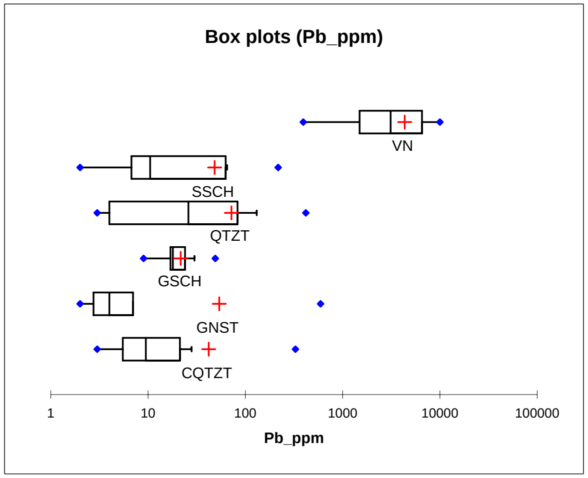
APPENDIX B4-2a Selected ICP Metals, Acid Base Accounting Database

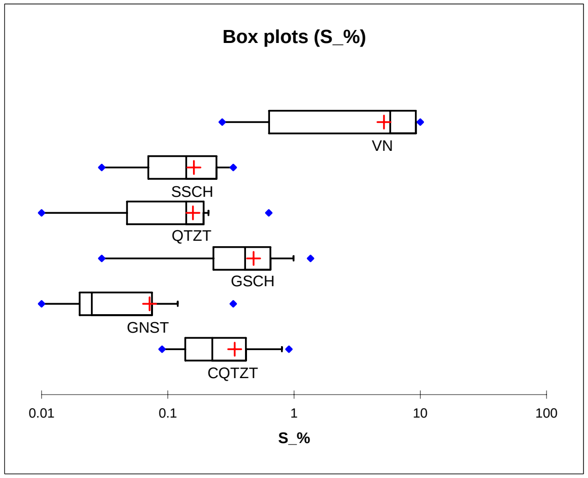


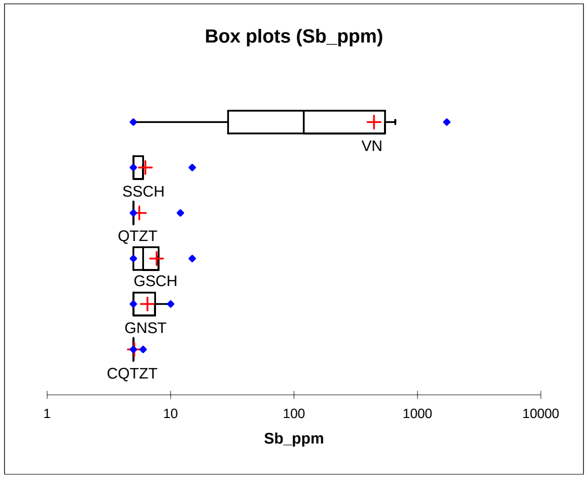











Box plots (Sb_ppm)
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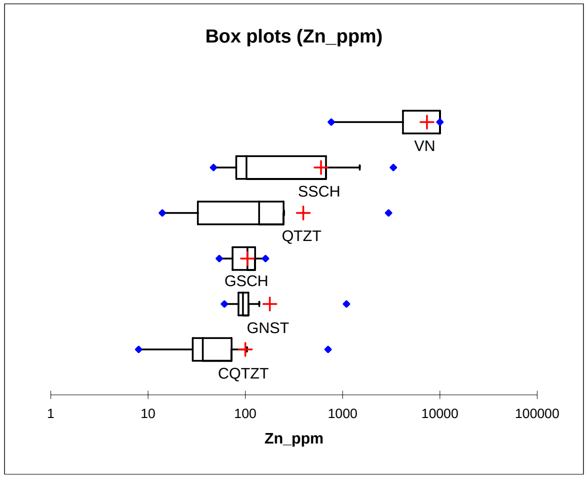
SSCH
QTZT
GSCH
GNST
CQTZT
1
10
100
1000
10000
Sb_ppm


Box plots (Zn_ppm)
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SSCH
QTZT
GSCH
GNST
CQTZT
1
10
100
1000
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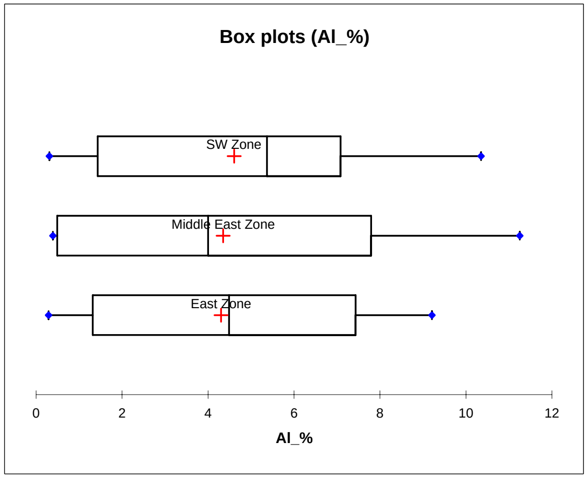
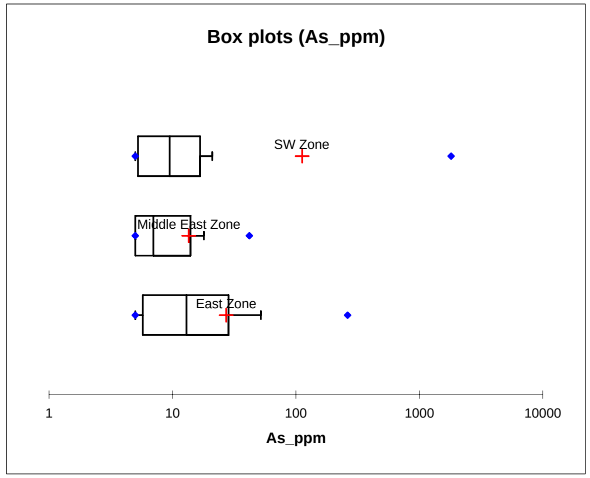
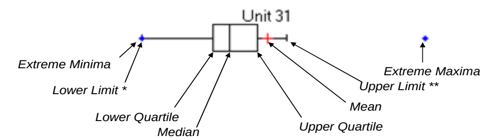
Zn_ppm

APPENDIX B4-2b ICP Metals by Bellekeno Zone, ABA Database

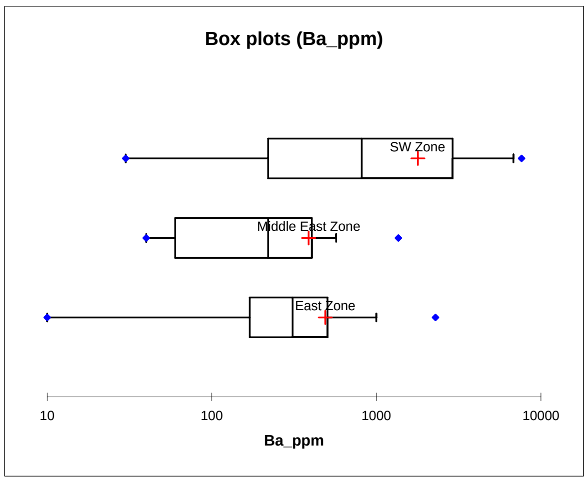


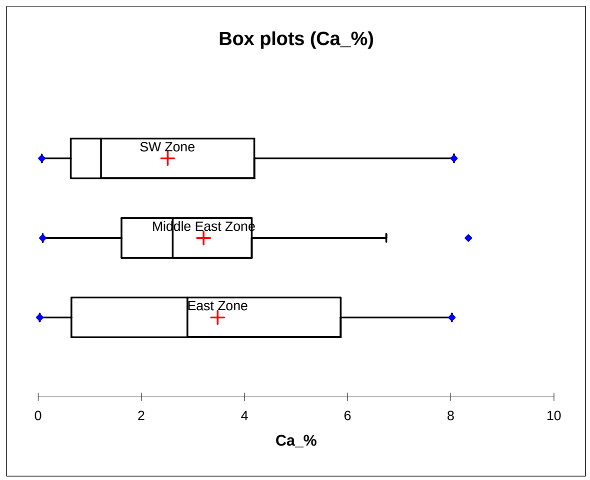


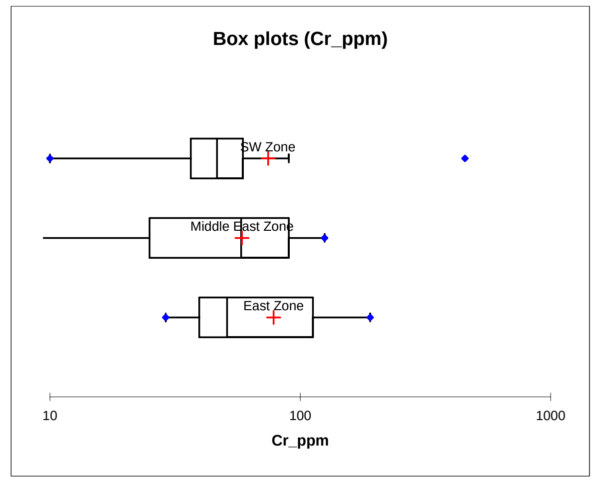
LEGEND FOR BOX PLOTS:



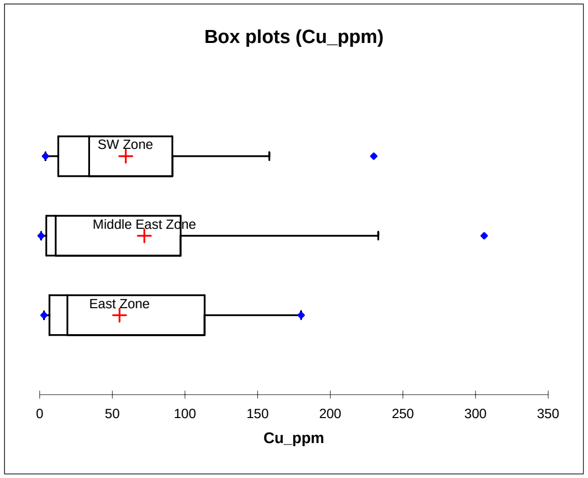
*Lower limit: Linf = X(i) such that {X(i) – [Q1 – 1.5 (Q3 – Q1)]} is minimum and X(i) = Q1 – 1.5 (Q3 – Q1).
**Upper limit: Lsup = X(i) such that {X(i) - [Q3 + 1.5 (Q3 – Q1)]} is minimum and X(i) = Q3 + 1.5 (Q3 – Q1)

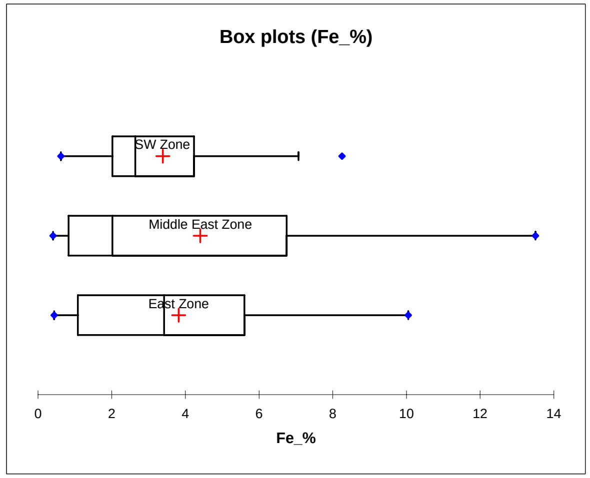


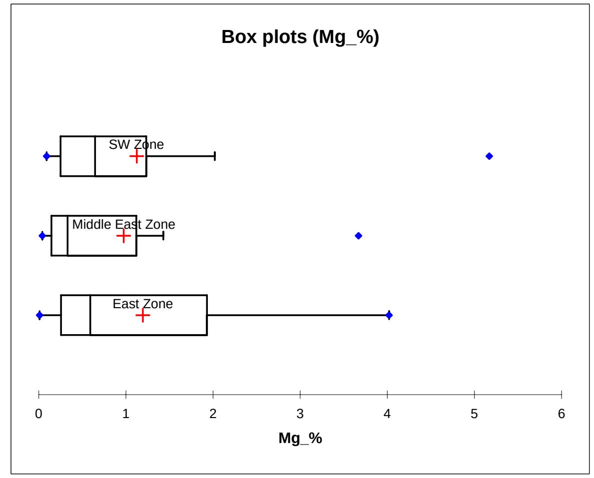


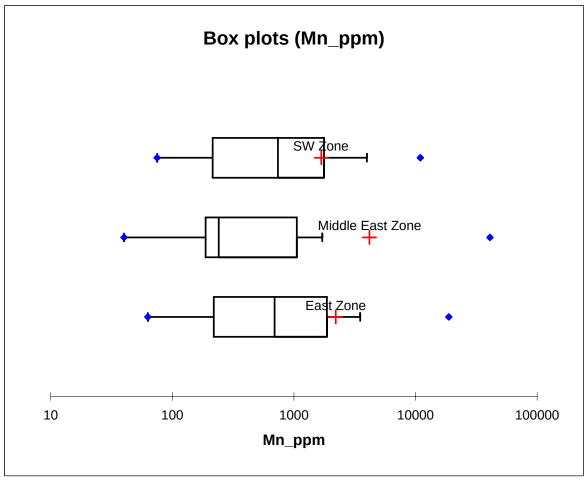


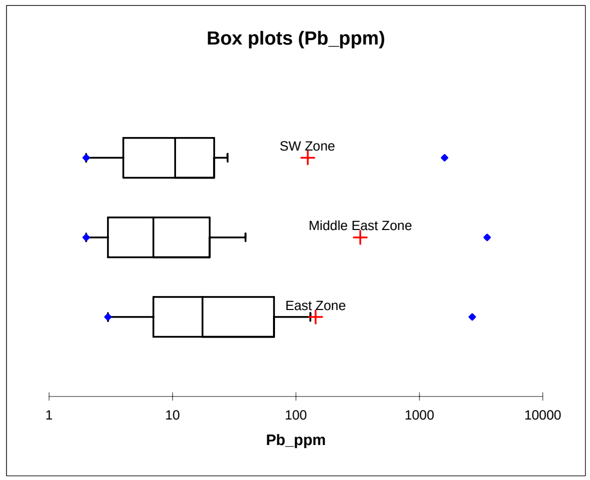
APPENDIX B4-2b ICP Metals by Bellekeno Zone, ABA Database

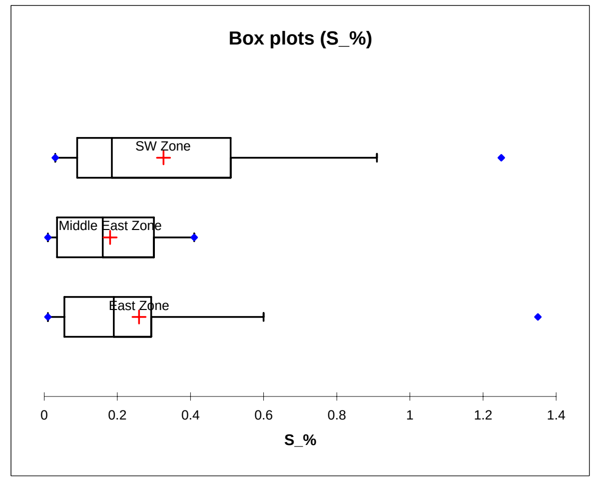




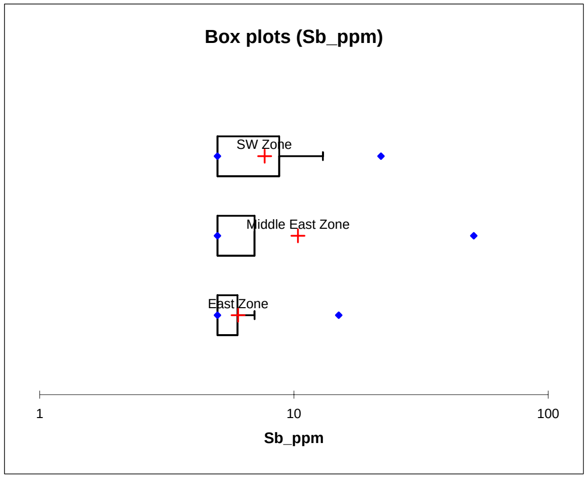


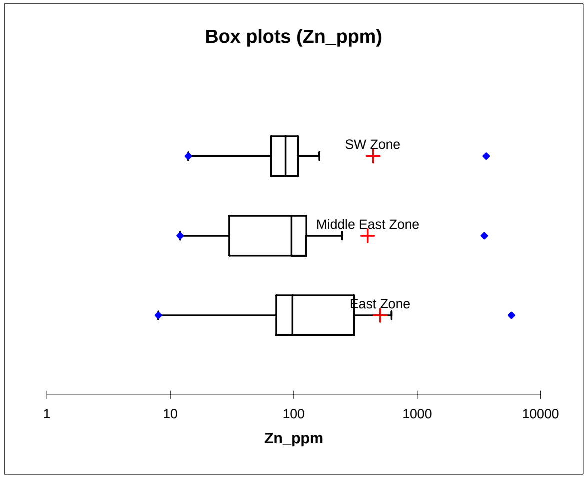




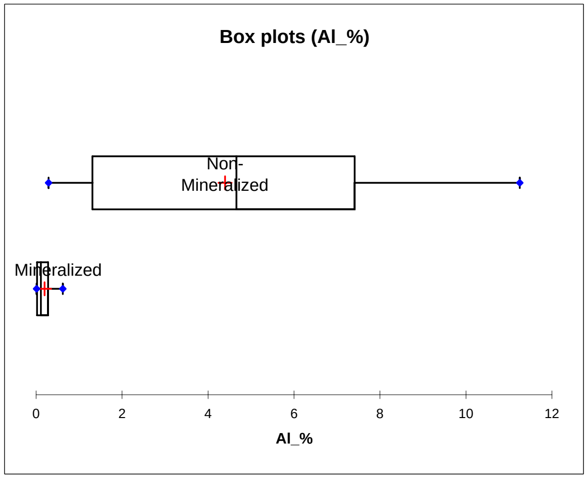


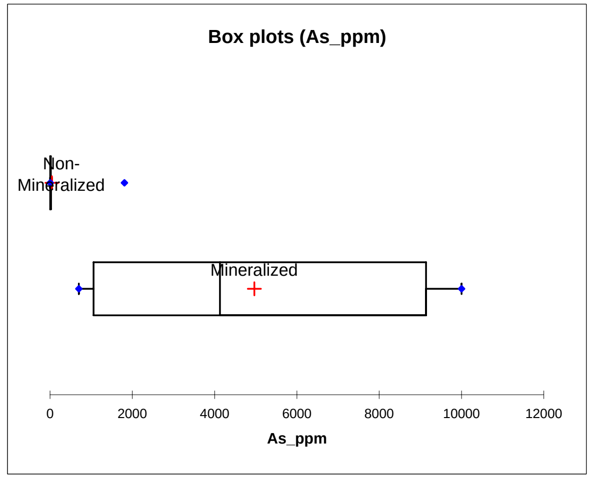
APPENDIX B4-2b ICP Metals by Bellekeno Zone, ABA Database



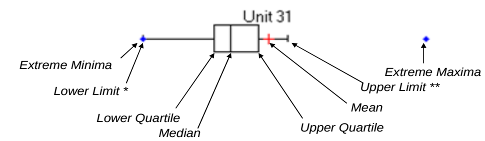


APPENDIX B4-2c

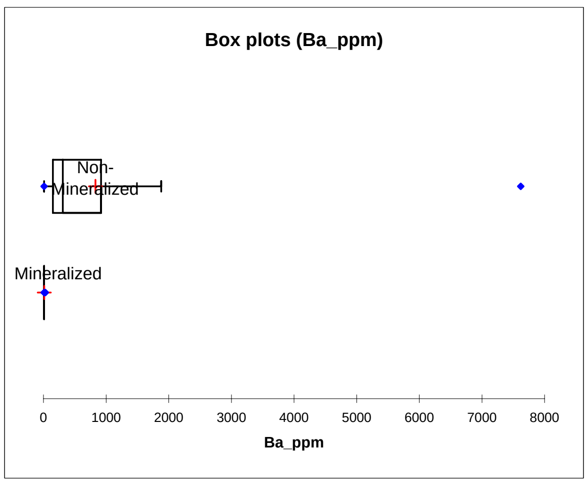


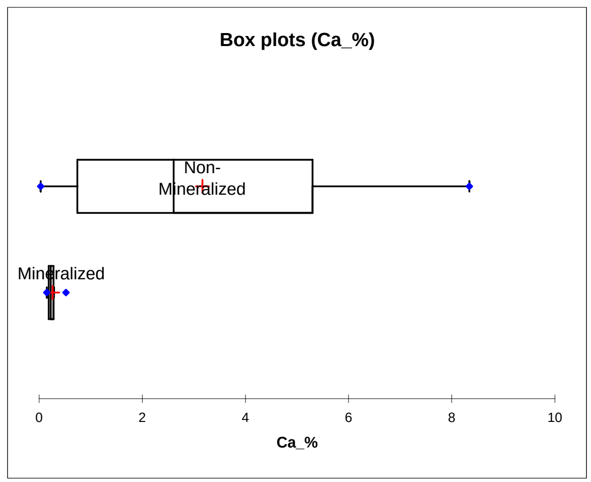


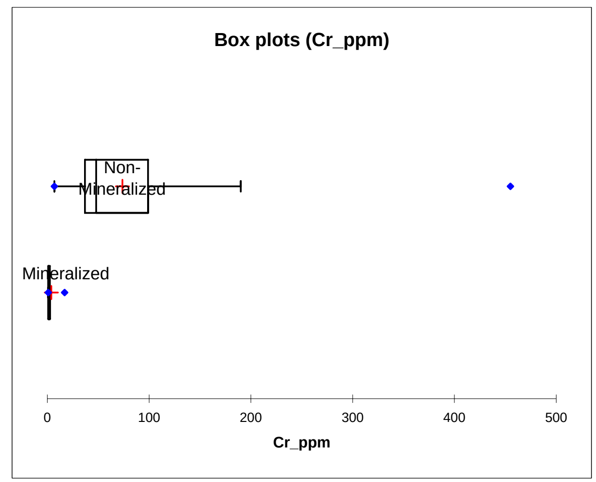
LEGEND FOR BOX PLOTS:



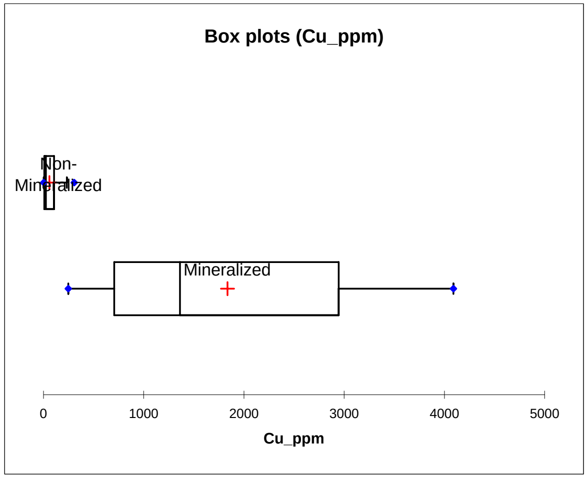
**Lower limit:* Linf = X(i) such that {X(i) – [Q1 – 1.5 (Q3 – Q1)]} is minimum and X(i) = Q1 – 1.5 (Q3 – Q1).
***Upper limit:* Lsup = X(i) such that {X(i) - [Q3 + 1.5 (Q3 – Q1)]} is minimum and X(i) = Q3 + 1.5 (Q3 – Q1)

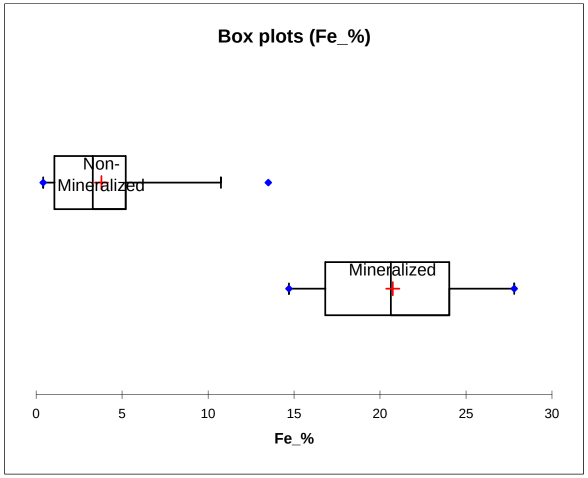


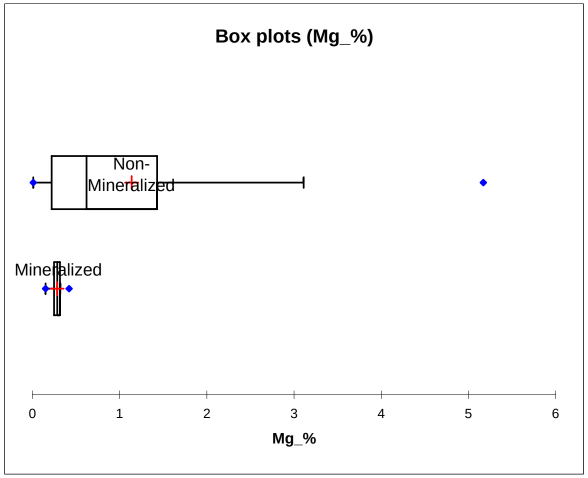


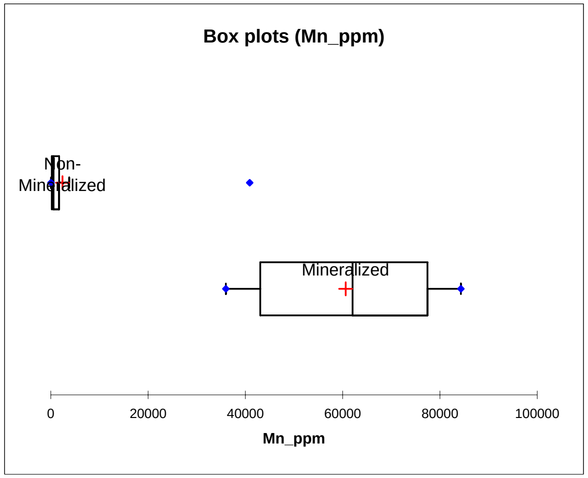


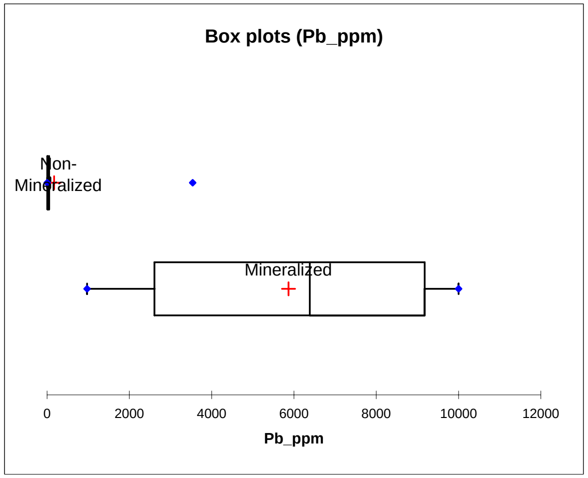
APPENDIX B4-2c

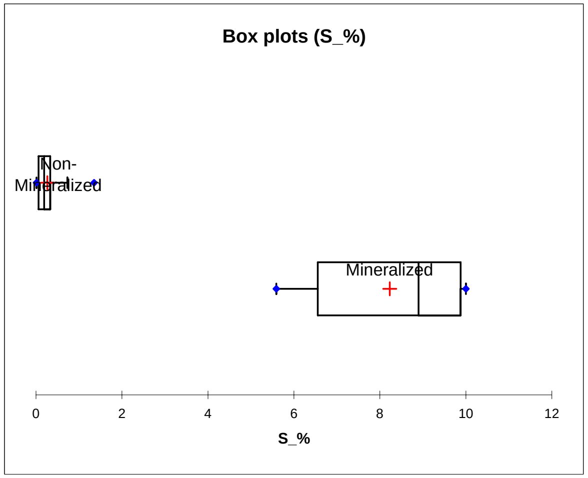




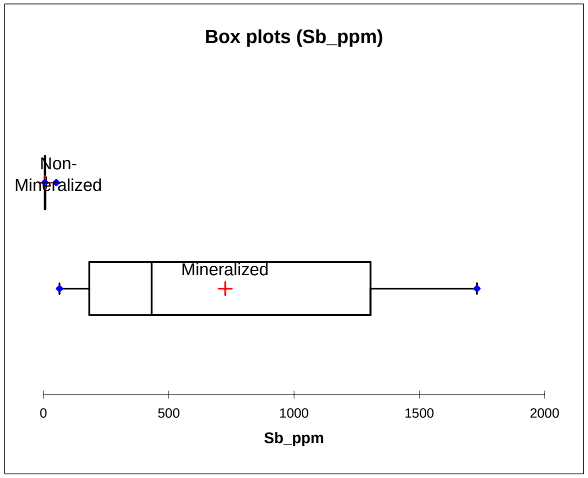


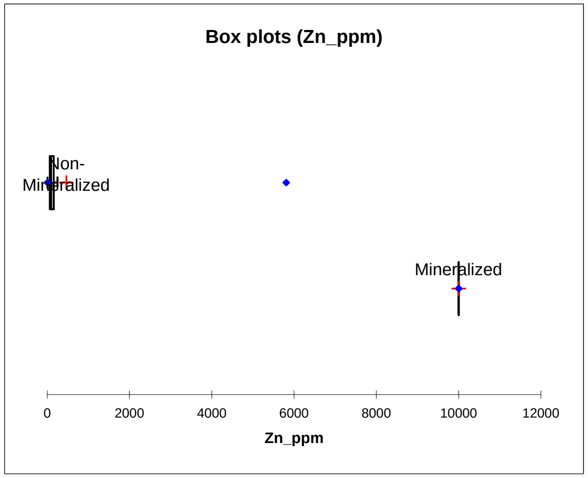




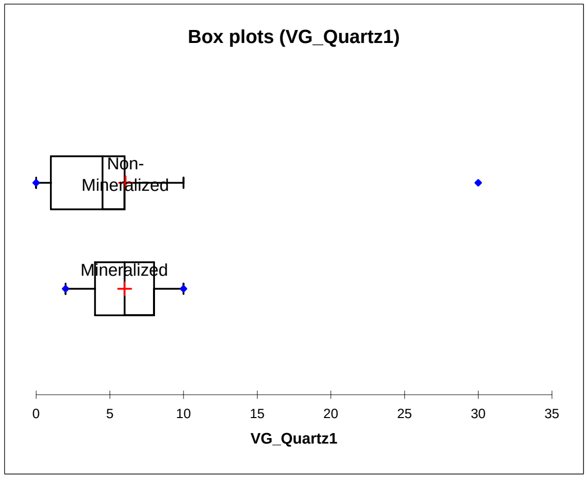


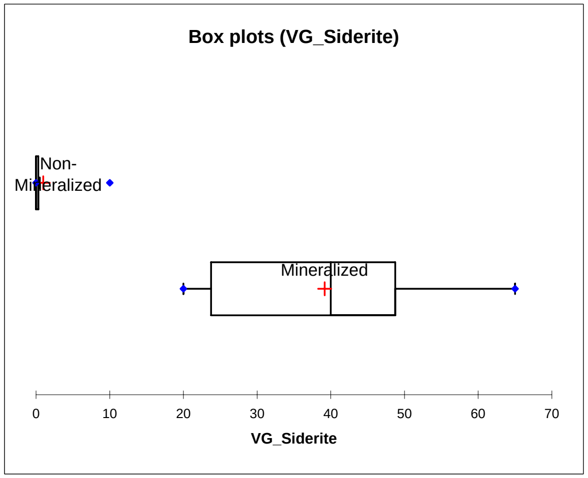
APPENDIX B4-2c



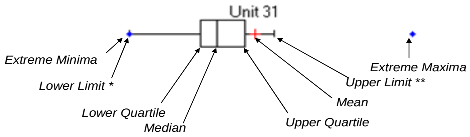


APPENDIX B4-3a Mineralogy and Alteration, ABA Datbase



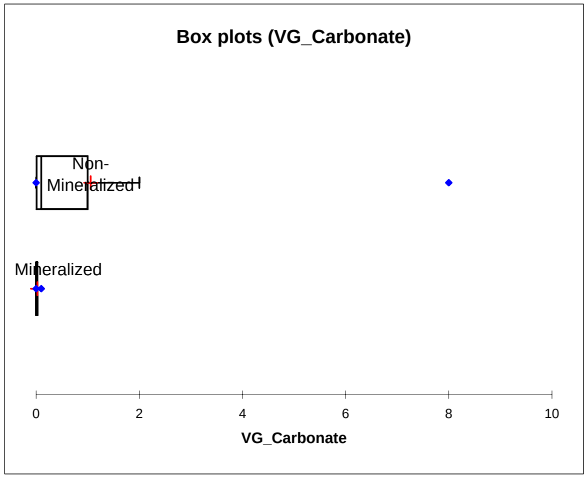


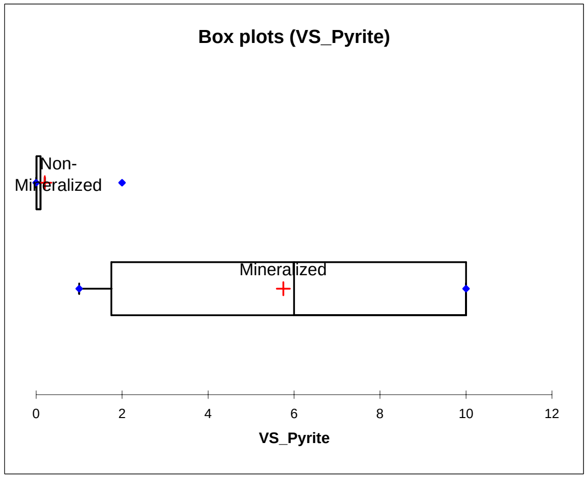
LEGEND FOR BOX PLOTS:

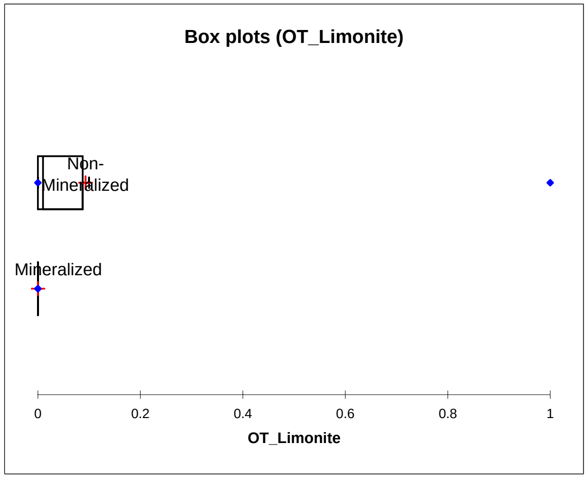


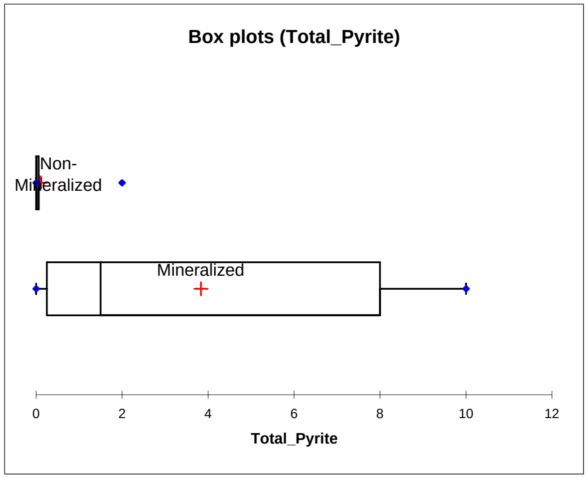
**Lower limit:* Linf = X(i) such that {X(i) – [Q1 – 1.5 (Q3 – Q1)]} is minimum and X(i) = Q1 – 1.5 (Q3 – Q1).

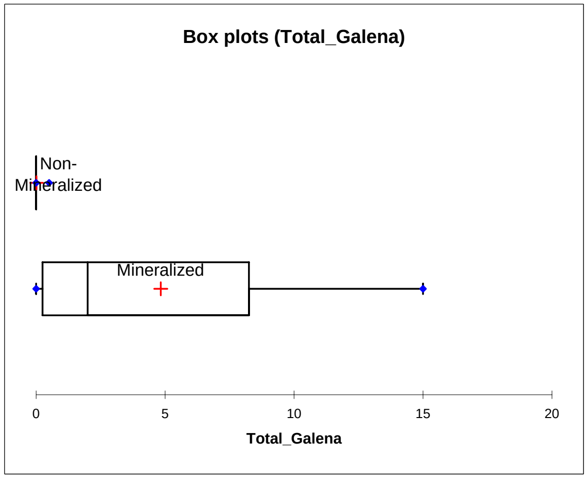
***Upper limit:* Lsup = X(i) such that {X(i) - [Q3 + 1.5 (Q3 – Q1)]} is minimum and X(i) = Q3 + 1.5 (Q3 – Q1)

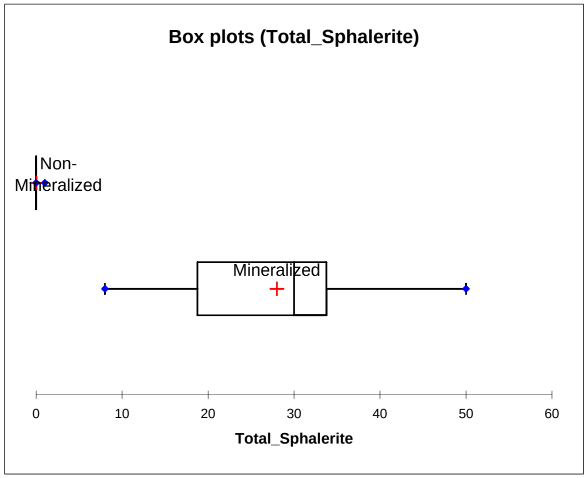


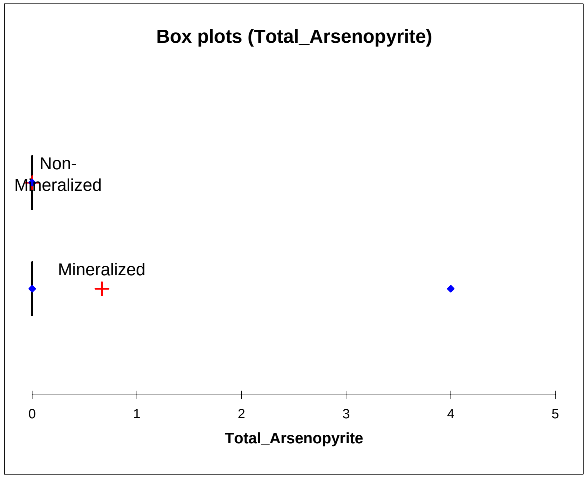


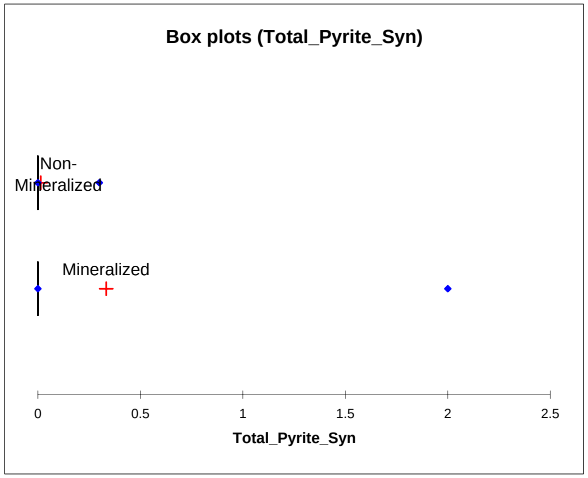


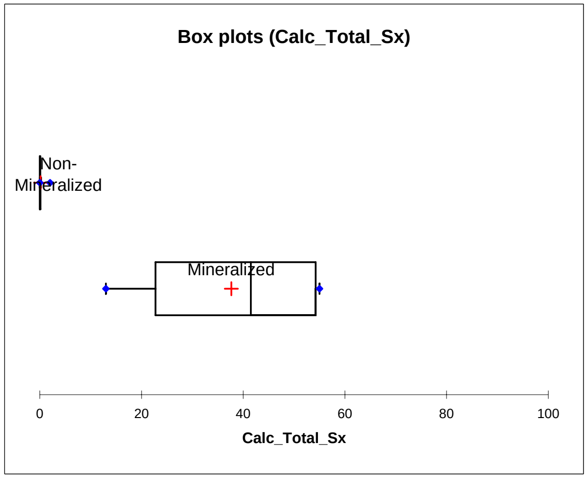

Box plots (Total_Pyrite)
Non-
Mineralized
Mineralized
0
2
4
6
8
10
12
Total_Pyrite


Box plots (Total_Galena)
Non-
Mineralized
Mineralized
0
5
10
15
20
Total_Galena

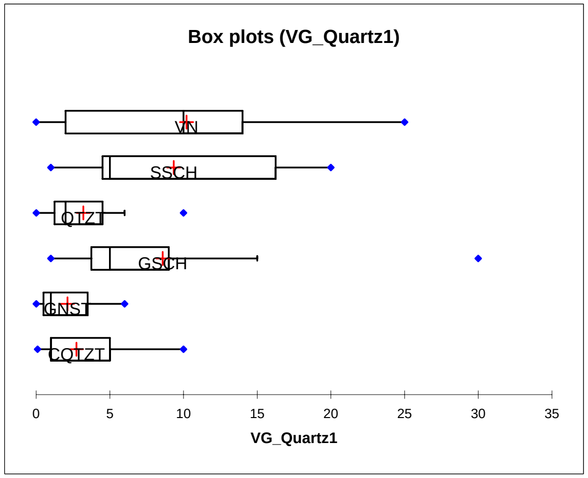

Box plots (Total_Sphalerite)
Non-
Mineralized
Mineralized
0
10
20
30
40
50
60
Total_Sphalerite

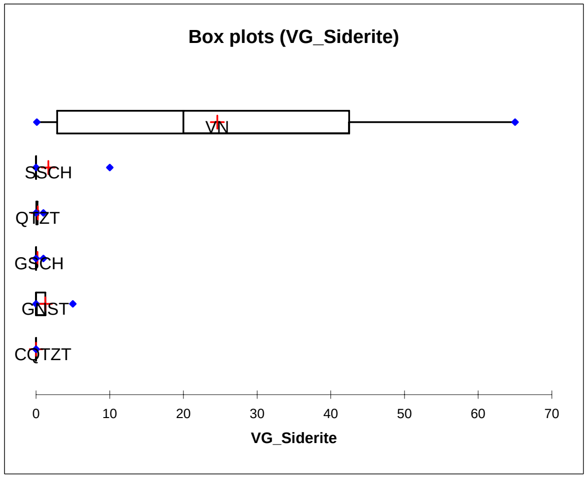

Box plots (Total_Arsenopyrite)
Non-
Mineralized
Mineralized
0
1
2
3
4
5
Total_Arsenopyrite


Box plots (Total_Pyrite_Syn)
Non-
Mineralized
Mineralized
0
0.5
1
1.5
2
2.5
Total_Pyrite_Syn

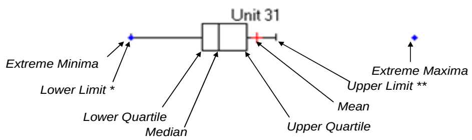

Box plots (Calc_Total_Sx)
Non-
Mineralized
Mineralized
0
20
40
60
80
100
Calc_Total_Sx

APPENDIX B4-3c Mineralogy and Alteration by Lithology, ABA Database



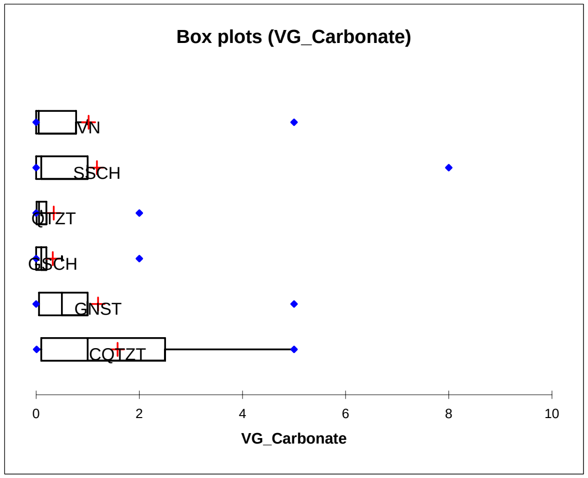


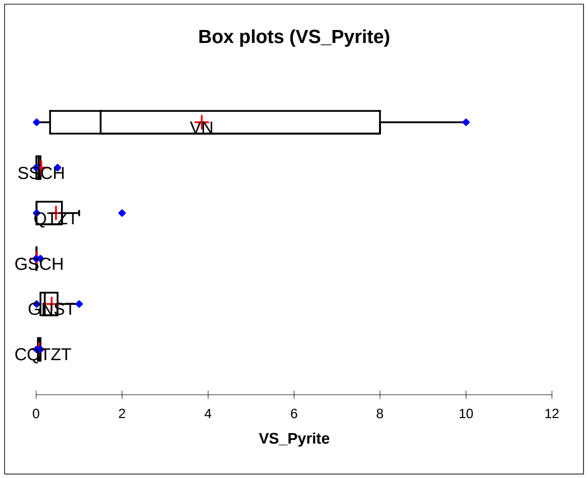
LEGEND FOR BOX PLOTS:

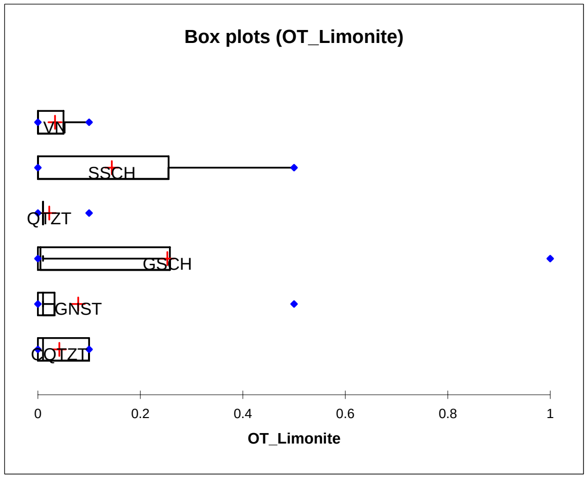


**Lower limit:* Linf = X(i) such that {X(i) – [Q1 – 1.5 (Q3 – Q1)]} is minimum and X(i) = Q1 – 1.5 (Q3 – Q1).

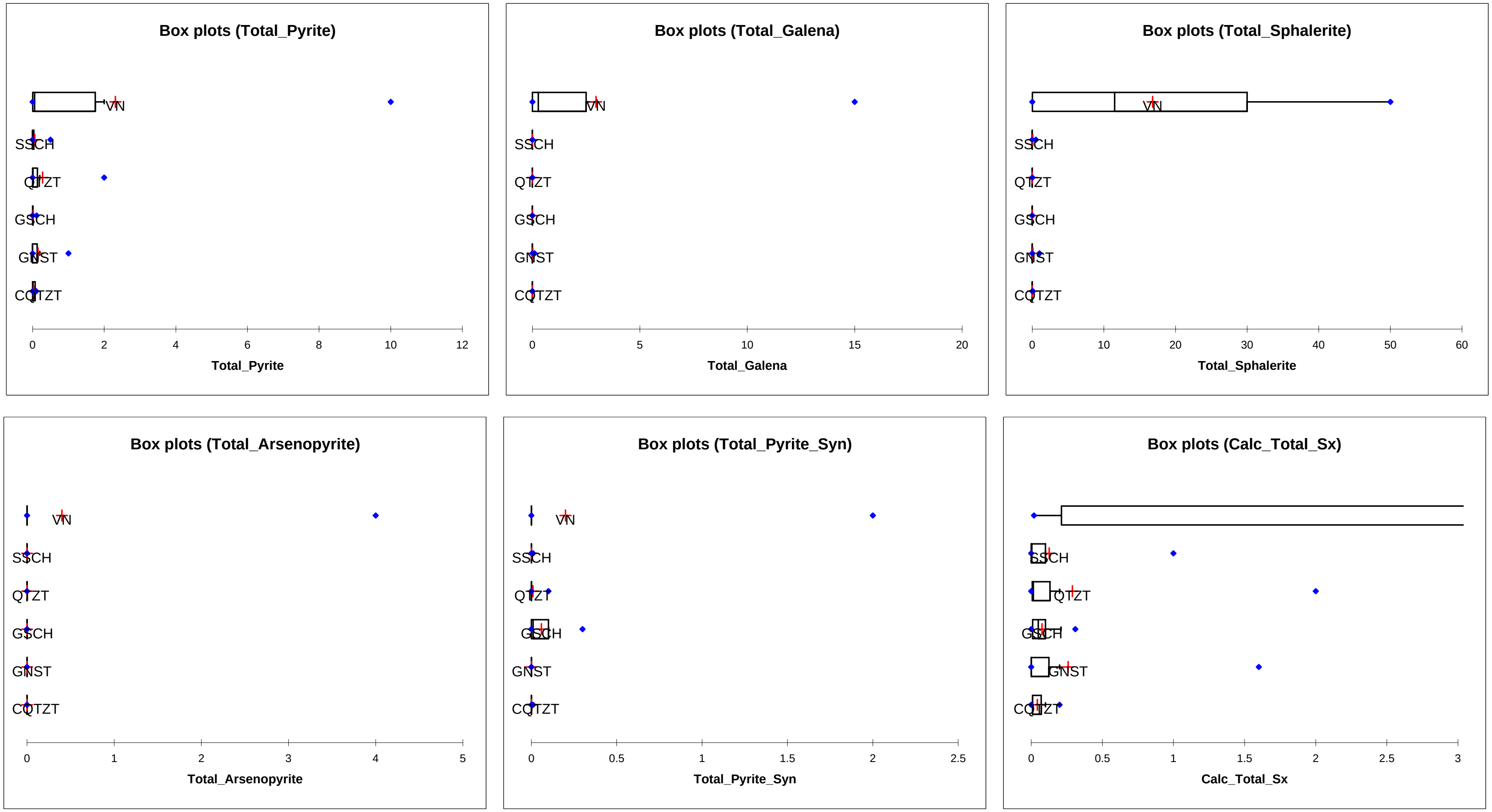
***Upper limit:* Lsup = X(i) such that {X(i) - [Q3 + 1.5 (Q3 – Q1)]} is minimum and X(i) = Q3 + 1.5 (Q3 – Q1)



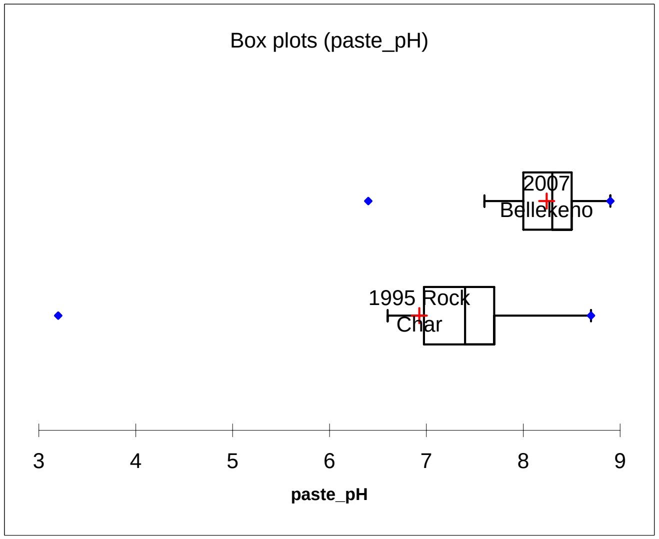


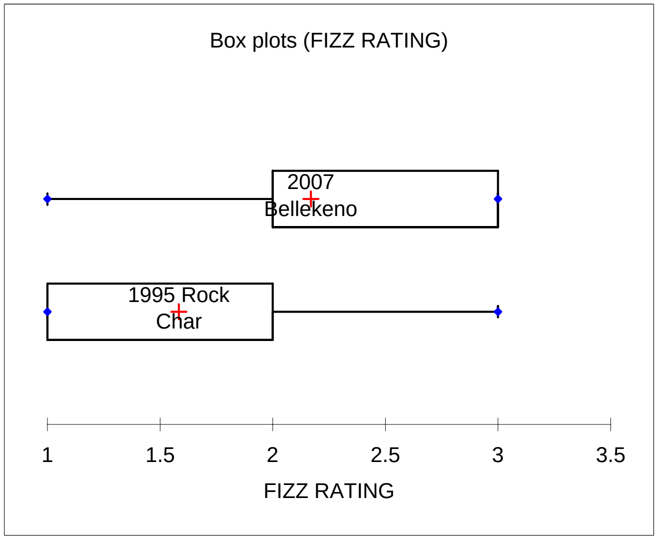


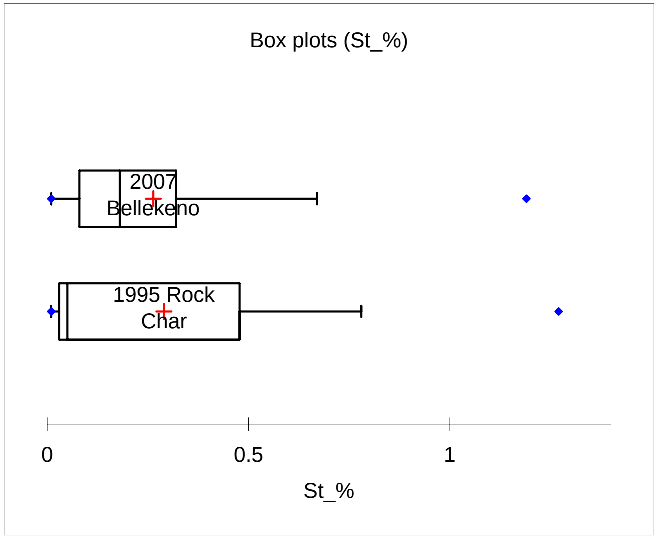
APPENDIX B4-3c Mineralogy and Alteration by Lithology, ABA Database

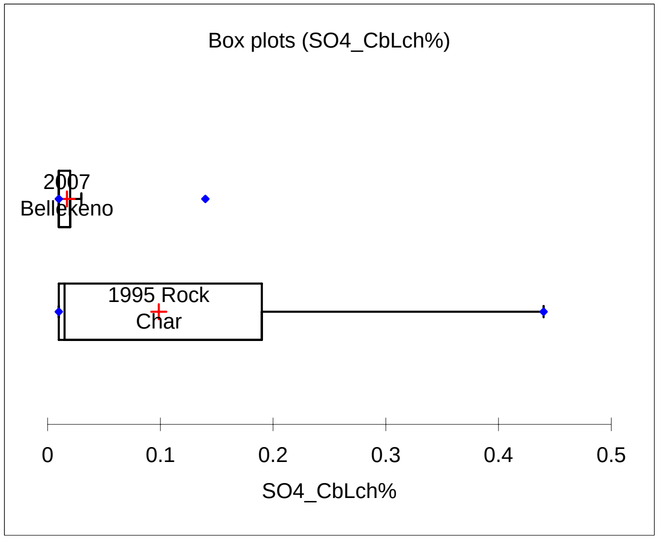


APPENDIX B4-4 Comparison of ABA Parameters Between 2007 Bellekeno and 1995-96 Keno Site-Wide Samples

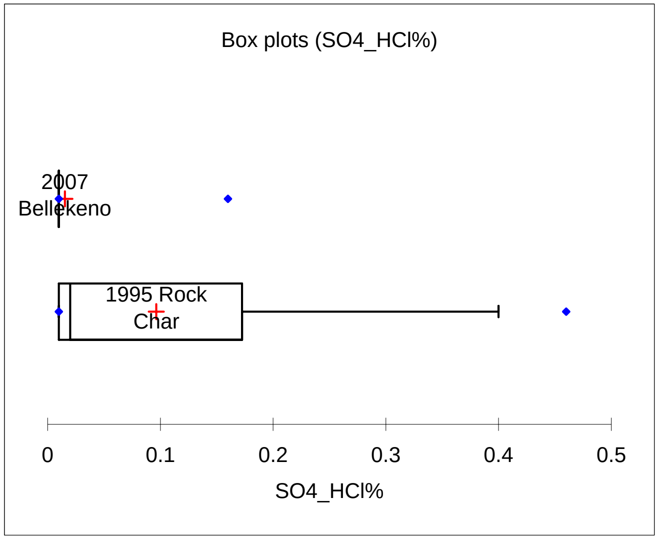


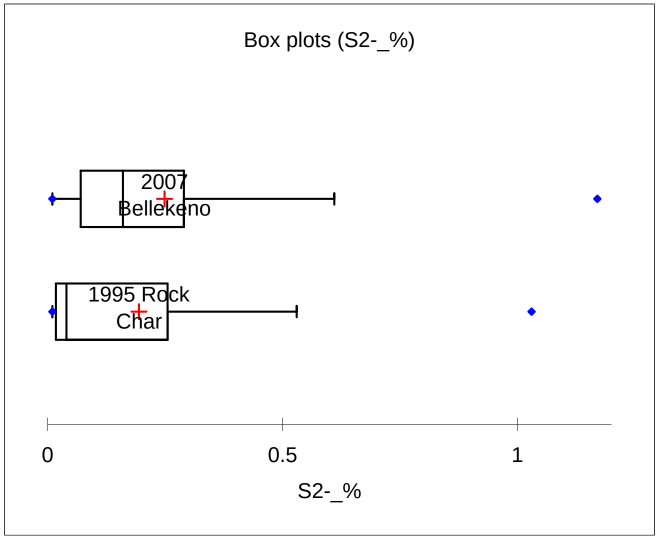


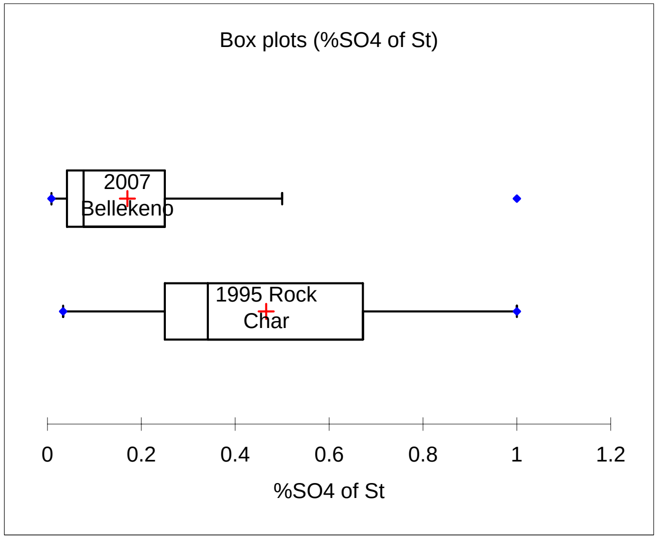


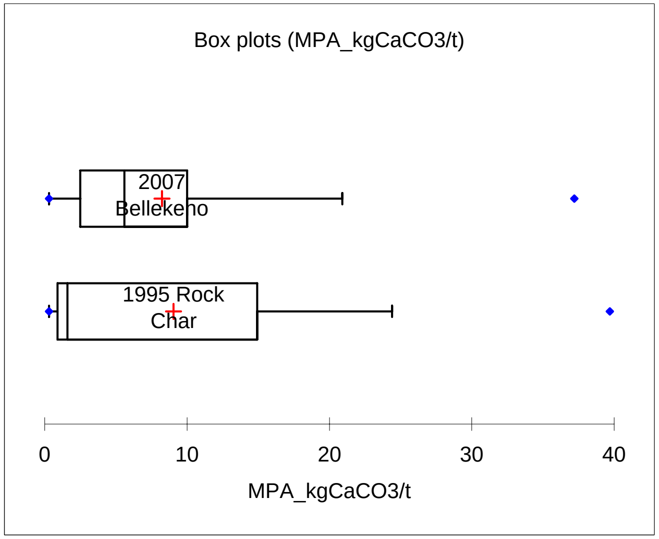


APPENDIX B4-4 Comparison of ABA Parameters Between 2007 Bellekeno and 1995-96 Keno Site-Wide Samples

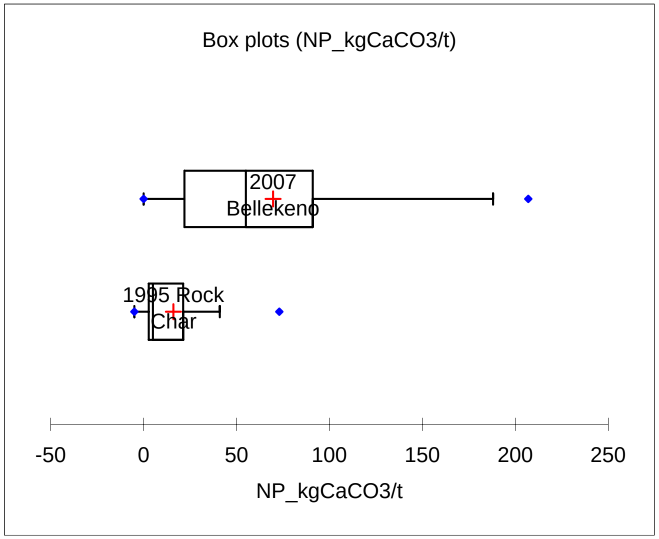


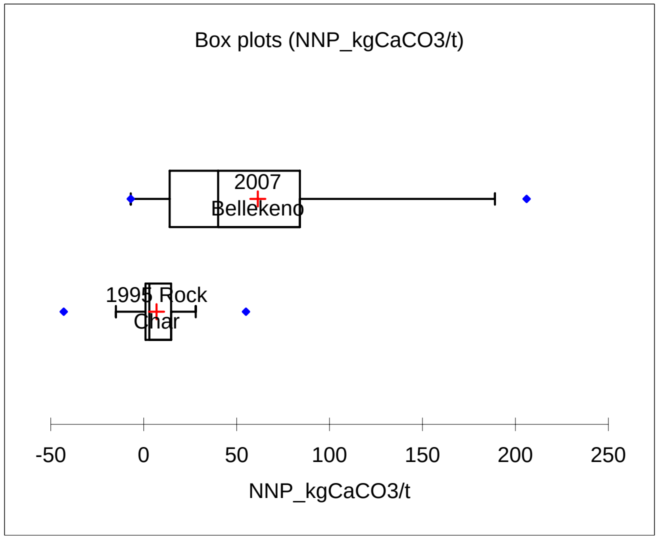


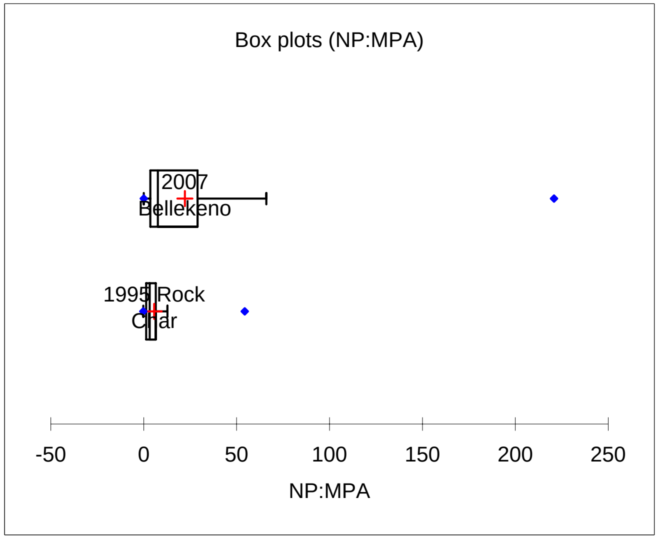


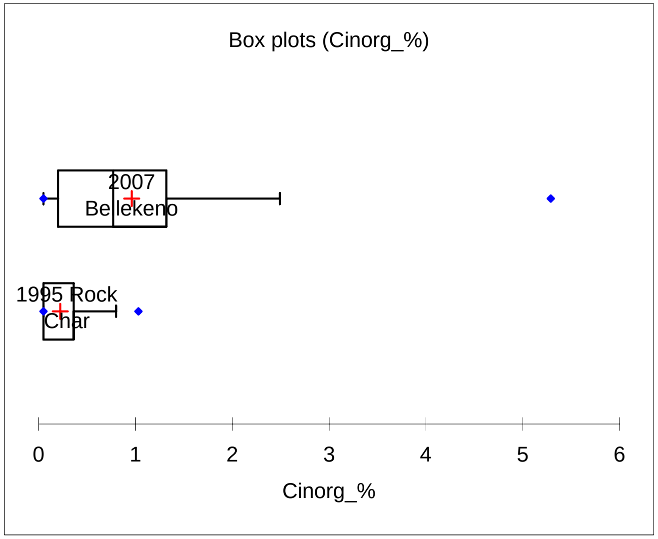


APPENDIX B4-4 Comparison of ABA Parameters Between 2007 Bellekeno and 1995-96 Keno Site-Wide Samples

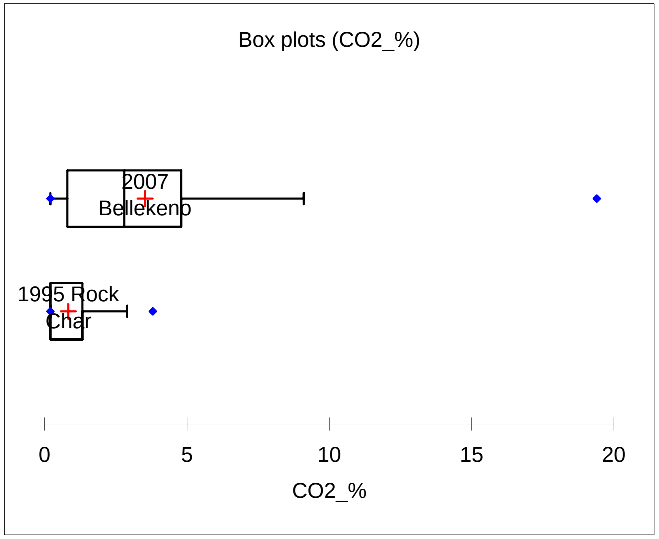


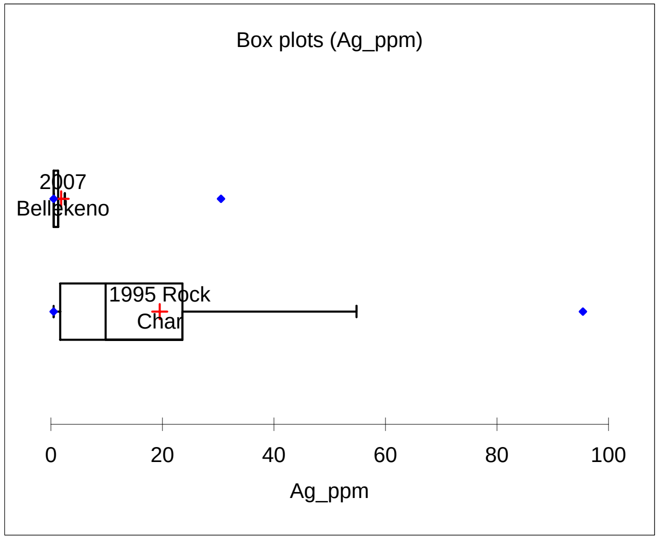


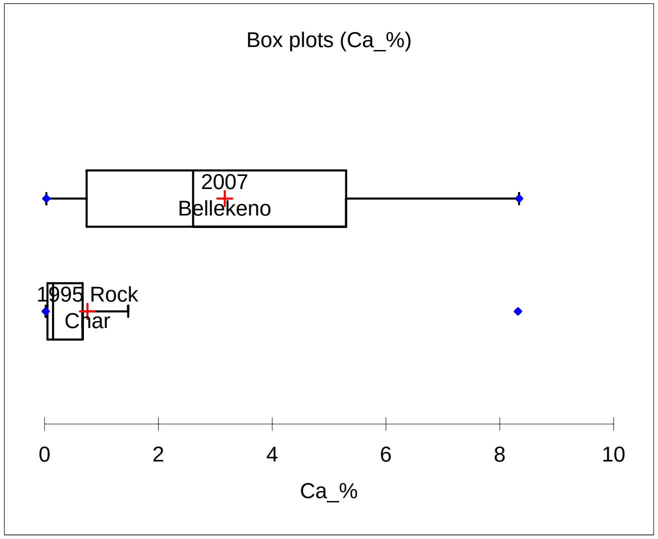


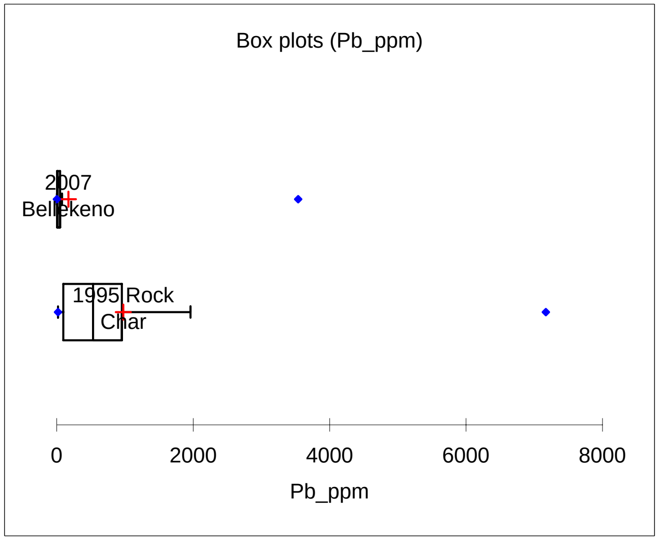


APPENDIX B4-4 Comparison of ABA Parameters Between 2007 Bellekeno and 1995-96 Keno Site-Wide Samples

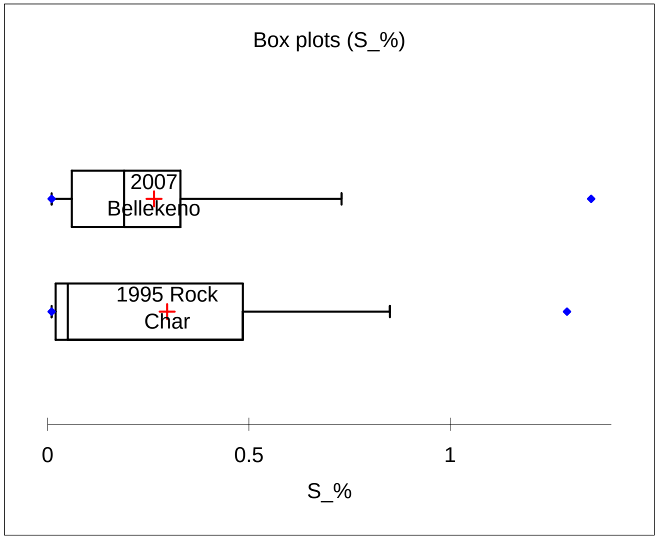


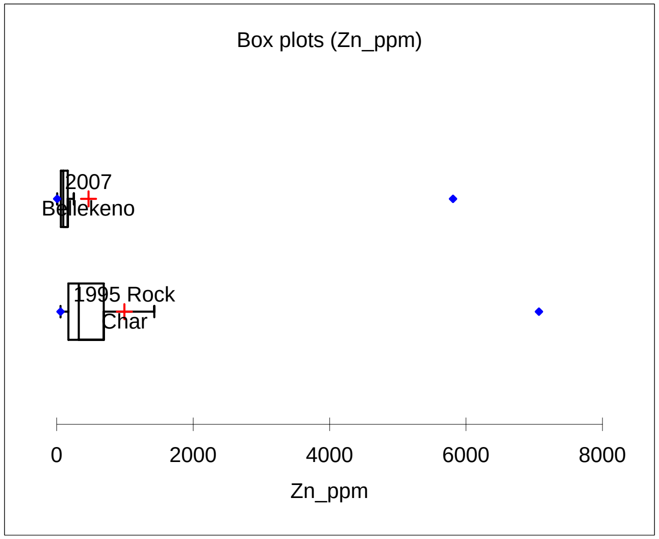


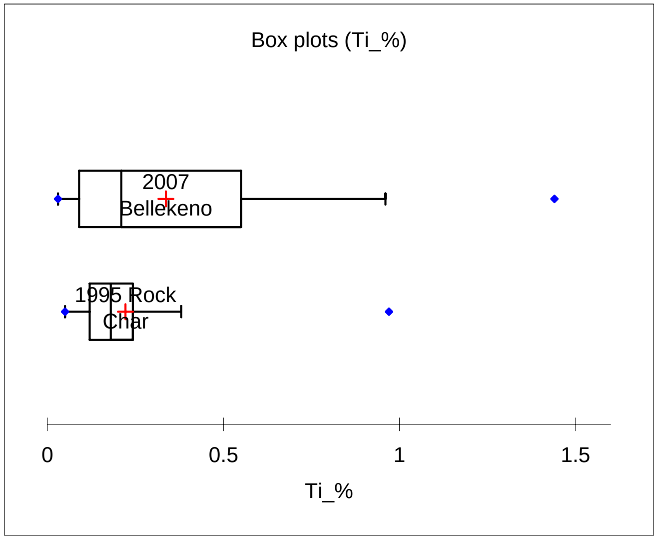




APPENDIX B4-4 Comparison of ABA Parameters Between 2007 Bellekeno and 1995-96 Keno Site-Wide Samples







APPENDIX C1-1 Bellekeno Waste Rock Drillhole Database
Summary Statistics

Bellekeno Non-Mineralized Rock

(<100 ppm Ag, <10000 ppm Pb, <10000 ppm Zn)

All Lithologies:

Statistic	Au_ppm	Ag_ppm	Al_%	As_ppm	Ba_ppm	Be_ppm	Bi_ppm	Ca_%	Cd_ppm	Co_ppm	Cr_ppm	Cu_ppm	Fe_%	Ga_ppm	K_%	La_ppm	Mg_%
No. of observations	6478	6478	6478	6478	6478	6478	6478	6478	6478	6478	6478	6478	6478	6478	6478	6478	6478
No. of missing values	0	0	0	0	0	0	0	0	0	0	0	0	0	2188	0	2188	0
Minimum	0.010	0.500	0.130	5.000	10.000	0.500	2.000	0.010	0.500	1.000	1.000	1.000	0.120	10.000	0.010	10.000	0.010
Maximum	3.160	90.700	13.900	10000.000	7620.000	4.100	27.000	23.400	144.000	75.000	1240.000	933.000	39.600	40.000	6.360	60.000	12.550
1st Quartile	0.010	0.500	0.900	5.000	140.000	0.500	2.000	0.390	0.500	2.000	37.000	7.000	1.023	10.000	0.190	10.000	0.140
Median	0.010	0.500	2.720	9.000	380.000	0.600	2.000	1.205	0.500	4.000	50.000	18.000	2.020	10.000	0.470	10.000	0.320
3rd Quartile	0.010	0.700	5.730	17.000	860.000	1.200	2.000	2.908	1.000	9.000	72.000	37.000	3.288	10.000	0.980	20.000	0.670
Mean	0.016	1.344	3.461	45.032	573.989	0.871	2.125	2.083	3.907	8.192	60.297	37.609	2.746	11.956	0.705	14.093	0.662
Standard deviation (n)	0.059	3.980	2.759	349.773	600.296	0.511	0.820	2.327	11.723	10.482	42.837	61.496	2.586	4.178	0.687	7.687	0.991
Variation coefficient	3.716	2.961	0.797	7.767	1.046	0.586	0.386	1.117	3.001	1.280	0.710	1.635	0.942	0.349	0.975	0.545	1.498
Skewness (Pearson)	35.697	11.417	0.570	20.616	2.697	1.448	15.943	1.874	5.358	2.217	6.480	4.444	2.840	1.903	1.671	2.000	3.281
Kurtosis (Pearson)	1602.047	175.187	-0.938	506.887	14.941	1.764	370.783	5.642	34.082	4.327	114.868	30.692	16.748	2.729	3.248	3.710	16.468
Geometric mean	0.012	0.728	2.216	11.567	331.031	0.759	2.075	1.013	0.974	4.305	50.639	18.201	1.950	11.424	0.435	12.712	0.314
Geometric standard deviation	1.608	2.148	2.865	2.764	3.173	1.649	1.190	3.936	3.489	3.104	1.884	3.190	2.284	1.323	2.850	1.515	3.474

CHSCH: Chloritic Schist

Statistic	Au_ppm	Ag_ppm	Al_%	As_ppm	Ba_ppm	Be_ppm	Bi_ppm	Ca_%	Cd_ppm	Co_ppm	Cr_ppm	Cu_ppm	Fe_%	Ga_ppm	K_%	La_ppm	Mg_%
No. of observations	222	222	222	222	222	222	222	222	222	222	222	222	222	222	222	222	222
No. of missing values	0	0	0	0	0	0	0	0	0	0	0	0	0	168	0	168	0
Minimum	0.010	0.500	0.150	5.000	20.000	0.500	2.000	0.100	0.500	3.000	3.000	1.000	0.150	10.000	0.020	10.000	0.050
Maximum	0.840	9.200	10.450	341.000	4220.000	2.700	7.000	21.000	120.500	47.000	764.000	282.000	12.400	30.000	4.250	60.000	12.550
1st Quartile	0.010	0.500	5.743	5.000	602.500	1.025	2.000	1.065	0.500	9.000	41.250	22.000	2.740	10.000	1.420	10.000	0.760
Median	0.010	0.500	6.940	6.000	850.000	1.400	2.000	2.560	0.500	12.000	54.000	31.000	3.455	20.000	2.025	20.000	0.960
3rd Quartile	0.010	0.500	7.900	12.000	1187.500	1.775	2.000	4.545	0.500	19.750	81.000	54.000	5.135	20.000	2.695	30.000	1.760
Mean	0.016	0.677	6.681	15.014	1020.405	1.423	2.054	3.252	2.527	15.878	74.495	49.459	4.181	16.111	1.967	24.444	1.428
Standard deviation (n)	0.056	0.759	1.742	33.525	719.501	0.532	0.421	2.887	12.052	9.910	76.812	50.544	2.219	5.241	0.940	14.229	1.254
Variation coefficient	3.541	1.121	0.261	2.233	0.705	0.374	0.205	0.888	4.768	0.624	1.031	1.022	0.531	0.325	0.478	0.582	0.878
Skewness (Pearson)	14.269	7.523	-0.822	7.032	1.778	0.073	9.391	2.078	8.008	1.301	5.007	2.490	1.442	-0.067	-0.307	0.614	3.908
Kurtosis (Pearson)	206.062	72.303	1.145	55.909	3.747	-0.556	95.872	7.502	68.062	0.966	34.174	6.548	2.102	-1.160	-0.519	-0.513	26.922
Geometric mean	0.011	0.574	6.317	8.839	780.674	1.309	2.033	2.154	0.666	13.335	57.030	34.423	3.680	15.193	1.519	20.367	1.109
Geometric standard deviation	1.542	1.537	1.513	2.176	2.356	1.543	1.127	2.711	2.512	1.807	2.039	2.328	1.684	1.425	2.661	1.866	2.022

APPENDIX C1-1 Bellekeno Waste Rock Drillhole Database
Summary Statistics

Bellekeno Non-Mineralized Rock

(<100 ppm Ag, <10000 ppm Pb, <1000

All Lithologies:

Statistic	Mn_ppm	Mo_ppm	Na_%	Ni_ppm	P_ppm	Pb_ppm	S_%	Sb_ppm	Sc_ppm	Sr_ppm	Th_ppm	Ti_%	Tl_ppm	U_ppm	V_ppm	W_ppm	Zn_ppm
No. of observations	6478	6478	6478	6478	6478	6478	6478	6478	6478	6478	6478	6478	6478	6478	6478	6478	6478
No. of missing values	0	0	0	0	0	0	0	0	2188	0	2188	0	2188	2188	0	0	0
Minimum	17.000	1.000	0.010	1.000	20.000	2.000	0.010	5.000	1.000	1.000	20.000	0.010	10.000	10.000	2.000	10.000	2.000
Maximum	100000	28.000	4.250	1560.000	4670.000	8970.000	10.000	208.000	45.000	852.000	20.000	2.380	50.000	20.000	1620.000	290.000	9950.000
1st Quartile	153.000	1.000	0.030	7.000	260.000	7.000	0.120	5.000	1.000	45.000	20.000	0.070	10.000	10.000	18.000	10.000	45.000
Median	306.000	1.000	0.090	19.000	400.000	14.000	0.320	5.000	3.000	89.000	20.000	0.160	10.000	10.000	50.000	10.000	86.000
3rd Quartile	1093.750	1.000	0.240	40.000	580.000	30.000	0.620	5.000	10.000	152.000	20.000	0.270	10.000	10.000	115.000	10.000	166.000
Mean	1482.709	1.324	0.248	27.524	466.334	94.935	0.447	6.351	8.198	108.309	20.000	0.240	10.042	10.019	89.554	10.105	360.394
Standard deviation (n)	4550.571	1.337	0.427	33.959	355.395	367.142	0.474	7.165	10.594	88.880	0.000	0.286	0.889	0.431	109.457	3.880	974.496
Variation coefficient	3.069	1.010	1.725	1.234	0.762	3.867	1.060	1.128	1.292	0.821	0.000	1.188	0.089	0.043	1.222	0.384	2.704
Skewness (Pearson)	10.001	8.511	3.040	16.089	3.629	10.654	3.634	15.391	1.806	1.771		3.005	29.692	23.092	3.072	61.316	5.153
Kurtosis (Pearson)	149.067	99.660	10.346	655.053	23.610	160.712	37.729	324.700	2.080	6.598		11.097	1102.212	531.252	18.807	4243.224	31.128
Geometric mean	429.926	1.153	0.088	16.171	373.466	18.367	0.243	5.670	3.977	70.595	20.000	0.153	10.025	10.013	46.069	10.032	104.106
Geometric standard deviation	3.944	1.496	4.334	3.086	1.989	4.475	3.689	1.416	3.303	2.976	1.000	2.510	1.049	1.030	3.414	1.076	3.785

CHSCH: Chloritic Schist

Statistic	Mn_ppm	Mo_ppm	Na_%	Ni_ppm	P_ppm	Pb_ppm	S_%	Sb_ppm	Sc_ppm	Sr_ppm	Th_ppm	Ti_%	Tl_ppm	U_ppm	V_ppm	W_ppm	Zn_ppm
No. of observations	222	222	222	222	222	222	222	222	222	222	222	222	222	222	222	222	222
No. of missing values	0	0	0	0	0	0	0	0	168	0	168	0	168	168	0	0	0
Minimum	98.000	1.000	0.010	1.000	130.000	2.000	0.010	5.000	1.000	6.000	20.000	0.010	10.000	10.000	3.000	10.000	11.000
Maximum	37600.0	11.000	3.510	310.000	3760.000	958.000	1.550	22.000	40.000	608.000	20.000	1.660	10.000	10.000	464.000	10.000	9310.000
1st Quartile	442.250	1.000	0.190	21.000	300.000	13.000	0.120	5.000	9.000	90.250	20.000	0.190	10.000	10.000	51.000	10.000	66.000
Median	608.500	1.000	0.420	28.500	460.000	19.000	0.245	5.000	13.000	135.000	20.000	0.290	10.000	10.000	76.500	10.000	81.500
3rd Quartile	1098.750	1.000	0.920	47.000	757.500	25.000	0.430	5.000	26.000	222.500	20.000	0.458	10.000	10.000	181.000	10.000	106.750
Mean	1112.356	1.293	0.644	39.595	667.162	31.338	0.336	5.649	17.667	169.590	20.000	0.406	10.000	10.000	121.640	10.000	236.640
Standard deviation (n)	2798.484	1.219	0.632	35.079	637.557	83.559	0.309	2.402	10.490	113.809	0.000	0.327	0.000	0.000	96.623	0.000	910.228
Variation coefficient	2.516	0.943	0.981	0.886	0.956	2.666	0.921	0.425	0.594	0.671	0.000	0.807	0.000	0.000	0.794	0.000	3.846
Skewness (Pearson)	10.772	5.796	1.670	3.483	2.593	8.835	1.546	4.870	0.571	1.440		1.762			1.221		7.980
Kurtosis (Pearson)	131.027	36.594	3.068	18.273	7.133	85.679	2.249	25.147	-0.806	2.335		2.511			0.545		68.081
Geometric mean	693.775	1.129	0.372	30.574	499.257	17.040	0.210	5.406	14.181	135.363	20.000	0.315	10.000	10.000	90.610	10.000	95.880
Geometric standard deviation	2.157	1.486	3.300	2.049	2.035	2.567	2.951	1.284	2.114	2.057	1.000	2.007	1.000	1.000	2.178	1.000	2.334

APPENDIX C1-1 Bellekeno Waste Rock Drillhole Database
Summary Statistics

Bellekeno Non-Mineralized Rock

CQTZT: Calcareous Quartzite

Statistic	Au_ppm	Ag_ppm	Al_%	As_ppm	Ba_ppm	Be_ppm	Bi_ppm	Ca_%	Cd_ppm	Co_ppm	Cr_ppm	Cu_ppm	Fe_%	Ga_ppm	K_%	La_ppm	Mg_%
No. of observations	505	505	505	505	505	505	505	505	505	505	505	505	505	505	505	505	505
No. of missing values	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum	0.010	0.500	0.140	5.000	10.000	0.500	2.000	0.030	0.500	1.000	1.000	1.000	0.340	10.000	0.030	10.000	0.020
Maximum	0.330	34.000	8.780	7480.000	1440.000	2.300	18.000	23.400	118.000	25.000	123.000	157.000	39.600	20.000	2.310	40.000	1.170
1st Quartile	0.010	0.500	0.560	5.000	120.000	0.500	2.000	1.120	0.500	1.000	30.000	4.000	0.670	10.000	0.150	10.000	0.100
Median	0.010	0.500	0.840	8.000	190.000	0.500	2.000	2.340	0.500	1.000	37.000	7.000	0.940	10.000	0.230	10.000	0.170
3rd Quartile	0.010	0.700	1.670	14.000	330.000	0.500	2.000	3.690	1.400	3.000	48.000	12.000	1.600	10.000	0.430	10.000	0.280
Mean	0.015	1.174	1.381	55.457	270.416	0.572	2.149	2.803	5.130	2.420	41.091	11.865	1.543	10.079	0.342	11.604	0.221
Standard deviation (n)	0.020	2.625	1.325	426.054	235.243	0.216	1.095	2.428	15.171	2.801	16.590	15.687	2.736	0.886	0.310	4.494	0.185
Variation coefficient	1.364	2.235	0.960	7.683	0.870	0.377	0.510	0.866	2.957	1.157	0.404	1.322	1.772	0.088	0.906	0.387	0.838
Skewness (Pearson)	9.827	7.763	2.225	14.165	2.073	3.935	10.879	2.100	4.675	4.050	1.573	4.066	10.005	11.102	2.363	3.137	1.990
Kurtosis (Pearson)	127.521	77.007	5.532	219.762	4.827	17.846	132.661	10.402	24.053	22.297	3.527	23.386	120.600	121.258	7.143	10.717	4.874
Geometric mean	0.012	0.702	0.995	10.420	200.740	0.550	2.072	1.707	1.066	1.739	38.060	7.518	1.094	10.055	0.254	11.076	0.165
Geometric standard deviation	1.616	2.070	2.156	2.834	2.156	1.286	1.222	3.349	3.918	2.051	1.523	2.422	1.978	1.063	2.110	1.313	2.175

CSCH: Carcareous Schist

Statistic	Au_ppm	Ag_ppm	Al_%	As_ppm	Ba_ppm	Be_ppm	Bi_ppm	Ca_%	Cd_ppm	Co_ppm	Cr_ppm	Cu_ppm	Fe_%	Ga_ppm	K_%	La_ppm	Mg_%
No. of observations	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36
No. of missing values	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum	0.010	0.500	1.690	5.000	70.000	0.500	2.000	1.670	0.500	1.000	30.000	5.000	1.080	10.000	0.330	10.000	0.230
Maximum	0.040	5.200	9.470	43.000	1560.000	2.300	2.000	9.560	1.700	32.000	129.000	170.000	7.110	20.000	2.120	40.000	0.950
1st Quartile	0.010	0.500	5.370	8.750	635.000	1.300	2.000	2.510	0.500	6.000	84.500	18.750	2.753	10.000	1.188	20.000	0.518
Median	0.010	0.500	6.955	12.500	910.000	1.700	2.000	3.270	0.500	9.000	101.000	22.000	3.525	15.000	1.365	30.000	0.670
3rd Quartile	0.010	0.800	8.158	18.000	1145.000	2.025	2.000	5.153	0.500	11.000	113.250	26.000	4.758	20.000	1.570	30.000	0.730
Mean	0.011	0.892	6.701	13.889	872.778	1.642	2.000	3.877	0.581	9.056	97.306	25.611	3.732	15.000	1.318	28.889	0.630
Standard deviation (n)	0.005	0.946	1.888	8.144	341.041	0.465	0.000	1.833	0.273	5.060	21.038	25.000	1.265	5.000	0.347	8.089	0.145
Variation coefficient	0.464	1.061	0.282	0.586	0.391	0.283	0.000	0.473	0.470	0.559	0.216	0.976	0.339	0.333	0.264	0.280	0.230
Skewness (Pearson)	5.031	3.332	-0.475	1.589	-0.452	-0.501		1.040	3.452	2.339	-0.854	5.315	0.342	0.000	-0.763	-0.425	-0.561
Kurtosis (Pearson)	24.709	10.952	-0.348	3.446	-0.424	-0.553		0.728	10.483	9.203	0.882	27.929	-0.205	-2.000	1.229	-0.233	0.329
Geometric mean	0.011	0.696	6.365	11.856	769.205	1.560	2.000	3.495	0.547	7.811	94.376	21.752	3.503	14.142	1.254	27.495	0.610
Geometric standard deviation	1.291	1.797	1.425	1.783	1.835	1.416	1.000	1.581	1.345	1.810	1.314	1.633	1.455	1.421	1.430	1.409	1.317

APPENDIX C1-1 Bellekeno Waste Rock Drillhole Database
Summary Statistics

Bellekeno Non-Mineralized Rock

CQTZT: Calcareous Quartzite

Statistic	Mn_ppm	Mo_ppm	Na_%	Ni_ppm	P_ppm	Pb_ppm	S_%	Sb_ppm	Sc_ppm	Sr_ppm	Th_ppm	Ti_%	Tl_ppm	U_ppm	V_ppm	W_ppm	Zn_ppm
No. of observations	505	505	505	505	505	505	505	505	505	505	505	505	505	505	505	505	505
No. of missing values	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum	35.000	1.000	0.010	1.000	20.000	2.000	0.010	5.000	1.000	2.000	20.000	0.010	10.000	10.000	5.000	10.000	7.000
Maximum	100000.0	5.000	0.920	61.000	2560.000	5430.000	10.000	158.000	21.000	833.000	20.000	0.410	50.000	20.000	281.000	20.000	9920.000
1st Quartile	117.000	1.000	0.010	4.000	260.000	6.000	0.110	5.000	1.000	40.000	20.000	0.050	10.000	10.000	10.000	10.000	25.000
Median	190.000	1.000	0.020	7.000	320.000	11.000	0.200	5.000	2.000	73.000	20.000	0.070	10.000	10.000	17.000	10.000	49.000
3rd Quartile	588.000	1.000	0.060	12.000	480.000	40.000	0.390	5.000	3.000	118.000	20.000	0.110	10.000	10.000	32.000	10.000	174.000
Mean	1870.836	1.071	0.051	9.754	385.723	87.727	0.322	6.083	2.721	88.693	20.000	0.091	10.119	10.040	27.323	10.020	471.089
Standard deviation (n)	7831.206	0.392	0.075	8.722	232.342	347.706	0.540	7.805	2.713	74.702	0.000	0.066	1.987	0.628	28.799	0.445	1333.664
Variation coefficient	4.186	0.366	1.476	0.894	0.602	3.964	1.675	1.283	0.997	0.842	0.000	0.729	0.196	0.063	1.054	0.044	2.831
Skewness (Pearson)	9.784	6.769	5.503	2.186	3.892	10.583	12.159	15.574	2.531	2.771		2.144	18.007	15.796	3.182	22.405	4.486
Kurtosis (Pearson)	109.803	52.174	46.785	6.110	29.707	138.119	204.227	285.899	7.934	19.350		5.209	338.532	247.504	15.908	500.002	22.145
Geometric mean	322.932	1.040	0.030	7.003	335.889	16.960	0.205	5.439	1.968	59.764	20.000	0.075	10.054	10.027	19.128	10.014	81.499
Geometric standard deviation	4.555	1.221	2.608	2.303	1.713	4.671	2.534	1.375	2.104	2.791	1.000	1.809	1.090	1.045	2.224	1.031	5.057

CSCH: Carcareous Schist

Statistic	Mn_ppm	Mo_ppm	Na_%	Ni_ppm	P_ppm	Pb_ppm	S_%	Sb_ppm	Sc_ppm	Sr_ppm	Th_ppm	Ti_%	Tl_ppm	U_ppm	V_ppm	W_ppm	Zn_ppm
No. of observations	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36
No. of missing values	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum	96.000	1.000	0.020	11.000	410.000	8.000	0.180	5.000	3.000	76.000	20.000	0.080	10.000	10.000	28.000	10.000	54.000
Maximum	1620.000	2.000	0.390	58.000	1340.000	335.000	2.590	8.000	33.000	420.000	20.000	0.500	10.000	10.000	312.000	10.000	224.000
1st Quartile	172.000	1.000	0.158	31.000	797.500	16.000	0.278	5.000	9.000	224.750	20.000	0.278	10.000	10.000	100.250	10.000	95.250
Median	254.500	1.000	0.270	42.500	975.000	19.000	0.460	5.000	12.000	263.500	20.000	0.325	10.000	10.000	128.000	10.000	110.500
3rd Quartile	302.000	1.000	0.350	51.000	1142.500	25.250	1.163	5.000	15.250	310.750	20.000	0.393	10.000	10.000	148.750	10.000	133.000
Mean	293.333	1.083	0.250	40.583	961.111	31.278	0.773	5.389	12.611	269.472	20.000	0.325	10.000	10.000	124.111	10.000	115.944
Standard deviation (n)	250.705	0.276	0.101	11.762	219.959	54.226	0.700	0.859	4.957	71.828	0.000	0.092	0.000	0.000	45.671	0.000	33.184
Variation coefficient	0.855	0.255	0.403	0.290	0.229	1.734	0.905	0.159	0.393	0.267	0.000	0.284	0.000	0.000	0.368	0.000	0.286
Skewness (Pearson)	4.154	3.015	-0.456	-0.508	-0.183	4.982	1.273	2.056	1.638	-0.016		-0.156			1.545		1.262
Kurtosis (Pearson)	18.979	7.091	-0.943	-0.560	-0.628	24.534	0.257	2.826	5.687	0.144		-0.057			5.868		2.331
Geometric mean	246.708	1.059	0.219	38.445	933.471	21.334	0.544	5.332	11.708	258.381	20.000	0.309	10.000	10.000	115.922	10.000	111.692
Geometric standard deviation	1.695	1.214	1.855	1.435	1.289	1.927	2.266	1.152	1.499	1.369	1.000	1.416	1.000	1.000	1.483	1.000	1.316

APPENDIX C1-1 Bellekeno Waste Rock Drillhole Database
Summary Statistics

Bellekeno Non-Mineralized Rock

GNST: Greenstone

Statistic	Au_ppm	Ag_ppm	Al_%	As_ppm	Ba_ppm	Be_ppm	Bi_ppm	Ca_%	Cd_ppm	Co_ppm	Cr_ppm	Cu_ppm	Fe_%	Ga_ppm	K_%	La_ppm	Mg_%
No. of observations	567	567	567	567	567	567	567	567	567	567	567	567	567	567	567	567	567
No. of missing values	0	0	0	0	0	0	0	0	0	0	0	0	0	86	0	86	0
Minimum	0.010	0.500	1.910	5.000	10.000	0.500	2.000	0.220	0.500	1.000	1.000	1.000	1.190	10.000	0.010	10.000	0.290
Maximum	0.460	79.400	13.900	518.000	6790.000	4.100	9.000	10.800	64.200	59.000	511.000	753.000	17.150	40.000	6.360	60.000	5.430
1st Quartile	0.010	0.500	7.105	5.000	80.000	0.500	2.000	5.360	0.500	33.000	26.500	142.000	7.450	20.000	0.120	10.000	2.395
Median	0.010	0.500	7.930	6.000	140.000	0.500	2.000	7.080	0.500	39.000	98.000	173.000	8.220	20.000	0.180	10.000	3.300
3rd Quartile	0.010	0.700	8.405	13.000	355.000	0.800	2.000	7.745	0.500	41.000	163.500	209.500	9.380	20.000	0.430	10.000	3.935
Mean	0.015	1.838	7.659	14.062	426.420	0.756	2.235	6.378	2.822	35.880	101.637	184.501	8.565	18.420	0.505	10.769	3.104
Standard deviation (n)	0.029	6.608	1.147	30.185	780.456	0.506	0.902	1.934	8.333	8.936	80.624	104.769	2.289	4.373	0.800	4.329	1.034
Variation coefficient	1.949	3.595	0.150	2.147	1.830	0.669	0.404	0.303	2.952	0.249	0.793	0.568	0.267	0.237	1.584	0.402	0.333
Skewness (Pearson)	11.703	8.003	-0.888	11.082	3.616	3.094	4.733	-1.236	4.512	-1.382	0.913	1.884	0.490	-0.609	2.881	7.481	-0.561
Kurtosis (Pearson)	157.542	74.100	3.672	159.431	15.616	11.719	24.501	1.033	21.022	2.111	1.853	6.167	1.199	1.913	9.756	63.752	-0.395
Geometric mean	0.012	0.728	7.556	8.837	179.005	0.666	2.144	5.828	0.805	34.020	52.273	152.271	8.239	17.782	0.226	10.425	2.862
Geometric standard deviation	1.580	2.371	1.192	2.151	3.365	1.561	1.276	1.702	3.027	1.479	4.751	2.128	1.340	1.327	3.404	1.229	1.578

GSCH: Graphitic Schist

Statistic	Au_ppm	Ag_ppm	Al_%	As_ppm	Ba_ppm	Be_ppm	Bi_ppm	Ca_%	Cd_ppm	Co_ppm	Cr_ppm	Cu_ppm	Fe_%	Ga_ppm	K_%	La_ppm	Mg_%
No. of observations	870	870	870	870	870	870	870	870	870	870	870	870	870	870	870	870	870
No. of missing values	0	0	0	0	0	0	0	0	0	0	0	0	0	747	0	747	0
Minimum	0.010	0.500	0.150	5.000	20.000	0.500	2.000	0.030	0.500	1.000	5.000	2.000	0.120	10.000	0.010	10.000	0.030
Maximum	0.470	13.900	11.250	812.000	6400.000	2.900	6.000	22.400	62.600	75.000	1240.000	246.000	10.300	30.000	3.730	40.000	12.450
1st Quartile	0.010	0.500	3.625	6.000	680.000	0.900	2.000	0.290	0.500	6.000	56.000	24.000	2.190	10.000	0.670	20.000	0.380
Median	0.010	0.500	5.115	11.000	1020.000	1.300	2.000	0.480	0.500	8.000	73.000	34.000	2.840	20.000	1.055	20.000	0.520
3rd Quartile	0.010	0.600	6.448	18.000	1330.000	1.600	2.000	1.018	0.800	11.000	91.000	45.000	3.460	20.000	1.490	30.000	0.710
Mean	0.013	0.719	5.110	16.957	1059.103	1.302	2.103	0.928	0.913	8.761	78.548	36.929	2.930	15.610	1.133	24.797	0.647
Standard deviation (n)	0.024	0.877	2.039	35.156	573.826	0.493	0.413	1.481	2.639	4.775	54.600	20.041	1.122	6.001	0.593	9.401	0.785
Variation coefficient	1.771	1.220	0.399	2.073	0.542	0.378	0.197	1.596	2.892	0.545	0.695	0.543	0.383	0.384	0.523	0.379	1.213
Skewness (Pearson)	14.461	8.267	0.172	15.427	2.103	0.410	4.895	7.740	17.150	4.078	12.623	2.431	1.185	0.555	0.767	0.147	9.697
Kurtosis (Pearson)	230.865	89.899	-0.090	313.348	11.633	-0.086	27.688	92.360	359.523	45.057	243.700	15.907	4.355	-0.611	0.560	-0.880	122.155
Geometric mean	0.011	0.601	4.603	11.662	913.060	1.204	2.077	0.562	0.655	7.694	71.260	32.220	2.714	14.513	0.967	22.829	0.517
Geometric standard deviation	1.456	1.565	1.670	2.062	1.806	1.509	1.154	2.522	1.690	1.713	1.514	1.727	1.514	1.465	1.856	1.534	1.838

APPENDIX C1-1 Bellekeno Waste Rock Drillhole Database
Summary Statistics

Bellekeno Non-Mineralized Rock

GNST: Greenstone

Statistic	Mn_ppm	Mo_ppm	Na_%	Ni_ppm	P_ppm	Pb_ppm	S_%	Sb_ppm	Sc_ppm	Sr_ppm	Th_ppm	Ti_%	Tl_ppm	U_ppm	V_ppm	W_ppm	Zn_ppm
No. of observations	567	567	567	567	567	567	567	567	567	567	567	567	567	567	567	567	567
No. of missing values	0	0	0	0	0	0	0	0	86	0	86	0	86	86	0	0	0
Minimum	144.000	1.000	0.010	1.000	320.000	2.000	0.010	5.000	7.000	2.000	20.000	0.130	10.000	10.000	25.000	10.000	45.000
Maximum	50400.000	6.000	4.250	190.000	4270.000	3540.000	1.830	83.000	45.000	823.000	20.000	2.380	30.000	20.000	1070.000	60.000	7110.000
1st Quartile	1257.500	1.000	0.875	42.000	530.000	2.000	0.010	5.000	32.000	187.500	20.000	0.760	10.000	10.000	272.000	10.000	90.000
Median	1440.000	1.000	1.430	74.000	630.000	5.000	0.030	5.000	35.000	215.000	20.000	0.890	10.000	10.000	300.000	10.000	111.000
3rd Quartile	1842.500	1.000	1.620	100.000	790.000	15.500	0.070	8.000	37.000	246.000	20.000	1.075	10.000	10.000	339.000	10.000	158.000
Mean	2952.674	1.131	1.259	70.783	822.011	94.605	0.082	8.187	33.994	220.056	20.000	0.975	10.187	10.125	312.614	10.141	357.774
Standard deviation (n)	5798.270	0.542	0.637	35.924	573.017	352.846	0.174	8.126	5.160	98.212	0.000	0.372	1.501	1.110	135.399	2.296	864.728
Variation coefficient	1.964	0.479	0.506	0.508	0.697	3.730	2.133	0.993	0.152	0.446	0.000	0.381	0.147	0.110	0.433	0.226	2.417
Skewness (Pearson)	5.059	5.878	-0.178	-0.038	3.002	6.210	5.235	5.646	-2.009	1.839		1.199	8.852	8.785	2.120	19.344	4.514
Kurtosis (Pearson)	27.728	41.556	0.869	-0.551	10.055	45.682	35.203	40.557	6.264	9.131		1.645	86.786	75.179	8.383	399.743	21.568
Geometric mean	1771.247	1.075	0.892	55.405	716.882	9.080	0.033	6.825	33.429	190.137	20.000	0.910	10.124	10.087	284.544	10.063	154.935
Geometric standard deviation	2.129	1.299	3.249	2.471	1.587	5.724	3.232	1.645	1.228	2.019	1.000	1.461	1.102	1.080	1.606	1.097	2.581

GSCH: Graphitic Schist

Statistic	Mn_ppm	Mo_ppm	Na_%	Ni_ppm	P_ppm	Pb_ppm	S_%	Sb_ppm	Sc_ppm	Sr_ppm	Th_ppm	Ti_%	Tl_ppm	U_ppm	V_ppm	W_ppm	Zn_ppm
No. of observations	870	870	870	870	870	870	870	870	870	870	870	870	870	870	870	870	870
No. of missing values	0	0	0	0	0	0	0	0	747	0	747	0	747	747	0	0	0
Minimum	53.000	1.000	0.010	1.000	20.000	2.000	0.010	5.000	2.000	11.000	20.000	0.010	10.000	10.000	3.000	10.000	6.000
Maximum	15600.000	28.000	2.510	1560.000	3810.000	1310.000	3.370	33.000	33.000	485.000	20.000	0.760	10.000	10.000	552.000	20.000	4880.000
1st Quartile	151.000	1.000	0.140	30.000	370.000	11.000	0.400	5.000	8.000	80.000	20.000	0.190	10.000	10.000	75.000	10.000	67.000
Median	244.000	1.000	0.220	42.000	535.000	15.000	0.720	5.000	11.000	102.000	20.000	0.260	10.000	10.000	123.500	10.000	101.000
3rd Quartile	399.750	2.000	0.290	52.000	670.000	20.000	1.038	5.000	15.000	145.000	20.000	0.330	10.000	10.000	205.000	10.000	152.750
Mean	418.795	1.676	0.236	46.423	555.460	22.275	0.754	5.669	11.553	120.784	20.000	0.262	10.000	10.000	143.371	10.011	130.859
Standard deviation (n)	996.016	1.842	0.177	60.768	272.789	67.275	0.490	2.151	5.009	62.998	0.000	0.103	0.000	0.000	84.742	0.339	213.051
Variation coefficient	2.378	1.099	0.752	1.309	0.491	3.020	0.649	0.379	0.434	0.522	0.000	0.392	0.000	0.000	0.591	0.034	1.628
Skewness (Pearson)	11.116	6.952	5.977	18.999	2.839	13.184	1.158	5.465	0.654	1.719		0.697			0.809	29.445	15.240
Kurtosis (Pearson)	145.124	69.671	64.630	448.608	24.065	201.916	2.915	42.552	1.273	4.138		1.667			0.485	865.001	300.393
Geometric mean	266.091	1.364	0.195	38.955	499.526	14.695	0.568	5.460	10.384	107.480	20.000	0.240	10.000	10.000	117.620	10.008	100.874
Geometric standard deviation	2.134	1.699	1.908	1.733	1.606	1.910	2.433	1.267	1.638	1.619	1.000	1.579	1.000	1.000	1.964	1.024	1.900

APPENDIX C1-1 Bellekeno Waste Rock Drillhole Database
Summary Statistics

Bellekeno Non-Mineralized Rock

PHY: Phyllite

Statistic	Au_ppm	Ag_ppm	Al_%	As_ppm	Ba_ppm	Be_ppm	Bi_ppm	Ca_%	Cd_ppm	Co_ppm	Cr_ppm	Cu_ppm	Fe_%	Ga_ppm	K_%	La_ppm	Mg_%
No. of observations	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
No. of missing values	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum	0.010	0.500	3.920	5.000	400.000	0.800	2.000	0.040	0.500	1.000	56.000	6.000	1.720	10.000	0.620	20.000	0.160
Maximum	0.030	0.700	7.840	15.000	1630.000	1.800	2.000	2.990	4.800	8.000	95.000	36.000	3.240	20.000	1.440	30.000	0.610
1st Quartile	0.010	0.500	4.060	5.000	860.000	1.000	2.000	0.050	0.500	2.000	58.000	13.000	2.060	10.000	0.760	20.000	0.260
Median	0.020	0.500	4.270	7.000	1060.000	1.400	2.000	0.050	0.500	4.000	67.000	14.000	2.180	10.000	0.800	20.000	0.320
3rd Quartile	0.030	0.500	6.050	8.000	1280.000	1.500	2.000	0.580	0.600	5.000	74.000	15.000	2.670	20.000	1.030	20.000	0.540
Mean	0.020	0.540	5.228	8.000	1046.000	1.300	2.000	0.742	1.380	4.000	70.000	16.800	2.374	14.000	0.930	22.000	0.378
Standard deviation (n)	0.009	0.080	1.516	3.688	411.806	0.358	0.000	1.143	1.710	2.449	14.071	10.107	0.529	4.899	0.287	4.000	0.170
Variation coefficient	0.447	0.148	0.290	0.461	0.394	0.275	0.000	1.540	1.239	0.612	0.201	0.602	0.223	0.350	0.309	0.182	0.450
Skewness (Pearson)	0.000	1.500	0.784	1.148	-0.183	-0.079		1.386	1.498	0.408	0.803	1.111	0.482	0.408	0.818	1.500	0.184
Kurtosis (Pearson)	-1.750	0.250	-1.007	-0.228	-0.951	-1.354		0.077	0.247	-1.033	-0.704	-0.130	-1.055	-1.833	-0.699	0.250	-1.559
Geometric mean	0.018	0.535	5.031	7.319	946.787	1.248	2.000	0.177	0.815	3.170	68.696	14.260	2.317	13.195	0.890	21.689	0.338
Geometric standard deviation	1.739	1.162	1.353	1.571	1.710	1.387	1.000	6.849	2.703	2.261	1.238	1.889	1.277	1.462	1.383	1.199	1.729

QTZT: Quartzite

Statistic	Au_ppm	Ag_ppm	Al_%	As_ppm	Ba_ppm	Be_ppm	Bi_ppm	Ca_%	Cd_ppm	Co_ppm	Cr_ppm	Cu_ppm	Fe_%	Ga_ppm	K_%	La_ppm	Mg_%
No. of observations	3293	3293	3293	3293	3293	3293	3293	3293	3293	3293	3293	3293	3293	3293	3293	3293	3293
No. of missing values	0	0	0	0	0	0	0	0	0	0	0	0	0	890	0	890	0
Minimum	0.010	0.500	0.130	5.000	10.000	0.500	2.000	0.010	0.500	1.000	3.000	1.000	0.230	10.000	0.010	10.000	0.010
Maximum	3.160	90.700	10.350	10000.000	3650.000	2.500	27.000	12.550	120.000	42.000	223.000	933.000	30.800	30.000	3.690	40.000	3.440
1st Quartile	0.010	0.500	0.560	5.000	100.000	0.500	2.000	0.300	0.500	1.000	35.000	6.000	0.780	10.000	0.150	10.000	0.090
Median	0.010	0.500	1.210	9.000	230.000	0.500	2.000	0.990	0.500	2.000	42.000	9.000	1.270	10.000	0.310	10.000	0.180
3rd Quartile	0.010	1.000	2.530	20.000	490.000	0.700	2.000	2.260	2.900	4.000	54.000	18.000	2.070	10.000	0.590	10.000	0.320
Mean	0.018	1.664	1.812	64.542	357.965	0.644	2.115	1.530	5.618	3.257	46.896	15.972	1.669	10.183	0.427	11.973	0.242
Standard deviation (n)	0.079	4.595	1.659	454.399	365.606	0.295	0.933	1.604	13.906	3.457	18.223	25.754	1.573	1.371	0.374	4.804	0.252
Variation coefficient	4.468	2.761	0.916	7.040	1.021	0.457	0.441	1.048	2.475	1.061	0.389	1.612	0.943	0.135	0.875	0.401	1.041
Skewness (Pearson)	28.757	9.729	1.547	16.451	2.196	2.531	17.485	1.667	4.085	3.798	1.942	16.465	5.965	7.664	1.907	2.641	4.223
Kurtosis (Pearson)	978.856	130.082	2.162	319.028	7.894	6.823	392.334	3.490	18.925	24.449	8.973	509.926	69.479	61.036	5.421	7.378	34.123
Geometric mean	0.012	0.826	1.224	12.715	217.393	0.601	2.063	0.753	1.291	2.277	43.965	10.300	1.299	10.127	0.301	11.354	0.157
Geometric standard deviation	1.680	2.392	2.457	3.185	2.910	1.399	1.185	4.072	4.277	2.231	1.425	2.397	1.967	1.098	2.369	1.342	2.713

APPENDIX C1-1 Bellekeno Waste Rock Drillhole Database
Summary Statistics

Bellekeno Non-Mineralized Rock

PHY: Phyllite

Statistic	Mn_ppm	Mo_ppm	Na_%	Ni_ppm	P_ppm	Pb_ppm	S_%	Sb_ppm	Sc_ppm	Sr_ppm	Th_ppm	Ti_%	Tl_ppm	U_ppm	V_ppm	W_ppm	Zn_ppm
No. of observations	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
No. of missing values	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum	110.000	1.000	0.220	14.000	300.000	5.000	0.020	5.000	6.000	55.000	20.000	0.150	10.000	10.000	65.000	10.000	40.000
Maximum	509.000	13.000	1.020	66.000	520.000	18.000	0.840	8.000	12.000	216.000	20.000	0.350	10.000	10.000	613.000	10.000	463.000
1st Quartile	159.000	1.000	0.260	22.000	380.000	9.000	0.020	5.000	7.000	90.000	20.000	0.210	10.000	10.000	83.000	10.000	53.000
Median	194.000	2.000	0.340	23.000	460.000	15.000	0.030	6.000	7.000	125.000	20.000	0.260	10.000	10.000	112.000	10.000	66.000
3rd Quartile	210.000	2.000	0.460	23.000	470.000	16.000	0.090	8.000	10.000	164.000	20.000	0.280	10.000	10.000	156.000	10.000	97.000
Mean	236.400	3.800	0.460	29.600	426.000	12.600	0.200	6.400	8.400	130.000	20.000	0.250	10.000	10.000	205.800	10.000	143.800
Standard deviation (n)	140.551	4.622	0.292	18.511	77.356	4.841	0.321	1.356	2.245	56.217	0.000	0.067	0.000	0.000	205.910	0.000	160.718
Variation coefficient	0.595	1.216	0.634	0.625	0.182	0.384	1.605	0.212	0.267	0.432	0.000	0.269	0.000	0.000	1.001	0.000	1.118
Skewness (Pearson)	1.273	1.465	1.225	1.369	-0.494	-0.485	1.476	0.212	0.556	0.213		-0.024			1.419		1.449
Kurtosis (Pearson)	-0.019	0.203	-0.144	0.104	-1.103	-1.354	0.216	-1.770	-1.304	-1.193		-1.009			0.137		0.180
Geometric mean	205.072	2.204	0.391	25.486	418.363	11.422	0.062	6.258	8.119	116.994	20.000	0.240	10.000	10.000	142.023	10.000	91.127
Geometric standard deviation	1.762	2.860	1.831	1.771	1.243	1.703	4.868	1.266	1.334	1.703	1.000	1.378	1.000	1.000	2.413	1.000	2.624

QTZT: Quartzite

Statistic	Mn_ppm	Mo_ppm	Na_%	Ni_ppm	P_ppm	Pb_ppm	S_%	Sb_ppm	Sc_ppm	Sr_ppm	Th_ppm	Ti_%	Tl_ppm	U_ppm	V_ppm	W_ppm	Zn_ppm
No. of observations	3293	3293	3293	3293	3293	3293	3293	3293	3293	3293	3293	3293	3293	3293	3293	3293	3293
No. of missing values	0	0	0	0	0	0	0	0	890	0	890	0	890	890	0	0	0
Minimum	17.000	1.000	0.010	1.000	20.000	2.000	0.010	5.000	1.000	1.000	20.000	0.010	10.000	10.000	2.000	10.000	2.000
Maximum	86200.000	24.000	2.120	101.000	3170.000	8970.000	5.820	208.000	36.000	428.000	20.000	1.040	20.000	10.000	663.000	290.000	9950.000
1st Quartile	128.000	1.000	0.010	5.000	200.000	7.000	0.140	5.000	1.000	20.000	20.000	0.060	10.000	10.000	11.000	10.000	33.000
Median	242.000	1.000	0.040	9.000	310.000	13.000	0.310	5.000	2.000	57.000	20.000	0.090	10.000	10.000	24.000	10.000	68.000
3rd Quartile	1105.000	1.000	0.100	18.000	450.000	81.000	0.550	5.000	4.000	102.000	20.000	0.150	10.000	10.000	49.000	10.000	305.000
Mean	1739.010	1.220	0.072	13.777	345.333	138.784	0.410	6.470	3.074	69.702	20.000	0.116	10.012	10.000	37.105	10.173	479.543
Standard deviation (n)	4816.526	1.081	0.099	13.068	225.845	455.294	0.419	8.727	3.269	59.704	0.000	0.086	0.353	0.000	39.992	5.349	1138.569
Variation coefficient	2.770	0.886	1.377	0.949	0.654	3.281	1.021	1.349	1.063	0.857	0.000	0.742	0.035	0.000	1.078	0.526	2.374
Skewness (Pearson)	7.937	9.942	6.474	1.906	2.831	8.932	3.447	14.091	3.607	1.276		2.717	28.249		3.317	45.745	4.009
Kurtosis (Pearson)	96.369	136.359	89.170	4.556	21.927	113.042	24.473	254.601	21.444	2.185		15.402	796.001		25.434	2305.978	18.385
Geometric mean	404.231	1.102	0.040	9.028	281.801	23.424	0.243	5.631	2.160	43.056	20.000	0.093	10.009	10.000	23.253	10.045	106.123
Geometric standard deviation	4.694	1.405	2.965	2.638	1.965	5.633	3.323	1.442	2.201	3.088	1.000	1.918	1.025	1.000	2.687	1.098	4.985

APPENDIX C1-1 Bellekeno Waste Rock Drillhole Database
Summary Statistics

Bellekeno Non-Mineralized Rock

SCH: Schist

Statistic	Au_ppm	Ag_ppm	Al_%	As_ppm	Ba_ppm	Be_ppm	Bi_ppm	Ca_%	Cd_ppm	Co_ppm	Cr_ppm	Cu_ppm	Fe_%	Ga_ppm	K_%	La_ppm	Mg_%
No. of observations	775	775	775	775	775	775	775	775	775	775	775	775	775	775	775	775	775
No. of missing values	0	0	0	0	0	0	0	0	0	0	0	0	0	147	0	147	0
Minimum	0.010	0.500	0.170	5.000	10.000	0.500	2.000	0.020	0.500	1.000	3.000	2.000	0.130	10.000	0.010	10.000	0.050
Maximum	0.300	23.400	11.150	3150.000	3400.000	3.700	6.000	21.100	24.500	41.000	247.000	256.000	10.350	30.000	3.850	50.000	11.750
1st Quartile	0.010	0.500	3.375	6.000	570.000	0.900	2.000	0.440	0.500	5.000	53.000	19.000	2.150	10.000	0.630	10.000	0.350
Median	0.010	0.500	5.030	10.000	900.000	1.200	2.000	0.900	0.500	8.000	70.000	28.000	2.770	10.000	0.950	20.000	0.510
3rd Quartile	0.010	0.600	6.625	16.000	1225.000	1.600	2.000	1.980	0.500	11.000	88.000	40.000	3.645	20.000	1.450	30.000	0.720
Mean	0.014	0.750	5.104	26.644	948.194	1.287	2.065	1.516	0.968	8.467	72.916	33.837	2.994	13.854	1.078	22.325	0.621
Standard deviation (n)	0.016	1.159	2.241	141.371	523.324	0.550	0.306	1.758	2.321	5.044	27.137	25.205	1.325	5.275	0.586	9.544	0.620
Variation coefficient	1.105	1.546	0.439	5.306	0.552	0.428	0.148	1.159	2.396	0.596	0.372	0.745	0.443	0.381	0.544	0.428	0.999
Skewness (Pearson)	10.440	12.214	0.194	16.491	1.090	0.559	6.175	3.508	7.092	2.595	1.042	3.095	1.361	0.890	0.842	0.357	9.184
Kurtosis (Pearson)	155.092	202.576	-0.591	326.764	2.292	0.031	50.066	23.237	54.451	12.634	3.098	15.696	3.723	-0.368	0.609	-0.610	139.164
Geometric mean	0.012	0.609	4.515	11.341	790.979	1.167	2.049	0.913	0.621	7.225	67.999	27.656	2.722	12.984	0.908	20.175	0.505
Geometric standard deviation	1.543	1.591	1.723	2.285	1.976	1.579	1.116	2.827	1.821	1.808	1.474	1.882	1.570	1.419	1.930	1.594	1.820

SSCH: Sericitic Schist

Statistic	Au_ppm	Ag_ppm	Al_%	As_ppm	Ba_ppm	Be_ppm	Bi_ppm	Ca_%	Cd_ppm	Co_ppm	Cr_ppm	Cu_ppm	Fe_%	Ga_ppm	K_%	La_ppm	Mg_%
No. of observations	205	205	205	205	205	205	205	205	205	205	205	205	205	205	205	205	205
No. of missing values	0	0	0	0	0	0	0	0	0	0	0	0	0	150	0	150	0
Minimum	0.010	0.500	0.390	5.000	30.000	0.500	2.000	0.150	0.500	3.000	12.000	5.000	0.920	10.000	0.130	10.000	0.130
Maximum	0.080	38.800	10.300	390.000	7620.000	3.200	6.000	20.500	144.000	40.000	203.000	276.000	9.300	30.000	4.570	40.000	4.530
1st Quartile	0.010	0.500	5.140	5.000	630.000	1.100	2.000	0.730	0.500	9.000	40.000	22.000	2.510	10.000	1.300	10.000	0.770
Median	0.010	0.500	6.310	6.000	860.000	1.400	2.000	1.720	0.500	12.000	51.000	35.000	3.150	10.000	2.020	20.000	0.890
3rd Quartile	0.010	0.500	7.280	15.000	1240.000	1.700	2.000	4.150	0.500	15.000	68.000	63.000	3.950	20.000	2.460	30.000	1.190
Mean	0.012	0.970	6.133	19.166	1179.171	1.421	2.337	2.814	2.349	13.273	61.249	49.249	3.476	14.000	1.911	20.182	1.133
Standard deviation (n)	0.008	2.894	1.597	44.867	1110.368	0.487	0.843	2.769	11.776	7.068	33.008	41.080	1.384	5.257	0.827	9.998	0.722
Variation coefficient	0.662	2.983	0.260	2.341	0.942	0.343	0.361	0.984	5.013	0.532	0.539	0.834	0.398	0.376	0.433	0.495	0.637
Skewness (Pearson)	6.031	11.323	-0.323	6.119	3.057	0.390	2.912	2.090	10.087	1.500	1.876	2.206	1.330	0.781	-0.101	0.509	2.253
Kurtosis (Pearson)	41.772	140.897	0.408	42.234	11.645	0.561	8.280	7.633	109.756	2.139	3.839	6.423	1.829	-0.616	-0.259	-0.947	5.499
Geometric mean	0.011	0.619	5.861	9.666	887.065	1.331	2.240	1.739	0.700	11.747	54.644	37.634	3.240	13.126	1.656	17.767	0.979
Geometric standard deviation	1.378	1.819	1.408	2.473	2.097	1.462	1.300	2.834	2.497	1.633	1.590	2.057	1.449	1.424	1.866	1.674	1.686

APPENDIX C1-1 Bellekeno Waste Rock Drillhole Database
Summary Statistics

Bellekeno Non-Mineralized Rock

SCH: Schist

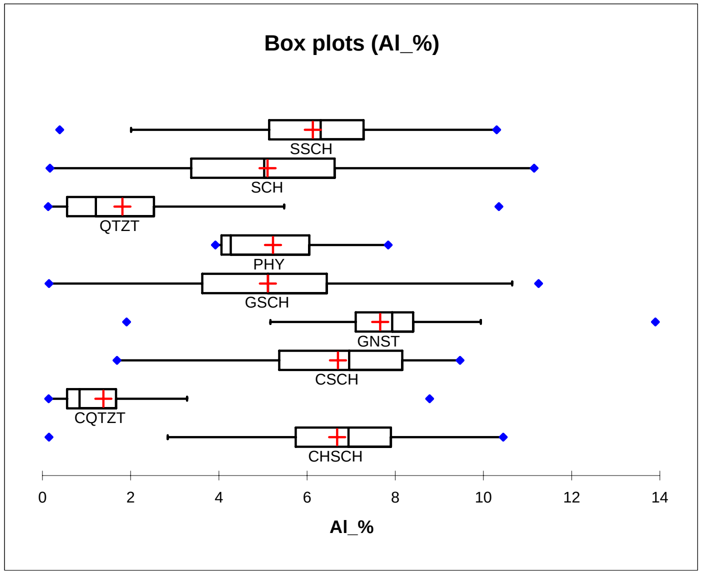
Statistic	Mn_ppm	Mo_ppm	Na_%	Ni_ppm	P_ppm	Pb_ppm	S_%	Sb_ppm	Sc_ppm	Sr_ppm	Th_ppm	Ti_%	Tl_ppm	U_ppm	V_ppm	W_ppm	Zn_ppm
No. of observations	775	775	775	775	775	775	775	775	775	775	775	775	775	775	775	775	775
No. of missing values	0	0	0	0	0	0	0	0	147	0	147	0	147	147	0	0	0
Minimum	47.000	1.000	0.010	1.000	80.000	2.000	0.010	5.000	1.000	9.000	20.000	0.010	10.000	10.000	2.000	10.000	10.000
Maximum	20600.000	18.000	2.800	194.000	4670.000	2040.000	6.160	30.000	36.000	734.000	20.000	1.390	10.000	10.000	1620.000	20.000	2030.000
1st Quartile	192.000	1.000	0.120	26.000	360.000	10.000	0.260	5.000	7.000	88.000	20.000	0.170	10.000	10.000	66.000	10.000	62.500
Median	278.000	1.000	0.200	36.000	510.000	15.000	0.530	5.000	10.000	133.000	20.000	0.230	10.000	10.000	100.000	10.000	89.000
3rd Quartile	469.000	1.000	0.290	49.000	740.000	20.000	0.860	5.000	13.000	193.000	20.000	0.300	10.000	10.000	141.000	10.000	121.000
Mean	547.116	1.578	0.237	38.418	595.548	28.414	0.643	5.845	10.167	149.275	20.000	0.246	10.000	10.000	112.997	10.013	126.310
Standard deviation (n)	1334.902	1.668	0.202	17.679	362.697	95.595	0.549	2.286	5.048	83.232	0.000	0.117	0.000	0.000	92.314	0.359	192.656
Variation coefficient	2.440	1.057	0.851	0.460	0.609	3.364	0.854	0.391	0.496	0.558	0.000	0.476	0.000	0.000	0.817	0.036	1.525
Skewness (Pearson)	9.591	5.086	4.566	1.316	3.257	14.281	2.580	4.502	1.383	1.650		2.845			8.819	27.785	6.429
Kurtosis (Pearson)	110.925	32.525	40.361	7.531	24.796	264.957	14.955	28.329	4.624	5.503		19.405			127.369	770.001	46.655
Geometric mean	321.727	1.285	0.185	34.065	515.980	15.259	0.439	5.598	8.904	129.021	20.000	0.223	10.000	10.000	94.002	10.009	91.737
Geometric standard deviation	2.250	1.680	2.049	1.718	1.698	2.253	2.709	1.295	1.743	1.742	1.000	1.585	1.000	1.000	1.852	1.025	1.935

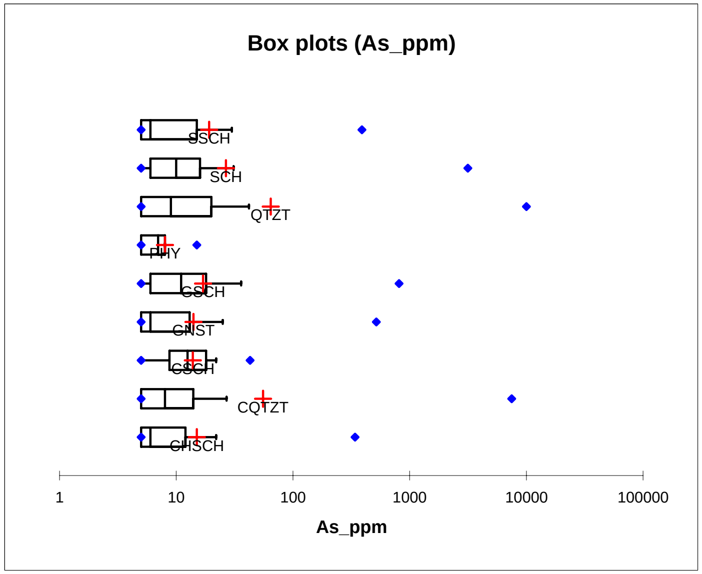
SSCH: Sericitic Schist

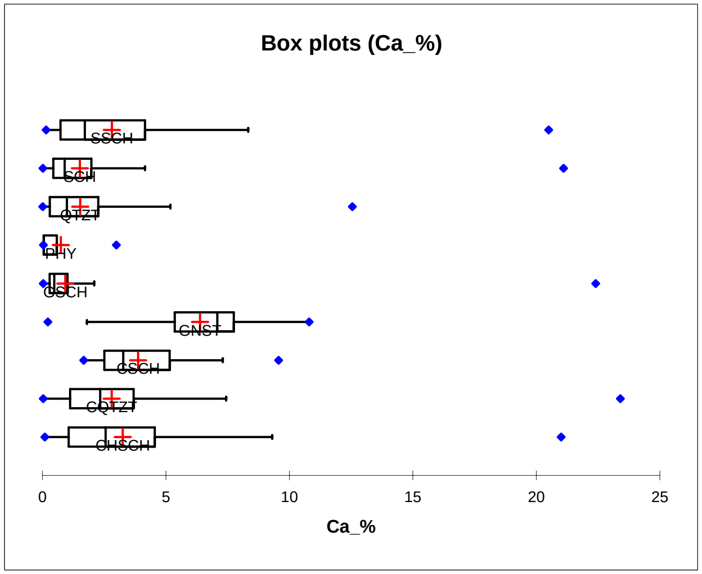
Statistic	Mn_ppm	Mo_ppm	Na_%	Ni_ppm	P_ppm	Pb_ppm	S_%	Sb_ppm	Sc_ppm	Sr_ppm	Th_ppm	Ti_%	Tl_ppm	U_ppm	V_ppm	W_ppm	Zn_ppm
No. of observations	205	205	205	205	205	205	205	205	205	205	205	205	205	205	205	205	205
No. of missing values	0	0	0	0	0	0	0	0	150	0	150	0	150	150	0	0	0
Minimum	50.000	1.000	0.010	4.000	70.000	2.000	0.040	5.000	1.000	4.000	20.000	0.040	10.000	10.000	8.000	10.000	15.000
Maximum	12500.000	22.000	2.090	189.000	1770.000	5530.000	2.220	29.000	31.000	852.000	20.000	0.890	10.000	10.000	1185.000	10.000	9920.000
1st Quartile	447.000	1.000	0.130	20.000	280.000	12.000	0.170	5.000	9.000	80.000	20.000	0.180	10.000	10.000	50.000	10.000	63.000
Median	673.000	1.000	0.330	29.000	360.000	17.000	0.280	5.000	12.000	122.000	20.000	0.220	10.000	10.000	70.000	10.000	80.000
3rd Quartile	958.000	1.000	0.650	47.000	530.000	23.000	0.490	5.000	21.000	218.000	20.000	0.300	10.000	10.000	106.000	10.000	105.000
Mean	1036.268	1.707	0.424	35.673	454.732	51.127	0.394	5.756	14.582	164.707	20.000	0.268	10.000	10.000	107.756	10.000	222.317
Standard deviation (n)	1434.008	2.815	0.361	22.706	289.938	385.087	0.357	2.594	7.852	125.104	0.000	0.146	0.000	0.000	135.084	0.000	876.379
Variation coefficient	1.384	1.649	0.852	0.636	0.638	7.532	0.905	0.451	0.539	0.760	0.000	0.543	0.000	0.000	1.254	0.000	3.942
Skewness (Pearson)	5.039	5.308	1.389	2.191	2.210	14.050	2.255	5.530	0.777	2.130		1.978			4.730		9.057
Kurtosis (Pearson)	29.977	29.547	2.585	9.525	5.786	196.885	5.960	37.561	-0.603	6.748		4.374			28.044		88.025
Geometric mean	714.813	1.228	0.277	30.007	391.532	17.511	0.286	5.489	12.459	129.108	20.000	0.239	10.000	10.000	77.174	10.000	92.981
Geometric standard deviation	2.158	1.780	2.777	1.810	1.692	2.314	2.238	1.298	1.842	2.052	1.000	1.602	1.000	1.000	2.069	1.000	2.346

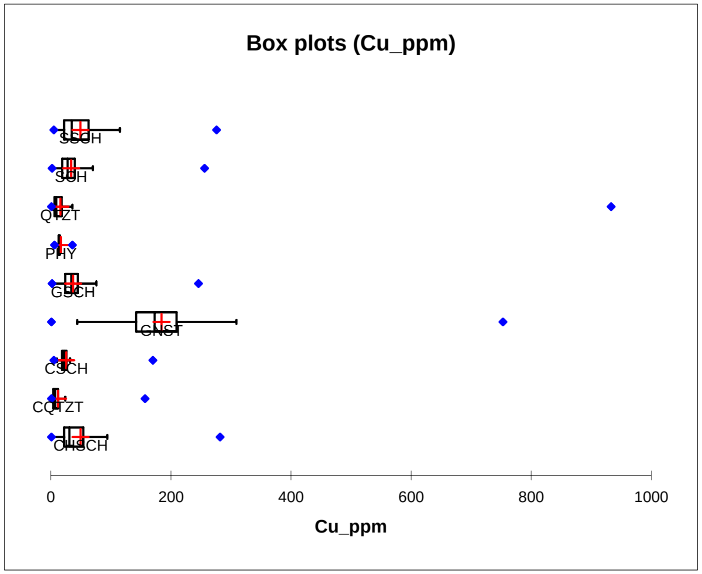
APPENDIX C2-1 Bellekeno Waste Rock Drillhole Database
ICP Metals by Lithology

Bellekeno Non-Mineralized Rock

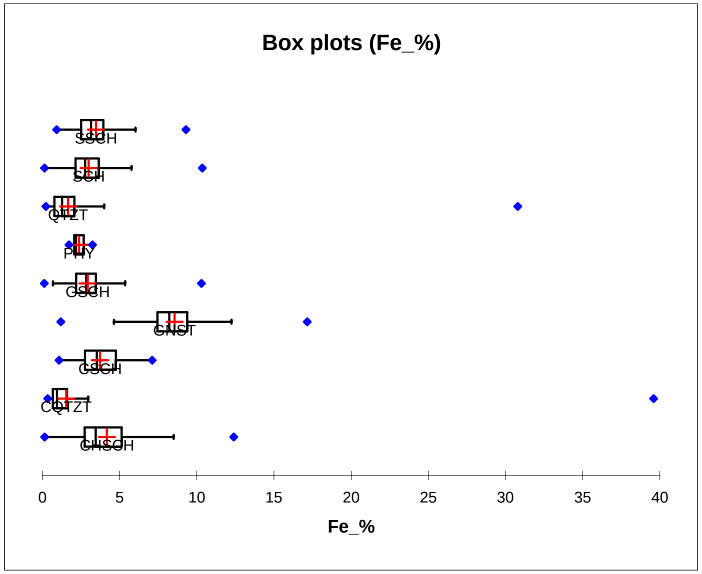


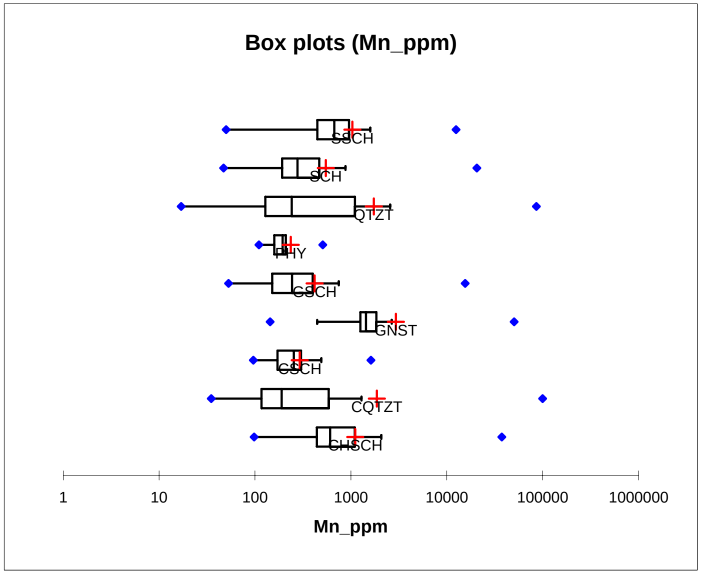


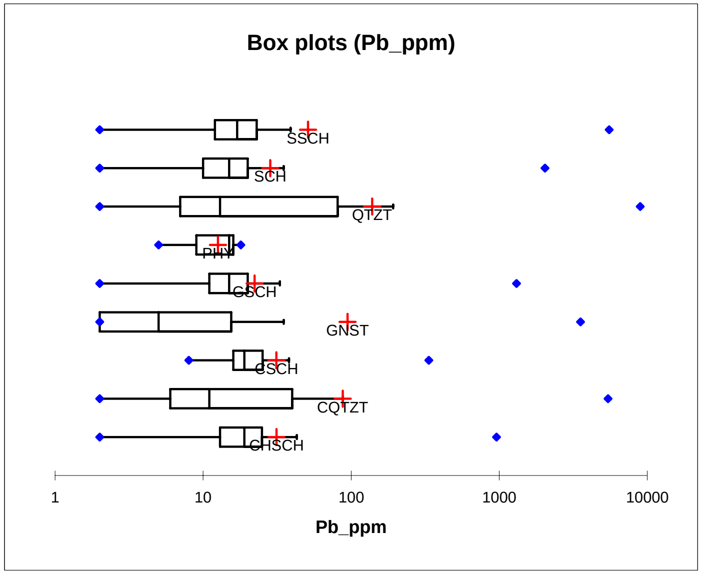


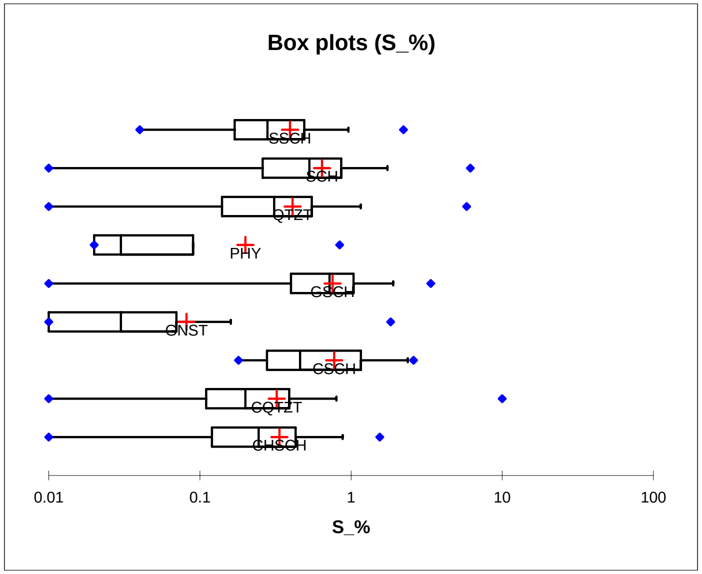


APPENDIX C2-1 Bellekeno Waste Rock Drillhole Database
ICP Metals by Lithology

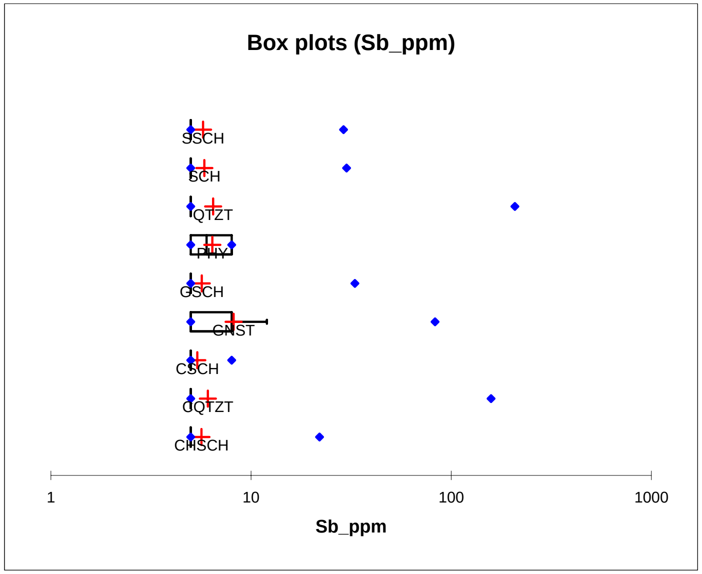


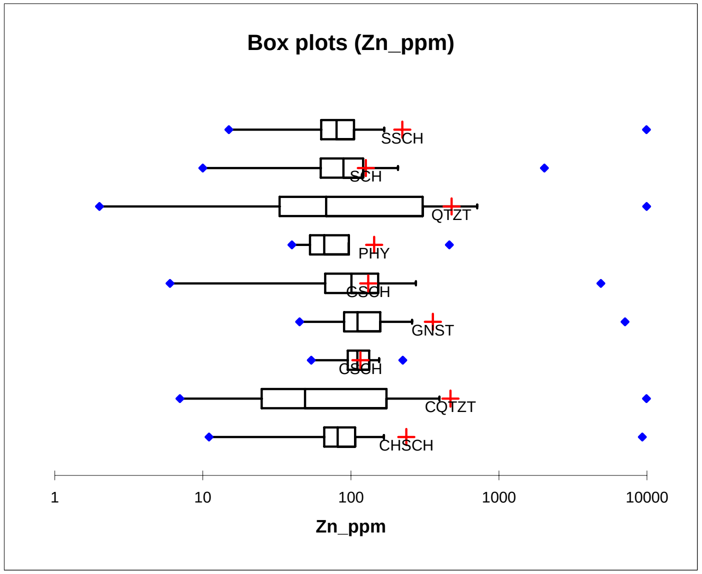






APPENDIX C2-1 Bellekeno Waste Rock Drillhole Database
ICP Metals by Lithology





ATTACHMENT C

Development	Face ID	Sample ID	Lith1	Lith1%	Lith2	Lith2%	Lith3	Lith3%	Vis. Py %	Vis. Ga %	Vis. Sph %	Vis. CaCO3 %	Area m2	Length m	SG	Tonnes	Fizz Rating	Paste pH
Bellekeno_Bypass	P27_SW_12	E604501	GSCH	50	CQTZT	50			0.25	0.00	0.00	0.75	1.40	2.40	2.63	8.84	4	8.59
Bellekeno_Bypass	P27_SW_12	E604502	CQTZT	100					0.25	0.00	0.00	0.75	3.00	2.40	2.64	19.01	4	8.94
Bellekeno_Bypass	P27_SW_12	E604503	CQTZT	100					0.25	0.00	0.00	0.75	2.36	2.40	2.64	14.95	3	8.46
Bellekeno_Bypass	P27_SW_14.4	E604504	CQTZT	100					0.00	0.00	0.00	0.75	1.79	2.20	2.64	10.40	4	9.08
Bellekeno_Bypass	P27_SW_14.4	E604505	CQTZT	95	GSCH	5			0.00	0.00	0.00	0.75	1.65	2.20	2.64	9.58	4	8.83
Bellekeno_Bypass	P27_SW_14.4	E604506	CQTZT	95	GSCH	5			0.00	0.00	0.00	0.75	3.63	2.20	2.64	21.08	4	8.85
Bellekeno_Bypass	P27_SW_16.6	E604507	CQTZT	100					0.00	0.00	0.00	0.75	2.12	2.20	2.64	12.31	4	9.60
Bellekeno_Bypass	P27_SW_16.6	E604508	CQTZT	70	GSCH	30			0.00	0.00	0.00	0.75	1.18	2.20	2.64	6.85	4	8.95
Bellekeno_Bypass	P27_SW_16.6	E604509	CQTZT	100					0.00	0.00	0.00	0.75	3.04	2.20	2.64	17.66	4	8.03
Bellekeno_Bypass	P27_SW_18.8	E604510	CQTZT	100					0.00	0.00	0.00	0.75	2.94	2.20	2.64	17.08	4	9.79
Bellekeno_Bypass	P27_SW_18.8	E604511	CQTZT	100					0.00	0.00	0.00	0.75	3.16	2.20	2.64	18.35	4	8.29
Bellekeno_Bypass	P27_SW_18.8	E604512	CQTZT	50	GSCH	50			0.25	0.00	0.00	0.75	1.59	2.20	2.64	9.23	4	9.00
Bellekeno_Bypass	P27_SW_22.1	E604513	CQTZT	70	GSCH	30			0.25	0.00	0.00	0.75	6.48	3.20	2.64	54.74	4	9.02
Bellekeno_Bypass	P27_SW_25.3	E604514	CQTZT	90	GSCH	10			0.00	0.00	0.00	0.75	6.48	3.10	2.64	53.03	2	8.30
Bellekeno_Bypass	P27_SW_28.4	E604515	CQTZT	100					0.01	0.00	0.00	0.75	6.48	3.30	2.64	56.45	4	8.47
Bellekeno_Bypass	P27_SW_31.7	E604516	CQTZT	100					0.01	0.00	0.00	0.75	5.83	3.30	2.64	50.79	2	8.35
Bellekeno_Bypass	P27_SW_31.7	E604517	VN	100					0.50	0.00	0.00	0.75	0.65	3.30	2.65	5.68	2	7.82
Bellekeno_Bypass	P29_SW_10.3	E604518	CQTZT	100					0.01	0.00	0.00	0.75	6.22	3.30	2.64	54.19	2	8.03
Bellekeno_Bypass	P29_SW_24.4	E604519	CQTZT	100					0.25	0.00	0.00	0.75	5.76	3.50	2.64	53.22	2	9.27
Bellekeno_Bypass	P29_SW_27.9	E604520	CQTZT	100					0.00	0.00	0.00	0.75	4.80	3.00	2.64	38.02	3	9.06
Bellekeno_Bypass	P29_SW_13.6	E604521	VN	80	CQTZT	20			0.50	0.00	0.00	0.10	1.22	3.90	2.65	12.61	2	7.52
Bellekeno_Bypass	P29_SW_13.6	E604522	CQTZT	100					0.01	0.00	0.00	0.75	4.99	3.90	2.64	51.38	3	7.42
Bellekeno_Bypass	P29_SW_17.5	E604523	CQTZT	80	VN	20			0.01	0.00	0.00	0.25	0.52	3.40	2.64	4.67	2	7.21
Bellekeno_Bypass	P29_SW_17.5	E604524	CQTZT	100					0.01	0.00	0.00	0.25	5.69	3.40	2.64	51.07	2	7.68
Bellekeno_Bypass	P29_SW_20.9	E604525	CQTZT	90	VN	10			0.01	0.00	0.00	0.25	6.48	3.50	2.64	59.88	2	7.89
Bellekeno_625 2nd Bypass	A47_SW_14.3	E604526	GNST	90	VM	10			0.00	0.00	0.25	0.75	3.13	3.20	2.77	27.74	4	8.04
Bellekeno_625 2nd Bypass	A47_SW_14.3	E604527	GNST	90	VM	10			0.00	0.00	0.50	0.75	3.67	3.20	2.77	32.53	4	7.68
Bellekeno_625 2nd Bypass	A47_SW_17.5	E604528	GNST	100					0.00	0.00	0.05	0.75	4.28	3.20	2.77	37.94	4	9.07
Bellekeno_625 2nd Bypass	A47_SW_17.5	E604529	GNST	95	VM	5			0.00	0.25	0.00	0.75	2.04	3.20	2.77	18.08	4	9.48
Bellekeno_625 2nd Bypass	A47_SW_20.1	E604530	GNST	100					0.25	0.00	0.00	0.75	4.83	2.20	2.77	29.43	4	9.71
Bellekeno_625 2nd Bypass	A47_SW_20.1	E604531	GNST	100					0.25	0.25	0.00	0.75	2.81	2.20	2.77	17.12	4	9.74
Bellekeno_625 2nd Bypass	A47_SW_23.3	E604532	GNST	100					0.25	0.25	0.00	0.75	3.51	3.30	2.77	32.08	4	9.38
Bellekeno_625 2nd Bypass	A47_SW_23.3	E604533	GNST	95	VN	5			0.25	0.25	0.00	0.75	3.95	3.30	2.77	36.11	4	9.87
Bellekeno_625 2nd Bypass	A47_SW_26.6	E604534	GNST	100					0.25	0.25	0.00	0.75	2.90	3.40	2.77	27.31	4	9.96
Bellekeno_625 2nd Bypass	A47_SW_26.6	E604535	GNST	100					0.25	0.00	0.00	0.75	3.30	3.40	2.77	31.08	4	9.98
Bellekeno_625 2nd Bypass	A47_SW_30	E604536	GNST	100					0.25	0.25	0.00	0.75	3.50	3.40	2.77	32.96	4	9.97
Bellekeno_625 2nd Bypass	A47_SW_30	E604537	GNST	100					0.25	0.25	0.00	0.75	2.26	3.40	2.77	21.28	4	9.36
Bellekeno_625 2nd Bypass	A47_SW_33.4	E604538	GNST	100					0.50	0.00	0.10	0.75	3.56	3.60	2.77	35.50	4	9.93
Bellekeno_625 2nd Bypass	A47_SW_33.4	E604539	GNST	100					0.50	0.00	0.10	0.75	2.13	3.60	2.77	21.24	4	9.26
Bellekeno_625 2nd Bypass	A47_SW_37	E604540	GNST	100					0.25	0.00	0.00	0.75	1.08	3.10	2.77	9.27	3	8.58
Bellekeno_625 2nd Bypass	A47_SW_37	E604541	VN	100					0.00	0.00	0.00	0.75	0.53	3.10	2.65	4.35	2	8.03
Bellekeno_625 2nd Bypass	A47_SW_37	E604542	GNST	100					0.00	0.00	0.00	0.75	4.64	3.10	2.77	39.84	2	7.75
Bellekeno_625 2nd Bypass	A49_SW_9.2	E604543	GNST	100					0.25	0.25	0.00	0.75	2.93	5.60	2.77	45.45	4	8.94
Bellekeno_625 2nd Bypass	A49_SW_9.2	E604544	GNST	100					0.25	0.25	0.00	0.75	3.23	5.60	2.77	50.10	4	8.95
Bellekeno_625 2nd Bypass	A49_SW_14.8	E604545	GNST	100					0.00	0.00	0.00	0.75	3.24	3.40	2.77	30.51	3	9.43
Bellekeno_625 2nd Bypass	A49_SW_14.8	E604546	GNST	100					0.00	0.00	0.00	0.75	3.24	3.40	2.77	30.51	4	8.84
Bellekeno_625 2nd Bypass	A49_SW_18.2	E604547	GNST	100					0.00	0.00	0.00	0.75	6.32	2.40	2.77	42.02	4	8.98
Bellekeno_625 2nd Bypass	A49_SW_18.2	E604548	VN	100					0.00	0.00	0.00	0.75	0.16	2.40	2.65	1.02	3	8.14
Bellekeno_625 2nd Bypass	A49_SW_20.6	E604549	GNST	100					0.00	0.00	0.00	0.75	6.10	5.10	2.77	86.17	4	9.55
Bellekeno_625 2nd Bypass	A49_SW_20.6	E604550	VN	100					0.00	0.00	0.00	0.10	0.38	5.10	2.65	5.14	2	7.01
Bellekeno_750 Level #1 X-Cut	P78_E_20.8	E604551	QTZT	100					0.10	0.00	0.10	0.75	5.56	3.50	2.60	50.60	4	8.96
Bellekeno_750 Level #1 X-Cut	P78_E_20.8	E604552	QTZT	100					0.10	0.00	0.10	0.75	5.23	3.50	2.60	47.59	2	8.73
Bellekeno_750 Level #1 X-Cut	P78_E_23.1	E604553	QTZT	75	GSCH	25			0.25	0.00	0.10	0.75	2.08	2.30	2.60	12.44	2	8.69
Bellekeno_750 Level #1 X-Cut	P78_E_23.1	E604554	QTZT	100					0.01	0.00	0.10	0.75	4.83	2.30	2.60	28.88	2	8.79
Bellekeno_750 Level #1 X-Cut	P78_E_23.1	E604555	QTZT	80	GSCH	10	VN	10	0.25	0.00	0.10	0.75	3.88	2.30	2.60	23.20	3	8.39
Bellekeno_750 Level #1 X-Cut	P78_E_26	E604556	CQTZT	100					0.00	0.00	0.00	0.75	2.56	2.90	2.64	19.60	3	8.52
Bellekeno_750 Level #1 X-Cut	P78_E_26	E604557	CQTZT	98	GSCH	2			0.05	0.00	0.00	0.75	5.52	2.90	2.64	42.26	2	8.80
Bellekeno_750 Level #1 X-Cut	P78_E_26	E604558	CQTZT	100					0.01	0.00	0.00	0.75	2.72	2.90	2.64	20.82	4	8.82
Bellekeno_750 Level #1 X-Cut	P78_E_29.3	E604563	CQTZT	95	GSCH	5			0.10	0.00	0.00	0.75	12.96	2.30	2.64	78.69	3	8.81
Bellekeno_750 Level #1 X-Cut	P78_E_31.6	E604564	CQTZT	100					0.00	0.00	0.00	0.75	1.86	4.10	2.64	20.13	4	8.34
Bellekeno_750 Level #1 X-Cut	P78_E_31.6	E604565	CQTZT	100					0.10	0.00	0.00	0.75	8.47	4.10	2.64	91.68	4	9.03
Bellekeno_750 Level #1 X-Cut	P78_E_31.6	E604566	CQTZT	100					0.00	0.00	0.00	0.75	2.63	4.10	2.64	28.47	3	8.84
Bellekeno_750 Level #1 X-Cut	P78_NE/SE_29	E604567	CQTZT	100					0.00	0.00	0.00	0.75	18.00	2.00	2.64	95.04	4	8.67
Bellekeno_750 Level #1 X-Cut	P78_NE_31	E604568	CQTZT	100					0.10	0.00	0.00	0.75	6.67	2.00	2.64	35.22	4	9.23
Bellekeno_750 Level #1 X-Cut	P78_NE_31	E604569	CQTZT	95	GSCH	5			0.10	0.00	0.00	0.75	14.03	2.00	2.64	74.08	2	8.76
Bellekeno_750 Level #1 X-Cut	P78_SE_32	E604591	QTZT	100					0.20	0.00	0.00	0.75	18.00	3.00	2.60	140.40	3	8.76
Bellekeno_750 Level #1 X-Cut	P78_SE_35	E604592	QTZT	90	VN	5	GSCH	5	0.25	0.01	0.00	0.75	4.76	2.40	2.60	29.70	4	9.23
Bellekeno_750 Level #1 X-Cut	P78_SE_35	E604593	QTZT	40	VM	60			0.50	2.00	0.00	0.75	2.69	2.40	2.60	16.79	2	8.25
Bellekeno_North Lateral	P26_N_11.4	E606001	CQTZT	90	GSCH	10			0.00	0.00	0.00	0.75	10.61	2.90	2.64	81.23	4	9.60
Bellekeno_East Decline	P23_W_27.4	E606002	CQTZT	60	GSCH	40			0.00	0.00	0.00	0.75	3.77	6.50	2.64	64.69	4	9.40
Bellekeno_East Decline	P23_W_27.4	E606003	CQTZT	100					0.30	0.00	0.00	0.75	7.97	6.50	2.64	136.77	4	9.54
Bellekeno_East Decline	P23_W_27.4	E606004	CQTZT	50	GSCH	50			0.00	0.00	0.00	0.75	14.15	6.50	2.64	242.81	3	9.07
Bellekeno_North Lateral	P26_N_14.3	E606005	CQTZT	95	GSCH	5			0.00	0.00	0.00	0.75	8.34	3.20	2.64	70.46	4	9.70
Bellekeno_North Lateral	P26_N_14.3	E606006	CQTZT	90	VN	10			0.25	0.00	0.00	0.75	3.86	3.20	2.64	32.61	4	9.41
Bellekeno_North Lateral	P26_N_14.3	E606007	CQTZT	60	GSCH	40			0.00	0.00	0.00	0.75	10.93	3.20	2.64	92.34	4	8.71
Bellekeno_North Lateral	P26_N_17.5	E606008	CQTZT	85	VN	15			0.00	0.00	0.00	0.75	9.09	2.70	2.64	64.79	4	9.25
Bellekeno_North Lateral	P26_N_17.5	E606009	CQTZT	90	GSCH	10			0.25	0.00	0.00	0.75	6.67	2.70	2.64	47.54	4	9.67
Bellekeno_North Lateral	P26_N_17.5	E606010	CQTZT	80	VN	20			0.10	0.00	0.00	0.75	9.47	2.70	2.64	67.50	4	9.87
Bellekeno_North Lateral	P26_N_20.2	E606011	CQTZT	95	GSCH	5			0.00	0.00	0.00	0.75	5.62	NA	2.64	NA	3	9.51
Bellekeno_North Lateral	P26_N_20.2	E606012	CQTZT	70	GSCH	30			0.00	0.00	0.00	0.75	5.42	NA	2.64	NA	2	9.45
Bellekeno_North Lateral	P26_N_20.2	E606013	CQTZT	70	VN	20	GSCH	10	0.25	0.00	0.00	0.75	11.47	NA	2.64	NA	4	9.58
Bellekeno_East Decline	P23_W_33.9	E606020	CQTZT	80	GSCH	20			0.25	0.00	0.00	0.75	8.46	1.62	2.64	36.18	3	9.16
Bellekeno_East Decline	P23_W_33.9	E606021	GSCH	80	CQTZT	20			0.25	0.00	0.00	0.75	5.53	1.62	2.63	23.56	2	9.19
Bellekeno_East Decline	P23_W_33.9	E606022	CQTZT	70	GSCH	30			0.25	0.00	0.00	0.75	10.85	1.62	2.64	46.40	4	8.96
Bellekeno_East Decline	P23_W_35.52	E606023	CQTZT	100					0.00	0.00	0.00	0.75	21.16	1.62	2.64	90.50	4	8.46
Bellekeno_East Decline	P23_W_37.14	E606024	CQTZT	70	GSCH	30			0.25	0.00	0.00	0.75	21.16	1.62	2.64	90.50	2	8.58
Bellekeno_East Decline	P28_W_16.7	E606032	CQTZT	90	GSCH	10			0.05	0.00	0.00	0.75	9.62	2.71	2.64	68.83	3	8.52
Bellekeno_East Decline	P28_W_16.7	E606033	GSCH	100					0.05	0.00	0.00	0.00	5.50	2.71	2.63	39.20	2	9.07
Bellekeno_East Decline	P28_W_16.7	E606034	CQTZT	80	GSCH	20			0.01	0.00	0.00	0.75	9.62	2.71	2.64	68.83	3	8.67
Bellekeno_East Decline	P28_W_19.8	E606035	CQTZT	90	GSCH	10			0.50	0.00	0.00	0.75	3.92	3.10	2.64	32.08	3	8.48
Bellekeno_East Decline	P28_W_19.8	E606036	GSCH	100					0.01	0.00	0.00	0.00	7.23	3.10	2.63	58.95	3	8.61
Bellekeno_East Decline	P28_W_19.8	E606037	CQTZT	80	GSCH	20			0.01	0.00	0.00	0.75	9.14	3.10	2.64	74.80	4	9.04
Bellekeno_East Decline	P28_W_22.6	E606038	CQTZT	80	GSCH	20			0.01	0.00	0.00	0.75	7.10	2.80	2.64	52.48	4	9.10
Bellekeno_East Decline	P28_W_22.6	E606039	CQTZT	80	GSCH	20			0.01	0.00	0.00	0.75	7.10	2.80	2.64	52.48	4	9.01
Bellekeno_East Decline	P28_W_22.6	E606040	CQTZT	80	GSCH	20			0.01	0.00	0.00	0.75	7.10	2.80	2.64	52.48	4	9.18
Bellekeno_East Decline	P28_W_25.4	E606041	GSCH	70	CQTZT	30			0.50	0.00	0.00	0.00	3.52	3.70	2.63	34.25	3	7.97
Bellekeno_East Decline	P28_W_25.4	E606042	CQTZT	90	GSCH	10			0.01	0.00	0.00	0.75	19.60	3.70	2.64	191.45	4	8.79
Bellekeno_East Decline	P28_W_29.1	E606043	CQTZT	100					0.10	0.00	0.00	0.75	7.10	3.66	2.64	68.60	4	8.74
Bellekeno_East Decline	P28_W_29.1	E606044	CQTZT	70	GSCH	30			0.10	0.00	0.00	0.75	7.10	3.66	2.64	68.60	4	8.85
Bellekeno_East Decline	P28_W_29.1	E606045	CQTZT	100					0.10	0.00	0.00	0.75	7.10	3.66	2.64	68.60	4	8.70
Bellekeno_East Decline	P28_W_32.76	E606046	GSCH	100					0.01	0.00	0.00	0.00	2.60	3.24	2.63	22.16	4	8.80
Bellekeno_East Decline	P28_W_32.76	E606047	CQTZT	90	GSCH	10			0.05	0.00	0.00	0.75	18.68	3.24	2.64	159.78	4	8.48
Bellekeno_East Decline	P28_W_36	E606048	CQTZT	100					0.05	0.00	0.00	0.75	7.10	3.93	2.64	73.66	4	8.83
Bellekeno_East Decline	P28_W_36	E606049	CQTZT	60	GSCH	40			0.10	0.00	0.00	0.75	7.10	3.93	2.64	73.66	4	8.38
Bellekeno_East Decline	P28_W_36	E606050	CQTZT	100					0.01	0.00	0.00	0.75	7.10	3.93	2.64	73.66	3	8.68
Bellekeno_East Decline	P28_W_39.3	E606051	GSCH	100					0.01	0.00	0.00	0.00	0.61	3.60	2.63	5.78	2	8.27
Bellekeno_East Decline	P28_W_39.3	E606052	CQTZT	90	GSCH	10			0.01	0.00	0.00	0.75	21.15	3.60	2.64	201.01	4	9.27
Bellekeno_East Decline	P30_W_14.4	E606053	FLT	100					0.00	0.00	0.00	0.75	0.10	2.85			4	8.90
Bellekeno_East Decline	P30_W_14.4	E606054	CQTZT	90	GSCH	10			0.10	0.00	0.00	0.75	21.10	2.85	2.64	158.76	4	8.65
Bellekeno_East Decline	P30_W_17.15	E606063	CQTZT	95	GSCH	5			0.01	0.00	0.00	0.75	21.45	3.40	2.64	192.54	4	9.40
Bellekeno_East Decline	Remuck3-BS_SW_12.7	E606064	GSCH	60	CQTZT	40			0.50	0.00	0.00	0.75	21.16	4.20	2.63	233.73	3	8.91
Bellekeno_East Decline	P30_W_20.65	E606065	CQTZT	95	GSCH	5			0.10	0.00	0.00	0.75	10.73	3.95	2.64	111.89	4	9.25
Bellekeno_East Decline	P30_W_20.65	E606066	CQTZT	95	GSCH	5			0.10	0.00	0.00	0.75	10.73	3.95	2.64	111.89	4	9.43
Bellekeno_East Decline	Remuck3-BS_SW_16.9	E606067	CQTZT	100					0.05	0.00	0.00	0.75	21.16	2.50	2.64	139.66	4	8.55
Bellekeno_East Decline	P30_W_24.6	E606068	CQTZT	90	GSCH	5	VN	5	0.05	0.00	0.00	0.75	15.38	7.00	2.64	284.22	4	9.41
Bellekeno_East Decline	P30_W_24.6	E606069	CQTZT	100					0.05	0.00	0.00	0.75	6.77	7.00	2.64	125.11	4	9.42
Bellekeno_East Decline	Remuck3-BS_SW_19.4	E606070	CQTZT	90	GSCH	10			0.00	0.00	0.00	0.75	6.98	3.00	2.64	55.28	4	9.04
Bellekeno_East Decline	Remuck3-BS_SW_19.4	E606071	CQTZT	80	VN	20			0.00	0.00	0.00	0.75	8.78	3.00	2.64	69.54	4	9.41
Bellekeno_East Decline	P30_W_31.6	E606072	CQTZT	90	GSCH	10			0.00	0.00	0.00	0.75	12.17	7.50	2.64	240.97	4	9.49
Bellekeno_East Decline	P30_W_31.6	E606073	CQTZT	95	GSCH	5			0.00	0.00	0.00	0.75	7.73	7.50	2.64	153.05	4	9.34
Bellekeno_East Decline	P30_W_31.6	E606074	CQTZT	60	GSCH	40			0.00	0.00	0.00	0.75	4.08	7.50	2.64	80.78	4	9.30

Development	Face ID	Sample ID	Lith1	Lith1%	Lith2	Lith2%	Lith3	Lith3%	Vis. Py %	Vis. Ga %	Vis. Sph %	Vis. CaCO3 %	Area m2	Length m	SG	Tonnes	Fizz Rating	Paste pH
Bellekeno_East Decline	P31_W_5.3	E606075	CQTZT	80	GSCH	20			0.00	0.00	0.00	0.75	5.47	3.70	2.64	53.43	4	8.47
Bellekeno_East Decline	P31_W_5.3	E606076	CQTZT	90	GSCH	10			0.25	0.00	0.00	0.75	11.80	3.70	2.64	115.26	4	9.75
Bellekeno_East Decline	P31_W_5.3	E606077	CQTZT	70	GSCH	30			0.25	0.00	0.00	0.75	6.36	3.70	2.64	62.12	4	9.78
Bellekeno_East Decline	P31_W_9	E606078	CQTZT	95	GSCH	5			0.00	0.00	0.00	0.75	11.25	3.70	2.64	109.89	4	9.47
Bellekeno_East Decline	P31_W_9	E606079	CQTZT	90	VN	10			0.25	0.00	0.00	0.75	5.90	3.70	2.64	57.63	4	9.43
Bellekeno_East Decline	P31_W_9	E606080	CQTZT	80	GSCH	15	VN	5	0.25	0.00	0.00	0.75	6.88	3.70	2.64	67.20	4	9.40
Bellekeno_East Decline	P31_W_12.7	E606081	CQTZT	80	GSCH	20			0.00	0.00	0.00	0.75	4.94	2.70	2.64	35.21	3	9.06
Bellekeno_East Decline	P31_W_12.7	E606082	CQTZT	90	GSCH	10			0.00	0.00	0.00	0.75	10.39	2.70	2.64	74.06	4	8.63
Bellekeno_East Decline	P31_W_12.7	E606083	CQTZT	70	GSCH	30			0.25	0.00	0.00	0.75	9.65	2.70	2.64	68.79	3	8.80
Bellekeno_East Decline	P31_W_15.4	E606084	CQTZT	80	GSCH	20			0.00	0.00	0.00	0.75	7.67	4.00	2.64	81.00	4	8.78
Bellekeno_East Decline	P31_W_15.4	E606085	CQTZT	70	VN	30			0.25	0.00	0.00	0.75	5.97	4.00	2.64	63.04	2	8.79
Bellekeno_East Decline	P31_W_15.4	E606086	CQTZT	70	GSCH	30			0.25	0.00	0.00	0.75	8.65	4.00	2.64	91.34	4	8.88
Bellekeno_East Decline	P31_W_19.4	E606087	CQTZT	90	GSCH	10			0.00	0.00	0.00	0.75	21.16	4.00	2.64	223.45	4	9.55
Bellekeno_East Decline	P31_W_23.4	E606088	CQTZT	80	GSCH	20			0.25	0.00	0.00	0.75	8.17	3.40	2.64	73.33	4	8.95
Bellekeno_East Decline	P31_W_23.4	E606089	CQTZT	95	GSCH	5			0.00	0.00	0.00	0.75	7.67	3.40	2.64	68.85	4	9.03
Bellekeno_East Decline	P31_W_23.4	E606090	CQTZT	70	GSCH	30			0.25	0.00	0.00	0.75	7.58	3.40	2.64	68.04	4	8.77
Bellekeno_East Decline	P31_W_26.8	E606091	CQTZT	80	GSCH	20			0.25	0.00	0.00	0.75	8.13	3.40	2.64	72.97	4	7.90
Bellekeno_East Decline	P31_W_26.8	E606092	CQTZT	95	VN	5			0.00	0.00	0.00	0.75	10.42	3.40	2.64	93.53	3	9.01
Bellekeno_East Decline	P31_W_26.8	E606093	CQTZT	75	GSCH	25			0.25	0.00	0.00	0.75	6.80	3.40	2.64	61.04	4	9.19
Bellekeno_East Decline	P31_W_30.75	E606094	CQTZT	90	GSCH	10			0.00	0.00	0.00	0.75	9.35	3.95	2.64	97.50	4	9.11
Bellekeno_East Decline	P31_W_30.75	E606095	CQTZT	80	GSCH	10	VN	10	0.25	0.00	0.00	0.75	5.76	3.95	2.64	60.07	4	9.15
Bellekeno_East Decline	P31_W_30.75	E606096	CQTZT	85	GSCH	15			0.25	0.00	0.00	0.75	8.74	3.95	2.64	91.14	4	9.20
Bellekeno_East Decline	P31_W_34.7	E606097	CQTZT	90	GSCH	10			0.00	0.00	0.00	0.75	8.73	4.00	2.64	92.19	4	9.35
Bellekeno_East Decline	P31_W_34.7	E606098	CQTZT	80	VN	10	GSCH	10	0.25	0.00	0.00	0.75	4.52	4.00	2.64	47.73	4	9.66
Bellekeno_East Decline	P31_W_34.7	E606099	CQTZT	80	GSCH	20			0.25	0.00	0.00	0.75	8.97	4.00	2.64	94.72	4	9.51
Bellekeno_East Decline	P31_W_38.7	E606100	CQTZT	90	GSCH	10			0.00	0.00	0.00	0.75	4.10	3.10	2.64	33.55	4	9.70
Bellekeno_East Decline	P31_W_38.7	E606101	CQTZT	70	VN	20	GSCH	10	0.25	0.00	0.00	0.75	8.19	3.10	2.64	67.03	4	8.62
Bellekeno_East Decline	P31_W_38.7	E606102	CQTZT	90	GSCH	10			0.25	0.00	0.00	0.75	11.05	3.10	2.64	90.43	4	8.78
Bellekeno_East Decline	P41_W_13.8	E606103	CQTZT	80	VN	20			0.25	0.00	0.00	0.75	12.02	4.10	2.64	130.10	4	7.75
Bellekeno_East Decline	P41_W_13.8	E606104	CQTZT	95	GSCH	5			0.00	0.00	0.00	0.75	4.81	4.10	2.64	52.06	4	8.83
Bellekeno_East Decline	P41_W_13.8	E606105	CQTZT	90	GSCH	10			0.00	0.00	0.00	0.75	7.49	4.10	2.64	81.07	4	8.52
Bellekeno_East Decline	P41_W_17.9	E606106	CQTZT	80	VN	20			0.25	0.00	0.00	0.75	7.61	3.20	2.64	64.29	4	8.74
Bellekeno_East Decline	P41_W_17.9	E606107	CQTZT	100					0.00	0.00	0.00	0.75	6.55	3.20	2.64	55.33	4	9.07
Bellekeno_East Decline	P41_W_17.9	E606108	CQTZT	80	GSCH	20			0.25	0.00	0.00	0.75	9.18	3.20	2.64	77.55	4	9.02
Bellekeno_East Decline	P41_W_21.2	E606109	CQTZT	80	VN	20			0.25	0.00	0.00	0.75	9.72	3.70	2.64	94.94	4	8.94
Bellekeno_East Decline	P41_W_21.2	E606110	CQTZT	90	GSCH	10			0.00	0.00	0.00	0.75	10.14	3.70	2.64	99.05	4	9.12
Bellekeno_East Decline	P41_W_21.2	E606111	CQTZT	80	GSCH	20			0.50	0.00	0.00	0.75	4.59	3.70	2.64	44.84	4	9.14
Bellekeno_East Decline	P41_W_24.9	E606112	CQTZT	90	VN	10			0.25	0.00	0.00	0.75	10.19	2.60	2.64	69.94	4	9.03
Bellekeno_East Decline	P41_W_24.9	E606113	CQTZT	95	GSCH	5			0.25	0.00	0.00	0.75	4.92	2.60	2.64	33.77	4	9.14
Bellekeno_East Decline	P41_W_24.9	E606114	CQTZT	80	GSCH	15	VN	5	0.25	0.00	0.00	0.75	9.16	2.60	2.64	62.87	4	9.19
Bellekeno_East Decline	P41_W_27.5	E606115	CQTZT	80	VN	10	GSCH	10	0.25	0.00	0.00	0.75	10.38	3.70	2.64	101.39	4	8.78
Bellekeno_East Decline	P41_W_27.5	E606116	CQTZT	90	GSCH	10			0.00	0.00	0.00	0.75	5.96	3.70	2.64	58.22	4	9.02
Bellekeno_East Decline	P41_W_27.5	E606117	CQTZT	80	GSCH	15	VN	5	0.25	0.00	0.00	0.75	8.10	3.70	2.64	79.12	4	9.11
Bellekeno_East Decline	P41_W_31.2	E606118	CQTZT	80	VN	15	GSCH	5	0.00	0.00	0.00	0.75	11.87	3.70	2.64	115.95	4	9.00
Bellekeno_East Decline	P41_W_31.2	E606119	CQTZT	90	GSCH	10			0.00	0.00	0.00	0.75	5.38	3.70	2.64	52.55	4	8.99
Bellekeno_East Decline	P41_W_31.2	E606120	CQTZT	80	GSCH	20			0.25	0.00	0.00	0.75	6.84	3.70	2.64	66.81	4	9.01
Bellekeno_East Decline	P41_W_34.9	E606121	CQTZT	100					0.00	0.00	0.00	0.75	7.35	6.70	2.64	130.01	4	9.08
Bellekeno_East Decline	P41_W_34.9	E606122	CQTZT	90	VN	10			0.25	0.00	0.00	0.75	5.36	6.70	2.64	94.81	4	9.14
Bellekeno_East Decline	P41_W_34.9	E606123	CQTZT	90	GSCH	10			0.25	0.00	0.00	0.75	10.03	6.70	2.64	177.41	4	9.17
Bellekeno_East Decline	P42_W_11.1	E606124	CQTZT	100					0.25	0.00	0.00	0.75	8.37	4.70	2.64	103.85	4	9.30
Bellekeno_East Decline	P42_W_11.1	E606125	CQTZT	80	VN	20			0.25	0.00	0.00	0.75	6.88	4.70	2.64	85.37	4	9.11
Bellekeno_East Decline	P42_W_11.1	E606126	CQTZT	70	GSCH	25	VN	5	0.25	0.00	0.00	0.75	8.36	4.70	2.64	103.73	4	9.31
Bellekeno_East Decline	P42_W_15.8	E606127	CQTZT	90	VN	5	GSCH	5	0.25	0.00	0.00	0.75	8.71	2.70	2.64	62.08	4	8.95
Bellekeno_East Decline	P42_W_15.8	E606128	CQTZT	90	VN	10			0.25	0.00	0.00	0.75	6.83	2.70	2.64	48.68	4	9.03
Bellekeno_East Decline	P42_W_15.8	E606129	CQTZT	80	GSCH	20			0.25	0.00	0.00	0.75	8.39	2.70	2.64	59.80	4	9.02
Bellekeno_East Decline	P42_W_18.7	E606130	CQTZT	95	GSCH	5			0.25	0.00	0.00	0.75	8.18	4.00	2.64	86.38	4	9.15
Bellekeno_East Decline	P42_W_18.7	E606131	CQTZT	80	VN	20			0.50	0.00	0.00	0.75	8.64	4.00	2.64	91.24	4	9.21
Bellekeno_East Decline	P42_W_18.7	E606132	CQTZT	70	GSCH	30			0.25	0.00	0.00	0.75	4.14	4.00	2.64	43.72	4	8.85
Bellekeno_East Decline	P42_W_22.7	E606133	CQTZT	90	VN	10			0.00	0.00	0.00	0.75	9.85	3.60	2.64	93.61	4	9.08
Bellekeno_East Decline	P42_W_22.7	E606134	CQTZT	95	VN	5			0.25	0.00	0.00	0.75	7.50	3.60	2.64	71.28	4	9.24
Bellekeno_East Decline	P42_W_22.7	E606135	CQTZT	80	VN	10	GSCH	10	0.50	0.00	0.00	0.75	7.01	3.60	2.64	66.62	4	9.11
Bellekeno_East Decline	P42_W_26.3	E606136	CQTZT	80	VN	20			0.25	0.00	0.00	0.75	10.05	3.80	2.64	100.82	4	8.65
Bellekeno_East Decline	P42_W_26.3	E606137	CQTZT	70	GSCH	30			0.25	0.00	0.00	0.75	4.31	3.80	2.64	43.24	4	9.12
Bellekeno_East Decline	P42_W_26.3	E606138	CQTZT	90	VN	5	GSCH	5	0.25	0.00	0.00	0.75	9.48	3.80	2.64	95.10	4	9.12
Bellekeno_East Decline	P42_W_30.1	E606139	CQTZT	50	GSCH	40	VN	10	0.25	0.00	0.00	0.75	4.18	3.30	2.64	36.42	3	8.17
Bellekeno_East Decline	P42_W_30.1	E606140	CQTZT	80	VN	20			0.25	0.00	0.00	0.75	9.44	3.30	2.64	82.24	4	8.67
Bellekeno_East Decline	P42_W_30.1	E606141	CQTZT	90	VN	10			0.25	0.00	0.00	0.75	7.87	3.30	2.64	68.56	4	9.12
Bellekeno_East Decline	P42_W_33.4	E606142	CQTZT	60	GSCH	30	VN	10	0.25	0.00	0.00	0.75	6.61	3.30	2.64	57.59	2	8.76
Bellekeno_East Decline	P42_W_33.4	E606143	CQTZT	90	VN	10			0.25	0.00	0.00	0.75	7.22	3.30	2.64	62.90	4	8.54
Bellekeno_East Decline	P42_W_33.4	E606144	CQTZT	100					0.00	0.00	0.00	0.75	7.90	3.30	2.64	68.82	4	8.95
Bellekeno_East Decline	P42_W_36.7	E606145	GSCH	60	CQTZT	40			0.25	0.00	0.00	0.75	21.16	3.30	2.63	183.65	2	8.32
Bellekeno_East Decline	P42_W_40	E606146	GSCH	80	CQTZT	20			0.50	0.00	0.10	0.75	3.12	5.00	2.63	41.03	2	8.29
Bellekeno_East Decline	P42_W_40	E606147	GSCH	60	CQTZT	40			0.50	0.00	0.10	0.75	10.14	5.00	2.63	133.34	2	8.33
Bellekeno_East Decline	P42_W_40	E606148	CQTZT	80	GSCH	20			0.25	0.00	0.20	0.75	8.48	5.00	2.64	111.94	2	8.14
Bellekeno_East Decline	BLP1_NE_10.5	E606154	CQTZT	80	GSCH	20			0.00	0.00	0.00	0.75	3.69	4.80	2.64	46.76	4	8.84
Bellekeno_East Decline	BLP1_NE_10.5	E606155	CQTZT	100					0.00	0.00	0.00	0.75	8.45	4.80	2.64	107.08	4	8.97
Bellekeno_East Decline	BLP1_NE_10.5	E606156	CQTZT	70	GSCH	30			0.00	0.00	0.00	0.75	10.28	4.80	2.64	130.27	4	8.90
Bellekeno_East Decline	BLP1_NE_15.3	E606157	CQTZT	80	GSCH	20			0.25	0.00	0.00	0.75	21.20	4.80	2.64	268.65	4	8.42
Bellekeno_East Decline	BLP_NE_20.1	E606158	CQTZT	70	GSCH	30			0.50	0.00	0.00	0.75	14.79	3.70	2.64	144.47	4	8.52
Bellekeno_East Decline	BLP_NE_20.1	E606159	CQTZT	100					0.01	0.00	0.00	0.75	1.50	3.70	2.64	14.65	4	8.66
Bellekeno_East Decline	BLP2_NE_12	E606160	CQTZT	90	GSCH	10			0.10	0.00	0.00	0.75	5.33	5.10	2.64	71.76	4	8.60
Bellekeno_East Decline	BLP2_NE_12	E606161	CQTZT	90	GSCH	10			0.50	0.00	0.00	0.75	5.33	5.10	2.64	71.76	4	8.83
Bellekeno_East Decline	BLP2_NE_12	E606162	CQTZT	90	GSCH	10			0.10	0.00	0.00	0.75	5.33	5.10	2.64	71.76	4	8.68
Bellekeno_East Decline	FLP1_NE_21.6	E606163	CQTZT	80	GSCH	20			0.10	0.00	0.00	0.75			2.64		4	8.60
Bellekeno_East Decline	FLP1_NE_21.6	E606164	CQTZT	70	GSCH	30			0.10	0.00	0.00	0.75	1.73	2.00	2.64	9.13	4	9.01
Bellekeno_East Decline	FLP1_NE_21.6	E606165	CQTZT	90	GSCH	10			0.10	0.00	0.00	0.75	14.57	2.00	2.64	76.93	4	8.70
Bellekeno_East Decline	BLP2_NE_17.1	E606166	CQTZT	90	GSCH	10			0.10	0.00	0.00	0.75	2.17	4.20	2.64	24.06	4	9.20
Bellekeno_East Decline	BLP2_NE_17.1	E606167	CQTZT	80	GSCH	20			0.10	0.00	0.00	0.75	14.12	4.20	2.64	156.56	4	8.92
Bellekeno_East Decline	BLP2_NE_21.3	E606168	CQTZT	90	GSCH	10			0.01	0.00	0.00	0.75	4.33	2.00	2.64	22.86	4	8.36
Bellekeno_East Decline	BLP2_NE_21.3	E606169	CQTZT	60	GSCH	40			0.10	0.00	0.00	0.75	3.88	2.00	2.64	20.49	4	8.68
Bellekeno_East Decline	BLP2_NE_21.3	E606170	CQTZT	90	GSCH	10			0.01	0.00	0.00	0.75	8.13	2.00	2.64	42.93	2	8.75
Bellekeno_625 2nd Bypass	A49_SW_21	E606171	QTZT	50	VN	50			0.00	0.00	0.00	0.75	NA	NA	2.60	NA	4	8.06
Bellekeno_625_South	P61_S_9	E606172	CQTZT	100					0.25	0.00	0.00	0.75	5.40	3.00	2.64	42.77	4	8.51
Bellekeno_East Decline	J2_W_3	E606173	CQTZT	90	GSCH	10			0.25	0.00	0.00	0.75	16.00	3.00	2.64	126.72	4	8.38
Bellekeno_625_South	P61_S_12	E606174	CQTZT	80	GSCH	20			0.25	0.00	0.00	0.75	5.40	3.20	2.64	45.62	4	9.03
Bellekeno_625_South	P61_S_15.2	E606175	GSCH	50	CQTZT	50			0.50	0.00	0.00	0.75	22.26	4.60	2.63	269.30	4	9.35
Bellekeno_625_South	P61_S_19.8	E606176	CQTZT	100					0.25	0.00	0.00	0.75	5.30	3.50	2.64	48.97	4	9.35
Bellekeno_625_South	P61_S_19.8	E606177	GSCH	50	CQTZT	50			0.25	0.00	0.00	0.75	6.60	3.50	2.63	60.75	2	9.19
Bellekeno_625_South	P61_S_23.3	E606178	CQTZT	100					0.00	0.00	0.00	0.75	11.82	2.80	2.64	87.37	3	9.01
Bellekeno_600_Incline	P63_S_5.8	E606179	GSCH	70	CQTZT	30			0.25	0.00	0.00	0.75	12.96	3.00	2.63	102.25	4	8.72
Bellekeno_625_South	P61_S_26.1	E606180	CQTZT	100					0.00	0.00	0.00	0.75	12.96	3.40	2.64	116.33	2	9.23
Bellekeno_625_South	P61_S_29.5	E606181	CQTZT	70	GSCH	30			0.25	0.00	0.01	0.75	9.72	3.30	2.64	84.68	2	8.96
Bellekeno_625_South	P61_S_29.5	E606182	CQTZT	100					0.25	0.01	0.00	0.75	3.24	3.30	2.64	28.23	4	9.16
Bellekeno_625_South	P61_S_32.8	E606183	CQTZT	90	GSCH	10			0.25	0.00	0.00	0.75	12.96	2.90	2.64	99.22	2	9.03
Bellekeno_600 HW Drive	P65_E_9.9	E606190	GSCH	100					0.00	0.00	0.00	0.75	5.24	3.50	2.63	48.23	4	9.27
Bellekeno_600 HW Drive	P65_E_9.9	E606191	CQTZT	100					0.00	0.00	0.00	0.75	4.88	3.50	2.64	45.09	4	8.81
Bellekeno_600 HW Drive	P65_E_13.6	E606192	GSCH	60	CQTZT	40			0.00	0.00	0.00	0.75	4.48	2.00	2.63	23.56	4	9.10
Bellekeno_600 HW Drive	P65_E_13.6	E606193	CQTZT	100					0.00	0.00	0.00	0.75	8.48	2.00	2.64	44.77	4	8.67
Bellekeno_600 HW Drive	P65_E_15.6	E606194	CQTZT	100					0.00	0.00	0.00	0.75	12.96	2.00	2.64	68.43	4	8.84
Bellekeno_600 HW Drive	P65_E_17.6	E606195	CQTZT	100					0.00	0.00	0.00	0.75	12.96	2.00	2.64	68.43	4	8.94
Bellekeno_600 HW Drive	P65_E_19.6	E606196	CQTZT	90	GSCH	10			0.00	0.00	0.00	0.75	12.96	2.00	2.64	68.43	4	9.14
Bellekeno_600 HW Drive	P65_E_21.5	E606197	CQTZT	90	GSCH	10			0.00	0.00	0.00	0.75	12.96	3.60	2.64	123.17	4	9.21
Bellekeno_600 HW Drive	P65_E_25.1	E606198	CQTZT	85	GSCH	15			0.00	0.00	0.00	0.75	6.56	3.10	2.64	53.69	4	9.46
Bellekeno_600 HW Drive	P65_E_25.1	E606199	CQTZT	80	GSCH	20			0.00	0.00	0.00	0.75	6.40	3.10	2.64	52.38	4	9.68
Bellekeno_600 HW Drive	P65_E_28.2	E606200	CQTZT	98	GSCH	2			0.00	0.00	0.00	0.75	12.96	3.10	2.64	106.06	4	9.25
Bellekeno_600 HW Drive	P65_E_31.3	E606201	CQTZT	100					0.00	0.00	0.00	0.75	12.96	2.40	2.64	82.11	4	9.58
Bellekeno_600 HW Drive	P65_E_34.3	E606202	CQTZT	100					0.00	0.00	0.00	0.75	12.96	3.00	2.64	102.64	4	9.00
Bellekeno_600 HW Drive	P65_E_37.3	E606203	CQTZT	100					0.00	0.00	0.00	0.75	12.96	1.30	2.64	44.48	4	8.90
Bellekeno_600 rehab	P43_N_20	E606204	CQTZT	50	VN	50			0.00	0.00	0.00	2.00	4.00	2.00	2.64	21.12	2	7.89
Bellekeno_750 Level #1 X-Cut	P78_E_7.3	E606243	GSCH	50	QTZT	50			0.50	0.00	0.10	0.75	4.47	2.80	2.63	32.92	4	7.95
Bellekeno_750 Level #1 X-Cut	P78_E_7.3	E606244	QTZT	70	GSCH	30			0.50	0.00	0.10	0.75	6.32	2.80	2.60	46.01	4	8.95

Development	Face ID	Sample ID	Lith1	Lith1%	Lith2	Lith2%	Lith3	Lith3%	Vis. Py %	Vis. Ga %	Vis. Sph %	Vis. CaCO3 %	Area m2	Length m	SG	Tonnes	Fizz Rating	Paste pH
Bellekeno_750 Level #1 X-Cut	P78_E_11.1	E606245	CQTZT	90	GSCH	10			0.00	0.00	0.00	0.75	10.80	3.80	2.64	108.35	4	8.72
Bellekeno_750 Level #1 X-Cut	P78_E_15	E606246	CQTZT	95	GSCH	5			0.30	0.00	0.01	0.75	5.09	2.30	2.64	30.91	4	8.84
Bellekeno_750 Level #1 X-Cut	P78_E_15	E606247	CQTZT	90	GSCH	10			0.20	0.00	0.00	0.75	7.87	2.30	2.64	47.79	4	8.58
Bellekeno_750 Level #1 X-Cut	P78_E_17.3	E606248	GSCH	40	QTZT	40	VN	20	0.10	0.00	0.00	0.75	5.57	3.50	2.63	51.27	4	9.10
Bellekeno_750 Level #1 X-Cut	P78_E_17.3	E606249	QTZT	95	VN	5			0.25	0.00	0.00	0.75	3.63	3.50	2.60	33.03	3	8.95
Bellekeno_750 Level #1 X-Cut	P78_E_17.3	E606250	QTZT	90	VN	8	GSCH	2	0.25	0.00	0.10	0.75	3.76	3.50	2.60	34.22	4	7.40
Bellekeno_East Decline	P18_W_43.1	E606301	CQTZT	60	VN	40			0.25	0.00	0.00	0.75	7.72	4.00	2.64	81.52	4	9.37
Bellekeno_East Decline	P18_W_43.1	E606302	CQTZT	70	GSCH	30			0.25	0.00	0.00	0.75	8.20	4.00	2.64	86.59	4	9.15
Bellekeno_East Decline	P18_W_43.1	E606303	CQTZT	80	VN	20			0.25	0.00	0.00	0.75	7.72	4.00	2.64	81.52	4	9.01
Bellekeno_East Decline	P18_W_40.15	E606304	CQTZT	100					0.25	0.00	0.00	0.75	21.16	2.95	2.64	164.79	4	8.48
Bellekeno_East Decline	P18_W_47.1	E606305	CQTZT	90	GSCH	10			0.00	0.00	0.00	0.75	21.16	4.00	2.64	223.45	4	8.78
Bellekeno_East Decline	P18_W_51.1	E606306	CQTZT	40	VN	40	GSCH	20	0.25	0.00	0.00	0.75	9.71	3.00	2.64	76.90	4	9.38
Bellekeno_East Decline	P18_W_51.1	E606307	CQTZT	70	GSCH	30			0.00	0.00	0.00	0.75	6.66	3.00	2.64	52.75	4	9.05
Bellekeno_East Decline	P18_W_51.1	E606308	CQTZT	90	GSCH	10			0.00	0.00	0.00	0.75	6.71	3.00	2.64	53.14	3	8.73
Bellekeno_East Decline	P19_W_16.1	E606309	CQTZT	90	VN	10			0.00	0.00	0.00	0.75	5.60	3.40	2.64	50.27	4	9.46
Bellekeno_East Decline	P19_W_16.1	E606310	CQTZT	70	VN	25	GSCH	5	0.25	0.00	0.00	0.75	7.67	3.40	2.64	68.85	2	9.20
Bellekeno_East Decline	P19_W_16.1	E606311	CQTZT	70	GSCH	30			0.25	0.00	0.00	0.75	9.40	3.40	2.64	84.37	2	9.02
Bellekeno_East Decline	P19_W_13.1	E606312	CQTZT	90	GSCH	10			0.00	0.00	0.00	0.75	21.16	3.00	2.64	167.59	3	8.69
Bellekeno_East Decline	P19_W_19.5	E606313	CQTZT	100					0.00	0.00	0.00	0.75	5.61	3.25	2.64	48.13	2	9.23
Bellekeno_East Decline	P19_W_19.5	E606314	CQTZT	80	VN	20			0.25	0.00	0.00	0.75	9.20	3.25	2.64	78.94	3	9.19
Bellekeno_East Decline	P19_W_19.5	E606315	CQTZT	80	VN	10	GSCH	10	0.25	0.00	0.00	0.75	9.76	3.25	2.64	83.74	2	8.90
Bellekeno_East Decline	P19_W_19.5	E606316	CQTZT	90	GSCH	10			0.00	0.00	0.00	0.75		3.25	2.64		4	9.24
Bellekeno_East Decline	P19_W_26	E606317	CQTZT	100					0.25	0.00	0.00	0.75	5.20	3.35	2.64	45.99	2	9.22
Bellekeno_East Decline	P19_W_26	E606318	CQTZT	70	VN	20	GSCH	10	0.25	0.00	0.00	0.75	8.14	3.35	2.64	71.99	4	9.30
Bellekeno_East Decline	P19_W_26	E606319	CQTZT	90	GSCH	10			0.25	0.00	0.00	0.75	11.58	3.35	2.64	102.41	4	9.20
Bellekeno_East Decline	P19_W_22.75	E606320	CQTZT	100					0.00	0.00	0.00	0.75	21.16	3.25	2.64	181.55	4	8.79
Bellekeno_East Decline	P19_W_32.7	E606321	CQTZT	90	VN	10			0.25	0.00	0.00	0.75	8.02	3.10	2.64	65.64	4	8.58
Bellekeno_East Decline	P19_W_32.7	E606322	CQTZT	100					0.00	0.00	0.00	0.75	7.52	3.10	2.64	61.54	3	8.86
Bellekeno_East Decline	P19_W_32.7	E606323	CQTZT	80	GSCH	20			0.25	0.00	0.00	0.75	8.30	3.10	2.64	67.93	2	8.70
Bellekeno_East Decline	P19_W_29.35	E606324	CQTZT	80	VN	10	GSCH	10	0.25	0.00	0.00	0.75	21.16	3.35	2.64	187.14	4	9.15
Bellekeno_East Decline	P19_W_38.8	E606325	CQTZT	100					0.00	0.00	0.00	0.75	4.74	3.00	2.64	37.54	4	8.48
Bellekeno_East Decline	P19_W_38.8	E606326	CQTZT	90	GSCH	5	VN	5	0.00	0.00	0.00	0.75	6.27	3.00	2.64	49.66	4	8.90
Bellekeno_East Decline	P19_W_38.8	E606327	CQTZT	80	GSCH	20			0.00	0.00	0.00	0.75	14.99	3.00	2.64	118.72	4	9.15
Bellekeno_East Decline	P19_W_35.8	E606328	CQTZT	95	GSCH	5			0.00	0.00	0.00	0.75	21.16	3.00	2.64	167.59	4	9.24
Bellekeno_East Decline	P21_W_16.1	E606329	CQTZT	100					0.00	0.00	0.00	0.75	8.03	2.75	2.64	58.30	4	9.31
Bellekeno_East Decline	P21_W_16.1	E606330	CQTZT	85	GSCH	10	VN	5	0.00	0.00	0.00	0.75	11.93	2.75	2.64	86.61	3	9.40
Bellekeno_East Decline	P21_W_16.1	E606331	CQTZT	70	GSCH	30			0.25	0.00	0.00	0.75	7.77	2.75	2.64	56.41	4	9.30
Bellekeno_East Decline	P21_W_13.1	E606332	CQTZT	90	GSCH	10			0.00	0.00	0.00	0.75	21.16	3.00	2.64	167.59	4	9.28
Bellekeno_East Decline	P21_W_18.85	E606333	CQTZT	95	GSCH	5			0.25	0.00	0.00	0.75	21.16	2.75	2.64	153.62	3	9.59
Bellekeno_East Decline	P21_W_21.6	E606334	CQTZT	80	GSCH	20			0.25	0.00	0.00	0.75	7.12	3.40	2.64	63.91	4	9.55
Bellekeno_East Decline	P21_W_21.6	E606335	CQTZT	90	VN	10			0.00	0.00	0.00	0.75	7.56	3.40	2.64	67.86	2	9.62
Bellekeno_East Decline	P21_W_21.6	E606336	CQTZT	90	GSCH	10			0.25	0.00	0.00	0.75	7.90	3.40	2.64	70.91	4	9.48
Bellekeno_East Decline	P21_W_25	E606337	CQTZT	95	GSCH	5			0.25	0.00	0.00	0.75	21.16	3.40	2.64	189.93	3	9.52
Bellekeno_East Decline	P21_W_28.4	E606338	CQTZT	95	GSCH	5			0.25	0.00	0.00	0.75	21.16	3.40	2.64	189.93	3	9.53
Bellekeno_East Decline	P21_W_31.8	E606339	CQTZT	100					0.25	0.00	0.00	0.75	5.98	3.40	2.64	53.68	4	9.05
Bellekeno_East Decline	P21_W_31.8	E606340	CQTZT	100					0.25	0.00	0.00	0.75	9.09	3.40	2.64	81.59	3	9.15
Bellekeno_East Decline	P21_W_31.8	E606341	CQTZT	90	VN	10			0.25	0.00	0.00	0.75	9.17	3.40	2.64	82.31	4	9.00
Bellekeno_East Decline	P21_W_35.2	E606342	CQTZT	100					0.00	0.00	0.00	0.75	21.00	3.35	2.64	185.72	4	9.21
Bellekeno_East Decline	P21_W_38.5	E606343	CQTZT	100					0.25	0.00	0.00	0.75	2.90	2.50	2.64	19.14	4	9.18
Bellekeno_East Decline	P21_W_38.5	E606344	CQTZT	80	GSCH	20			0.50	0.00	0.00	0.75	14.80	2.50	2.64	97.68	4	9.37
Bellekeno_East Decline	P21_W_38.5	E606345	CQTZT	70	GSCH	20	VN	10	0.25	0.00	0.00	0.75	3.20	2.50	2.64	21.12	2	8.95
Bellekeno_East Decline	P21_W_41	E606346	CQTZT	85	GSCH	10	VN	5	0.25	0.00	0.00	0.75	21.16	2.40	2.64	134.07	4	9.04
Bellekeno_East Decline	P21_W_43.4	E606347	CQTZT	100					0.00	0.00	0.00	0.75	5.95	3.60	2.64	56.55	4	9.34
Bellekeno_East Decline	P21_W_43.4	E606348	CQTZT	55	GSCH	40	VN	5	0.25	0.00	0.00	0.75	3.59	3.60	2.64	34.12	3	8.58
Bellekeno_East Decline	P21_W_43.4	E606349	CQTZT	95	VN	5			0.25	0.00	0.00	0.75	5.84	3.60	2.64	55.50	3	8.80
Bellekeno_East Decline	P21_W_43.4	E606350	CQTZT	100					0.25	0.00	0.00	0.75	5.41	3.60	2.64	51.42	3	8.90
Bellekeno_East Decline	P21_W_47	E606351	CQTZT	60	GSCH	40			0.25	0.00	0.00	0.75	3.87	3.80	2.64	38.82	4	9.00
Bellekeno_East Decline	P21_W_47	E606352	CQTZT	70	GSCH	30			0.25	0.00	0.00	0.75	9.67	3.80	2.64	97.01	4	9.28
Bellekeno_East Decline	P21_W_47	E606353	CQTZT	80	GSCH	10	VN	10	0.25	0.00	0.00	0.75	6.55	3.80	2.64	65.71	2	8.77
Bellekeno_East Decline	P21_W_50.8	E606355	CQTZT	95	GSCH	5			0.25	0.00	0.00	0.75	21.16	3.80	2.64	212.28	3	9.06
Bellekeno_East Decline	P23_W_4.9	E606356	CQTZT	95	VN	5			0.25	0.00	0.00	0.75	4.41	2.15	2.64	25.03	2	8.54
Bellekeno_East Decline	P23_W_4.9	E606357	CQTZT	90	GSCH	5	VN	5	0.25	0.00	0.00	0.75	7.08	2.15	2.64	40.19	3	8.16
Bellekeno_East Decline	P23_W_4.9	E606358	CQTZT	80	GSCH	20			0.25	0.00	0.00	0.75	8.51	2.15	2.64	48.30	2	8.12
Bellekeno_East Decline	P23_W_7.05	E606359	QTZT	80	GSCH	20			0.50	0.01	0.01	0.75	21.16	2.15	2.60	118.28	3	8.93
Bellekeno_East Decline	P23_W_9.2	E606360	CQTZT	50	GSCH	45	VN	5	0.50	0.00	0.00	0.75	6.79	3.80	2.64	68.12	3	8.69
Bellekeno_East Decline	P23_W_9.2	E606361	GSCH	85	CQTZT	10	VN	5	0.50	0.00	0.00	0.75	12.41	3.80	2.63	124.03	3	8.84
Bellekeno_East Decline	P23_W_9.2	E606362	GSCH	70	CQTZT	30			0.50	0.00	0.00	0.75	5.19	3.80	2.63	51.87	3	8.58
Bellekeno_North Lateral	P24_N_10.5	E606363	CQTZT	90	GSCH	5	VN	5	1.00	0.00	0.00	0.75	6.23	4.10	2.64	67.43	4	9.00
Bellekeno_North Lateral	P24_N_10.5	E606364	CQTZT	90	GSCH	10			1.00	0.00	0.00	0.75	4.93	4.10	2.64	53.36	4	8.95
Bellekeno_North Lateral	P24_N_10.5	E606365	CQTZT	60	GSCH	40			1.00	0.00	0.00	0.75	9.81	4.10	2.64	106.18	3	8.83
Bellekeno_North Lateral	P24_N_5.9	E606366	CQTZT	90	GSCH	10			1.00	0.00	0.00	0.75	21.16	4.60	2.64	256.97	4	9.00
Bellekeno_North Lateral	P24_N_14.6	E606367	CQTZT	80	GSCH	15	VN	5	1.00	0.00	0.01	0.75	7.35	4.60	2.64	89.26	2	8.86
Bellekeno_North Lateral	P24_N_14.6	E606368	GSCH	100					1.00	0.00	0.00	0.75	15.03	4.60	2.63	181.83	2	9.15
Bellekeno_East Decline	P23_W_13	E606373	CQTZT	80	GSCH	15	VN	5	0.25	0.00	0.00	0.75	9.21	2.90	2.64	70.51	4	9.15
Bellekeno_East Decline	P23_W_13	E606374	GSCH	90	CQTZT	10			0.25	0.00	0.00	0.75	9.48	2.90	2.63	72.30	2	9.03
Bellekeno_East Decline	P23_W_13	E606375	CQTZT	60	GSCH	40			0.25	0.00	0.00	0.75	4.19	2.90	2.64	32.08	4	9.03
Bellekeno_North Lateral	P24_N_19.2	E606376	CQTZT	50	GSCH	40	VN	10	0.25	0.00	0.00	0.75	13.75	2.60	2.64	94.38	4	9.24
Bellekeno_North Lateral	P24_N_19.2	E606377	CQTZT	70	GSCH	30			0.25	0.00	0.00	0.75	7.30	2.60	2.64	50.11	4	9.46
Bellekeno_East Decline	P23_W_15.9	E606384	CQTZT	95	VN	5			0.25	0.00	0.00	0.75	2.42	1.50	2.64	9.58	4	9.38
Bellekeno_East Decline	P23_W_15.9	E606385	GSCH	60	CQTZT	40			0.25	0.00	0.00	0.75	13.23	1.50	2.63	52.19	3	8.01
Bellekeno_East Decline	P23_W_15.9	E606386	CQTZT	60	GSCH	40			0.25	0.00	0.00	0.75	4.04	1.50	2.64	16.00	3	8.60
Bellekeno_East Decline	P23_W_17.4	E606387	CQTZT	90	GSCH	10			0.25	0.00	0.00	0.75	7.56	3.60	2.64	71.85	4	8.87
Bellekeno_East Decline	P23_W_17.4	E606388	CQTZT	80	VN	20			0.25	0.00	0.00	0.75	3.02	3.60	2.64	28.70	4	8.90
Bellekeno_East Decline	P23_W_17.4	E606389	CQTZT	80	GSCH	20			0.25	0.00	0.00	0.75	15.47	3.60	2.64	147.03	4	9.00
Bellekeno_North Lateral	P26_N_7.5	E606390	CQTZT	100					0.25	0.00	0.00	0.75	7.05	3.90	2.64	72.59	4	9.18
Bellekeno_North Lateral	P26_N_7.5	E606391	CQTZT	100					0.25	0.00	0.00	0.75	7.05	3.90	2.64	72.59	4	9.20
Bellekeno_North Lateral	P26_N_7.5	E606392	CQTZT	100					0.25	0.00	0.00	0.75	7.05	3.90	2.64	72.59	4	9.23
Bellekeno_East Decline	P23_W_21	E606393	CQTZT	80	GSCH	20			0.25	0.00	0.00	0.75	6.66	2.90	2.64	50.99	4	9.62
Bellekeno_East Decline	P23_W_21	E606394	CQTZT	95	GSCH	5			0.25	0.00	0.00	0.75	5.93	2.90	2.64	45.40	4	9.45
Bellekeno_East Decline	P23_W_21	E606395	CQTZT	60	GSCH	40			0.25	0.00	0.00	0.75	12.59	2.90	2.64	96.39	3	9.22
Bellekeno_East Decline	P23_W_23.9	E606396	CQTZT	50	GSCH	50			0.25	0.00	0.00	0.75	6.11	3.50	2.64	56.46	4	9.40
Bellekeno_East Decline	P23_W_23.9	E606397	CQTZT	95	GSCH	5			0.00	0.00	0.00	0.75	6.42	3.50	2.64	59.32	4	9.15
Bellekeno_East Decline	P23_W_23.9	E606398	CQTZT	50	GSCH	50			0.00	0.00	0.00	0.75	11.38	3.50	2.64	105.15	4	9.26
Bellekeno_North Lateral	P26_N_11.4	E606399	CQTZT	95	GSCH	5			0.00	0.00	0.00	0.75	8.04	2.90	2.64	61.55	3	9.40
Bellekeno_North Lateral	P26_N_11.4	E606400	CQTZT	100					0.00	0.00	0.00	0.75	5.69	2.90	2.64	43.56	4	9.17
Bellekeno_East Decline	P15_w_44	E606401	CQTZT	70	VN	30			0.00	0.00	0.00	0.75	9.80	3.40	2.64	87.96	2	8.50
Bellekeno_East Decline	P15_w_44	E606402	CQTZT	100					0.00	0.00	0.00	0.75	14.80	3.40	2.64	132.84	4	8.71
Bellekeno_East Decline	P15_w_44	E606403	CQTZT	90	GSCH	10			0.25	0.00	0.00	0.75		2.70	2.64		4	8.55
Bellekeno_East Decline	P15_w_44	E606404	CQTZT	90	GSCH	10			0.25	0.00	0.00	0.75		2.70	2.64		4	8.51
Bellekeno_East Decline	P15_SW_47.4	E606405	CQTZT	70	GSCH	30			0.25	0.00	0.00	0.75	3.33	3.40	2.64	29.89	3	8.60
Bellekeno_East Decline	P15_SW_47.4	E606406	CQTZT	100					0.25	0.00	0.00	0.75	8.14	3.40	2.64	73.06	2	8.52
Bellekeno_East Decline	P15_SW_47.4	E606407	CQTZT	70	GSCH	30			0.25	0.00	0.00	0.75	9.65	3.40	2.64	86.62	4	8.68
Bellekeno_East Decline	P15_W_47.4	E606408	CQTZT	80	VN	20			0.25	0.00	0.00	0.75	2.36	3.50	2.64	21.81	3	8.01
Bellekeno_East Decline	P15_W_47.4	E606409	CQTZT	100					0.25	0.00	0.00	0.75	15.89	3.50	2.64	146.82	4	8.62
Bellekeno_East Decline	P15_W_47.4	E606410	CQTZT	95	GSCH	5			0.25	0.00	0.00	0.75	4.13	3.50	2.64	38.16	4	8.32
Bellekeno_East Decline	P15_W_50.9	E606411	CQTZT	70	VN	30			0.25	0.00	0.00	0.75	10.00	3.50	2.64	92.40	2	8.41
Bellekeno_East Decline	P15_W_50.9	E606412	CQTZT	100					0.25	0.00	0.00	0.75	10.00	3.50	2.64	92.40	4	8.42
Bellekeno_East Decline	BLP17_N45W_3	E606413	CQTZT	100					0.25	0.00	0.00	0.75	2.00	3.50	2.64	18.48	4	8.45
Bellekeno_East Decline	BLP17_N45W_3	E606414	CQTZT	90	GSCH	10			0.25	0.00	0.00	0.75	4.60	3.50	2.64	42.50	3	8.02
Bellekeno_East Decline	BLP17_W_22.9	E606415	CQTZT	80	VN	20			0.25	0.00	0.00	0.75	2.70	3.30	2.64	23.52	4	8.76
Bellekeno_East Decline	BLP17_W_22.9	E606416	CQTZT	95	VN	5			0.25	0.00	0.00	0.75	11.10	3.30	2.64	96.70	3	8.50
Bellekeno_East Decline	BLP17_W_22.9	E606417	GSCH	60	CQTZT	40			1.00	0.00	0.00	0.75	2.30	3.30	2.63	19.96	4	8.54
Bellekeno_East Decline	BLP17_W_26.2	E606418	CQTZT	95	VN	5			0.25	0.00	0.00	0.75	12.30	3.30	2.64	107.16	4	8.78
Bellekeno_East Decline	BLP17_W_26.2	E606419	CQTZT	60	GSCH	30	VN	10	1.00	0.00	0.00	0.75	12.00	3.30	2.64	104.54	4	8.95
Bellekeno_East Decline	BLP17_W_33.75	E606420	CQTZT	100					0.00	0.00	0.00	0.75	8.83	3.70	2.64	86.25	4	8.92
Bellekeno_East Decline	BLP17_W_33.75	E606421	GSCH	50	CQTZT	50			0.25	0.00	0.00	0.75	6.53	3.70	2.63	63.54	4	9.27
Bellekeno_East Decline	BLP17_W_33.75	E606422	CQTZT	80	VN	20			0.00	0.00	0.00	0.75	7.58	3.70	2.64	74.04	4	9.02
Bellekeno_East Decline	BLP17_W_37.4	E606423	CQTZT	100					0.00	0.00	0.00	0.75	7.20	3.10	2.64	58.92	2	9.25
Bellekeno_East Decline	BLP17_W_37.4	E606424	GSCH	50	CQTZT	50			1.00	0.00	0.00	0.75	7.70	3.10	2.63	62.78	4	9.08
Bellekeno_East Decline	BLP17_W_37.4	E606425	CQTZT	80	VN	20			0.25	0.00	0.00	0.75	6.70	3.10	2.64	54.83	3	9.08
Bellekeno_East Decline	BLP17_W_40.5	E606426	CQTZT	100					0.25	0.00	0.00	0.75	3.92	3.30	2.64	34.15	3	9.22

Development	Face ID	Sample ID	Lith1	Lith1%	Lith2	Lith2%	Lith3	Lith3%	Vis. Py %	Vis. Ga %	Vis. Sph %	Vis. CaCO3 %	Area m2	Length m	SG	Tonnes	Fizz Rating	Paste pH
Bellekeno_East Decline	BLP17_W_40.5	E606427	CQTZT	50	GSCH	50			1.00	0.00	0.00	0.75	3.36	3.30	2.64	29.27	4	9.36
Bellekeno_East Decline	BLP17_W_40.5	E606428	CQTZT	80	VN	20			0.25	0.00	0.00	0.75	5.09	3.30	2.64	44.34	4	9.65
Bellekeno_East Decline	P18_W_9.3	E606429	CQTZT	90	GSCH	10			0.25	0.00	0.00	0.75	21.16	3.40	2.64	189.93	4	8.94
Bellekeno_East Decline	P18_W_12.7	E606430	CQTZT	100					0.00	0.00	0.00	0.75	6.20	2.80	2.64	45.83	4	9.28
Bellekeno_East Decline	P18_W_12.7	E606431	CQTZT	50	GSCH	50			1.00	0.00	0.00	0.75	4.50	2.80	2.64	33.26	4	9.48
Bellekeno_East Decline	P18_W_12.7	E606432	CQTZT	60	VN	30	GSCH	10	0.25	0.00	0.00	0.75	13.50	2.80	2.64	99.79	4	9.47
Bellekeno_East Decline	P18_W_15.5	E606433	CQTZT	80	GSCH	20			0.25	0.00	0.00	0.75	6.70	4.10	2.64	72.52	4	9.40
Bellekeno_East Decline	P18_W_15.5	E606434	CQTZT	70	VN	20	GSCH	10	0.25	0.00	0.00	0.75	7.30	4.10	2.64	79.02	2	9.69
Bellekeno_East Decline	P18_W_15.5	E606435	CQTZT	90	GSCH	10			0.25	0.00	0.00	0.75	8.90	4.10	2.64	96.33	3	9.22
Bellekeno_East Decline	P18_W_19.6	E606436	CQTZT	90	GSCH	10			0.25	0.00	0.00	0.75	6.10	4.10	2.64	66.03	4	8.75
Bellekeno_East Decline	P18_W_19.6	E606437	CQTZT	100					0.25	0.00	0.00	0.75	6.10	4.10	2.64	66.03	4	9.18
Bellekeno_East Decline	P18_W_19.6	E606438	CQTZT	80	GSCH	20			0.25	0.00	0.00	0.75	11.40	4.10	2.64	123.39	4	8.53
Bellekeno_East Decline	P18_W_23.5	E606439	CQTZT	100					0.25	0.00	0.00	0.75	21.16	3.90	2.64	217.86	4	8.33
Bellekeno_East Decline	P18_W_27.5	E606440	CQTZT	100					0.25	0.00	0.00	0.75	8.10	2.30	2.64	49.18	4	9.11
Bellekeno_East Decline	P18_W_27.5	E606441	CQTZT	70	VN	20	GSCH	10	0.25	0.00	0.00	0.75	4.90	2.30	2.64	29.75	4	8.90
Bellekeno_East Decline	P18_W_27.5	E606442	CQTZT	90	GSCH	10			0.25	0.00	0.00	0.75	11.60	2.30	2.64	70.44	3	8.90
Bellekeno_East Decline	P18_W_29.8	E606443	CQTZT	100					0.25	0.00	0.00	0.75	21.16	4.20	2.64	234.62	3	8.65
Bellekeno_East Decline	P18_W_34	E606444	CQTZT	80	VN	20			0.25	0.00	0.00	0.75	9.30	3.20	2.64	78.57	4	9.37
Bellekeno_East Decline	P18_W_34	E606445	CQTZT	95	VN	5			0.00	0.00	0.00	0.75	11.74	3.20	2.64	99.18	4	9.45
Bellekeno_East Decline	P18_W_34	E606446	CQTZT	70	GSCH	30			0.25	0.00	0.00	0.75	5.67	3.20	2.64	47.90	2	9.14
Bellekeno_East Decline	P18_W_11	E606447	CQTZT	100					0.00	0.00	0.00	0.75	4.00	1.00	2.64	10.56	4	7.63
Bellekeno_East Decline	P18_W_37.2	E606448	CQTZT	100					0.00	0.00	0.00	0.75	4.02	2.95	2.64	31.31	4	8.70
Bellekeno_East Decline	P18_W_37.2	E606449	CQTZT	70	VN	20	GSCH	10	0.00	0.00	0.00	0.75	7.03	2.95	2.64	54.75	4	9.02
Bellekeno_East Decline	P18_W_37.2	E606450	CQTZT	80	VN	10	GSCH	10	0.25	0.00	0.00	0.75	13.16	2.95	2.64	102.49	3	8.62
Bellekeno_East Decline	P13_W_27.2	E606451	CQTZT	50	VN	50			0.10	0.00	0.00	0.75	9.31	2.25	2.64	55.30	3	9.00
Bellekeno_East Decline	P13_W_27.2	E606452	CQTZT	100					0.10	0.00	0.00	0.75	10.75	2.25	2.64	63.86	2	9.00
Bellekeno_East Decline	P13_W_29.5	E606453	QTZT	100					0.00	0.00	0.00	0.75	7.05	2.25	2.60	41.24	4	9.00
Bellekeno_East Decline	P13_W_29.5	E606454	GSCH	100					0.00	0.00	0.00	0.75	7.05	2.25	2.63	41.72	4	9.00
Bellekeno_East Decline	P13_W_29.5	E606455	GSCH	100					0.00	0.00	0.00	0.75	7.05	2.25	2.63	41.72	4	9.00
Bellekeno_East Decline	P13_w_31.7	E606456	CQTZT	100					0.00	0.00	0.00	0.75	8.03	2.65	2.64	56.18	3	8.37
Bellekeno_East Decline	P13_w_31.7	E606457	CQTZT	100					0.00	0.00	0.00	0.75	6.47	2.65	2.64	45.26	3	8.46
Bellekeno_East Decline	P13_w_31.7	E606458	GSCH	80	CQTZT	20			0.00	0.00	0.00	0.75	5.26	2.65	2.63	36.66	4	8.79
Bellekeno_East Decline	P13_W_34.35	E606459	CQTZT	90	VN	10			0.00	0.00	0.00	0.75	7.05	2.65	2.64	49.32	4	8.54
Bellekeno_East Decline	P13_W_34.35	E606460	CQTZT	90	VN	10			0.00	0.00	0.00	0.75	7.05	2.65	2.64	49.32	4	8.72
Bellekeno_East Decline	P13_W_34.35	E606461	CQTZT	90	VN	10			0.00	0.00	0.00	0.75	7.05	2.65	2.64	49.32	4	8.78
Bellekeno_East Decline	P13_W_37	E606462	CQTZT	100					0.10	0.00	0.00	0.75	3.89	3.65	2.64	37.48	3	7.75
Bellekeno_East Decline	P13_W_37	E606463	CQTZT	100					0.10	0.00	0.00	0.75	9.05	3.65	2.64	87.21	3	7.93
Bellekeno_East Decline	P13_W_37	E606464	GSCH	80	CQTZT	20			0.50	0.00	0.00	0.75	9.46	3.65	2.63	90.81	4	8.31
Bellekeno_East Decline	P13_W_44.3	E606465	CQTZT	100					0.00	0.00	0.00	0.75	9.31	3.60	2.64	88.48	3	9.00
Bellekeno_East Decline	P13_W_44.3	E606466	CQTZT	90	GSCH	10			0.10	0.00	0.00	0.75	10.53	3.60	2.64	100.08	3	8.15
Bellekeno_East Decline	P13_W_44.3	E606467	GSCH	70	CQTZT	30			0.75	0.00	0.00	0.50	12.15	3.60	2.63	115.04	4	8.90
Bellekeno_East Decline	P13_W_40.7	E606468	CQTZT	95	GSCH	5			0.50	0.00	0.00	0.75	7.10	3.60	2.64	67.48	4	9.00
Bellekeno_East Decline	P13_W_40.7	E606469	CQTZT	95	GSCH	5			0.50	0.00	0.00	0.75	7.10	3.60	2.64	67.48	4	8.68
Bellekeno_East Decline	P13_W_40.7	E606470	CQTZT	95	GSCH	5			0.50	0.00	0.00	0.75	7.10	3.60	2.64	67.48	4	8.63
Bellekeno_East Decline	P13_W_47.9	E606471	CQTZT	100					0.25	0.00	0.00	0.75	7.10	3.60	2.64	67.48	4	9.00
Bellekeno_East Decline	P13_W_47.9	E606472	CQTZT	100					0.25	0.00	0.00	0.75	7.10	3.60	2.64	67.48	4	9.00
Bellekeno_East Decline	P13_W_47.9	E606473	CQTZT	100					0.25	0.00	0.00	0.75	7.10	3.60	2.64	67.48	4	9.00
Bellekeno_East Decline	P13_W_51.05	E606474	CQTZT	100					0.10	0.00	0.00	0.75	7.05	3.15	2.64	58.63	4	7.81
Bellekeno_East Decline	P13_W_51.05	E606475	CQTZT	100					0.10	0.00	0.00	0.75	7.05	3.15	2.64	58.63	4	8.18
Bellekeno_East Decline	P13_W_51.05	E606476	CQTZT	100					0.10	0.00	0.00	0.75	7.05	3.15	2.64	58.63	4	8.20
Bellekeno_East Decline	P13_W_54.2	E606477	CQTZT	100					0.10	0.00	0.00	0.75	1.47	3.80	2.64	14.71	4	8.50
Bellekeno_East Decline	P13_W_54.2	E606478	CSCH	95	CQTZT	5			1.00	0.00	0.00	0.75	8.09	3.80	2.65	81.48	4	8.25
Bellekeno_East Decline	P13_W_54.2	E606479	CQTZT	100					0.10	0.00	0.00	0.75	14.97	3.80	2.64	150.14	4	9.03
Bellekeno_East Decline	P15_W_21.7	E606480	CQTZT	90	GSCH	10			0.20	0.00	0.00	0.75	21.30	3.80	2.64	213.68	4	8.46
Bellekeno_East Decline	P15_W_25.75	E606481	CQTZT	100					0.00	0.00	0.00	0.75	14.62	4.05	2.64	156.32	4	8.70
Bellekeno_East Decline	P15_W_25.75	E606482	GSCH	70	CQTZT	15	VN	15	0.50	0.00	0.00	0.75	1.56	4.05	2.63	16.62	2	7.70
Bellekeno_East Decline	P15_W_25.75	E606483	CQTZT	80	VN	20			0.50	0.00	0.00	0.75	9.37	4.05	2.64	100.18	3	8.02
Bellekeno_East Decline	P15_W_28.7	E606484	CQTZT	100					0.00	0.00	0.00	0.75	21.16	2.95	2.64	164.79	4	8.15
Bellekeno_East Decline	P15_W_31.08	E606485	CQTZT	100					0.20	0.00	0.00	0.75	10.84	2.38	2.64	68.11	2	8.20
Bellekeno_East Decline	P15_W_31.08	E606486	CQTZT	90	GSCH	10			0.00	0.00	0.00	0.75	11.53	2.38	2.64	72.45	4	8.44
Bellekeno_East Decline	P15_W_31.1	E606487	CQTZT	100					0.00	0.00	0.00	0.75	21.16	3.10	2.64	173.17	4	8.40
Bellekeno_East Decline	P15_W_34.2	E606488	CQTZT	90	GSCH	10			0.20	0.00	0.00	0.75	21.16	3.00	2.64	167.59	4	8.15
Bellekeno_East Decline	P15_W_37.2	E606489	CQTZT	100					0.00	0.00	0.00	0.75	2.36	4.10	2.64	25.54	4	8.18
Bellekeno_East Decline	P15_W_37.2	E606490	CQTZT	90	VN	10			0.00	0.00	0.00	0.75	8.12	4.10	2.64	87.89	4	8.01
Bellekeno_East Decline	P15_W_37.2	E606491	CQTZT	100					0.00	0.00	0.00	0.75	11.00	4.10	2.64	119.06	4	8.44
Bellekeno_East Decline	P15_SW_37.2	E606492	CQTZT	100					0.00	0.00	0.00	0.75	9.83	4.10	2.64	106.40	4	8.52
Bellekeno_East Decline	P15_SW_37.2	E606493	CQTZT	50	GSCH	50			0.20	0.00	0.00	0.75	6.76	4.10	2.64	73.17	4	8.67
Bellekeno_East Decline	P15_W_41.3	E606494	CQTZT	80	VN	20			0.20	0.00	0.00	0.75	9.47	2.70	2.64	67.50	3	8.06
Bellekeno_East Decline	P15_W_41.3	E606495	CQTZT	50	VN	50			0.20	0.00	0.00	0.75	3.73	2.70	2.64	26.59	3	8.13
Bellekeno_East Decline	P15_W_41.3	E606496	GSCH	50	CQTZT	30	VN	20	2.00	0.00	0.00	0.75	1.47	2.70	2.63	10.44	4	8.10
Bellekeno_East Decline	P15_W_41.3	E606497	CQTZT	90	VN	10			0.00	0.00	0.00	0.75	5.24	2.70	2.64	37.35	4	8.52
Bellekeno_East Decline	P15_SW_41.3	E606498	CQTZT	80	GSCH	20			0.25	0.00	0.00	0.75	21.30	2.70	2.64	151.83	4	8.29
Bellekeno_East Decline	P15_W_14	E606499	GSCH	50	CQTZT	50			0.25	0.00	0.00	0.75	15.50	3.00	2.63	122.30	4	8.82
Bellekeno_East Decline	P15_W_14	E606500	CQTZT	100					0.25	0.00	0.00	0.75	6.67	3.00	2.64	52.83	4	8.65
Bellekeno_East Decline	1_W_24.36	E606501	CQTZT	100					0.00	0.00	0.00	0.75	3.91	3.70	2.64	38.19	4	9.00
Bellekeno_East Decline	1_W_24.36	E606502	CQTZT	100					0.00	0.00	0.00	0.75	6.09	3.70	2.64	59.49	4	8.62
Bellekeno_East Decline	1_W_24.36	E606503	CQTZT	100					0.00	0.00	0.00	0.75	5.53	3.70	2.64	54.02	3	7.28
Bellekeno_East Decline	1_W_24.36	E606504	CQTZT	100					0.00	0.00	0.00	0.75	2.94	3.70	2.64	28.72	4	7.20
Bellekeno_East Decline	P2_W_10.6	E606505	CQTZT	100					0.00	0.00	0.00	0.75	4.10	3.67	2.64	39.72	4	7.82
Bellekeno_East Decline	P2_W_10.6	E606506	CQTZT	100					0.00	0.00	0.00	0.75	3.04	3.67	2.64	29.45	4	7.84
Bellekeno_East Decline	P2_W_10.6	E606507	CQTZT	100					0.00	0.00	0.00	0.75	4.71	3.67	2.64	45.63	3	7.94
Bellekeno_East Decline	P2_W_10.6	E606508	CQTZT	100					0.00	0.00	0.00	0.75	1.26	3.67	2.64	12.21	1	7.46
Bellekeno_East Decline	P2_W_14.27	E606509	CQTZT	100					0.00	0.00	0.00	0.75	1.68	3.08	2.64	13.66	3	7.94
Bellekeno_East Decline	P2_W_14.27	E606510	CQTZT	80	GSCH	20			0.00	0.00	0.00	0.75	7.06	3.08	2.64	57.41	4	8.37
Bellekeno_East Decline	P2_W_14.27	E606511	CQTZT	100					0.00	0.00	0.00	0.75	6.37	3.08	2.64	51.80	4	8.49
Bellekeno_East Decline	P2_W_14.27	E606512	CQTZT	100					0.00	0.00	0.00	0.75	12.47	3.08	2.64	101.40	4	8.02
Bellekeno_East Decline	P2_W_17.35	E606513	CQTZT	100					0.00	0.00	0.00	0.75	5.91	4.78	2.64	74.58	4	8.40
Bellekeno_East Decline	P2_W_17.35	E606514	CQTZT	100					0.00	0.00	0.00	0.75	1.59	4.78	2.64	20.06	4	8.64
Bellekeno_East Decline	P2_W_17.35	E606515	CQTZT	100					0.00	0.00	0.00	0.75	13.66	4.78	2.64	172.38	3	8.10
Bellekeno_East Decline	P2_W_22.13	E606516	CQTZT	100					0.00	0.00	0.00	0.75	5.50	3.77	2.64	54.74	4	8.11
Bellekeno_East Decline	P2_W_22.13	E606517	CQTZT	100					0.00	0.00	0.00	0.75	4.77	3.77	2.64	47.47	3	8.28
Bellekeno_East Decline	P2_W_22.13	E606518	CQTZT	100					0.00	0.00	0.00	0.75	13.55	3.77	2.64	134.86	4	8.10
Bellekeno_East Decline	P2_W_25.91	E606519	CQTZT	100					0.00	0.00	0.00	0.75	7.97	3.77	2.64	79.32	4	8.09
Bellekeno_East Decline	P2_W_25.91	E606520	CQTZT	100					0.00	0.00	0.00	0.75	7.97	3.77	2.64	79.32	4	8.09
Bellekeno_East Decline	P2_W_25.91	E606521	CQTZT	100					0.00	0.00	0.00	0.75	7.97	3.77	2.64	79.32	3	7.99
Bellekeno_East Decline	P2_W_29.68	E606522	CQTZT	100					0.00	0.00	0.00	0.75	7.97	3.77	2.64	79.32	4	8.20
Bellekeno_East Decline	P2_W_29.68	E606523	CQTZT	100					0.00	0.00	0.00	0.75	7.97	3.77	2.64	79.32	3	8.64
Bellekeno_East Decline	P2_W_29.68	E606524	CQTZT	100					0.00	0.00	0.00	0.75	7.97	3.77	2.64	79.32	4	8.75
Bellekeno_East Decline	P4_W_18.16	E606525	CQTZT	100					0.00	0.00	0.00	0.75	6.25	3.06	2.64	50.49	4	8.65
Bellekeno_East Decline	P4_W_18.16	E606526	GSCH	100					0.00	0.00	0.00	0.75	2.82	3.06	2.63	22.69	4	8.64
Bellekeno_East Decline	P4_W_18.16	E606527	CQTZT	100					0.00	0.00	0.00	0.75	8.73	3.06	2.64	70.52	4	8.07
Bellekeno_East Decline	P4_W_18.16	E606528	CQTZT	100					0.00	0.00	0.00	0.75	3.35	3.06	2.64	27.06	4	8.70
Bellekeno_East Decline	P4_W_21.22	E606529	CQTZT	100					0.00	0.00	0.00	0.75	4.90	3.48	2.64	45.02	4	8.56
Bellekeno_East Decline	P4_W_21.22	E606530	VN	100					0.00	0.00	0.00	0.75	2.50	3.48	2.65	23.06	4	8.52
Bellekeno_East Decline	P4_W_21.22	E606531	CQTZT	100					0.00	0.00	0.00	0.75	4.90	3.48	2.64	45.02	2	8.60
Bellekeno_East Decline	P4_W_21.22	E606532	CQTZT	100					0.00	0.00	0.00	0.75	4.90	3.48	2.64	45.02	2	8.20
Bellekeno_East Decline	P4_W_21.22	E606533	CQTZT	100					0.00	0.00	0.00	0.75	4.90	3.48	2.64	45.02	3	8.24
Bellekeno_East Decline	P4_W_24.7	E606534	CQTZT	100					0.00	0.00	0.00	0.75	9.24	3.60	2.64	87.82	4	8.41
Bellekeno_East Decline	P4_W_24.7	E606535	CSCH	100					0.00	0.00	0.00	0.75	4.83	3.60	2.65	46.08	4	7.78
Bellekeno_East Decline	P4_W_24.7	E606536	CQTZT	100					0.00	0.00	0.00	0.75	9.35	3.60	2.64	88.86	4	7.95
Bellekeno_East Decline	P4_NW_23.2	E606537	CQTZT	100					0.00	0.00	0.00	0.75	2.25	2.50	2.64	14.85	4	7.72
Bellekeno_East Decline	P4_NW_23.2	E606538	CQTZT	100					0.00	0.00	0.00	0.75	2.25	2.50	2.64	14.85	4	7.83
Bellekeno_East Decline	P4_NW_23.2	E606539	CQTZT	100					0.00	0.00	0.00	0.75	2.25	2.50	2.64	14.85	4	8.32
Bellekeno_East Decline	P4_NW_23.2	E606540	GSCH	100					0.00	0.00	0.00	0.75	2.25	2.50	2.63	14.79	4	8.08
Bellekeno_East Decline	P4_W_28.3	E606541	CQTZT	100					0.00	0.00	0.00	0.75	14.36	4.20	2.64	159.22	4	8.46
Bellekeno_East Decline	P4_W_28.3	E606542	CQTZT	100					0.00	0.00	0.00	0.75	4.29	4.20	2.64	47.57	4	7.84
Bellekeno_East Decline	P4_W_28.3	E606543	CQTZT	100					0.00	0.00	0.00	0.75	14.02	4.20	2.64	155.45	3	7.80
Bellekeno_East Decline	P4_W_32.5	E606544	CQTZT	100					0.00	0.00	0.00	0.75	11.18	3.00	2.64	88.55	3	8.85
Bellekeno_East Decline	P4_W_32.5	E606545	CQTZT	100					0.00	0.00	0.00	0.75	4.08	3.00	2.64	32.31	4	8.30
Bellekeno_East Decline	P4_W_32.5	E606546	CQTZT	100					0.00	0.00	0.00	0.75	10.26	3.00	2.64	81.26	2	7.80
Bellekeno_East Decline	P4_NW_28.2	E606547	CQTZT	100					0.00	0.00	0.00	0.75	5.45	3.00	2.64	43.16	4	8.09

Development	Face ID	Sample ID	Lith1	Lith1%	Lith2	Lith2%	Lith3	Lith3%	Vis. Py %	Vis. Ga %	Vis. Sph %	Vis. CaCO3 %	Area m2	Length m	SG	Tonnes	Fizz Rating	Paste pH
Bellekeno_East Decline	P4_NW_28.2	E606548	CQTZT	100					0.00	0.00	0.00	0.75	6.91	3.00	2.64	54.73	4	8.40
Bellekeno_East Decline	P4_W_38.5	E606549	CQTZT	100					0.00	0.00	0.00	0.75	23.91	3.16	2.64	199.47	4	8.36
Bellekeno_East Decline	P4_W_35.5	E606550	CQTZT	100					0.00	0.00	0.00	0.75	23.61	3.16	2.64	196.96	4	8.30
Bellekeno_East Decline	P4_W_42	E606551	CQTZT	100					0.00	0.00	0.00	0.75	17.09	3.16	2.64	142.57	4	8.80
Bellekeno_East Decline	P4_W_42	E606552	CQTZT	60	FLT	40			0.00	0.00	0.00	0.75	2.56	3.16	2.64	21.36	4	8.18
Bellekeno_East Decline	P4_W_42	E606553	CQTZT	100					0.00	0.00	0.00	0.75	11.37	3.16	2.64	94.85	4	8.30
Bellekeno_East Decline	P5_West_13.4	E606554	CQTZT	100					0.00	0.00	0.00	0.75	4.97	4.40	2.64	57.73	3	8.87
Bellekeno_East Decline	P5_West_13.4	E606555	CQTZT	80	FLT	20			0.00	0.00	0.00	0.75	4.49	4.40	2.64	52.16	4	7.97
Bellekeno_East Decline	P5_West_13.4	E606556	CQTZT	60	GSCH	40			0.00	0.00	0.00	0.75	12.77	4.40	2.64	148.34	4	6.54
Bellekeno_East Decline	P5_W_17.8	E606557	CQTZT	100					0.00	0.00	0.00	0.75	4.95	2.65	2.64	34.63	3	8.27
Bellekeno_East Decline	P5_W_17.8	E606558	CQTZT	70	FLT	20	GSCH	10	0.00	0.00	0.00	0.75	2.65	2.65	2.64	18.54	4	8.34
Bellekeno_East Decline	P5_W_17.8	E606559	CQTZT	100					0.00	0.00	0.00	0.75	6.83	2.65	2.64	47.78	2	8.67
Bellekeno_East Decline	P5_W_17.8	E606560	GSCH	60	QTZT	40			0.00	0.00	0.00	0.75	8.54	2.65	2.63	59.52	4	8.35
Bellekeno_East Decline	P5_W_20.45	E606561	CQTZT	100					0.00	0.00	0.00	0.75	1.43	3.95	2.64	14.91	2	8.67
Bellekeno_East Decline	P5_W_20.45	E606562	CQTZT	100					0.00	0.00	0.00	0.75	2.73	3.95	2.64	28.47	4	8.50
Bellekeno_East Decline	P5_W_20.45	E606563	CQTZT	80	GSCH	20			0.00	0.00	0.00	0.75	14.38	3.95	2.64	149.95	4	8.83
Bellekeno_East Decline	P5_W_24.4	E606564	CQTZT	100					0.00	0.00	0.00	0.75	5.39	2.05	2.64	29.17	4	8.79
Bellekeno_East Decline	P5_W_24.4	E606565	CQTZT	80	GSCH	20			0.00	0.00	0.00	0.75	7.93	2.05	2.64	42.92	4	8.10
Bellekeno_East Decline	P5_W_24.4	E606566	CQTZT	70	GSCH	30			0.00	0.00	0.00	0.75	6.88	2.05	2.64	37.23	4	8.28
Bellekeno_East Decline	P5_W_26.45	E606567	CQTZT	100					0.00	0.00	0.00	0.75	2.79	4.55	2.64	33.56	4	8.22
Bellekeno_East Decline	P5_W_26.45	E606568	CQTZT	90	GSCH	10			0.00	0.00	0.00	0.75	8.23	4.55	2.64	98.81	4	7.66
Bellekeno_East Decline	P5_W_26.45	E606569	CQTZT	70	GSCH	30			0.00	0.00	0.00	0.75	6.96	4.55	2.64	83.57	4	8.15
Bellekeno_East Decline	P5_W_31	E606570	CQTZT	98	FLT	2			0.10	0.00	0.00	0.75	2.93	3.07	2.64	23.75	4	8.22
Bellekeno_East Decline	P5_W_31	E606571	CQTZT	90	GSCH	10			0.50	0.00	0.00	0.75	9.17	3.07	2.64	74.32	1	7.30
Bellekeno_East Decline	P5_W_31	E606572	CQTZT	60	GSCH	40			0.10	0.00	0.00	0.75	8.29	3.07	2.64	67.19	4	7.61
Bellekeno_East Decline	P5_W_34.07	E606573	CQTZT	50	CQTZT	50			0.00	0.00	0.00	0.75	0.78	3.63	2.64	7.50	4	8.75
Bellekeno_East Decline	P5_W_34.07	E606574	CQTZT	90	GSCH	10			0.30	0.00	0.00	0.75	11.82	3.63	2.64	113.30	3	7.75
Bellekeno_East Decline	P5_W_34.07	E606575	CQTZT	70	GSCH	30			0.30	0.00	0.00	0.75	13.52	3.63	2.64	129.53	4	7.50
Bellekeno_East Decline	P5_W_37.4	E606576	CQTZT	100					0.30	0.00	0.00	0.75	9.72	3.30	2.64	84.67	3	7.50
Bellekeno_East Decline	P5_W_37.4	E606577	GSCH	85	VN	15			0.30	0.00	0.00	0.75	16.30	3.30	2.63	141.49	4	8.31
Bellekeno_East Decline	P5_W_40.7	E606578	CQTZT	100					0.25	0.00	0.00	0.75	11.38	3.15	2.64	94.66	4	7.35
Bellekeno_East Decline	P5_W_40.7	E606579	CQTZT	90	GSCH	10			0.50	0.00	0.00	0.75	14.78	3.15	2.64	122.91	4	6.96
Bellekeno_East Decline	P6_W_23	E606580	CQTZT	95	GSCH	5			0.10	0.00	0.00	0.75	11.71	3.00	2.64	92.73	4	8.85
Bellekeno_East Decline	P6_W_23	E606581	CQTZT	95	GSCH	5			0.10	0.00	0.00	0.75	15.03	3.00	2.64	119.08	4	6.56
Bellekeno_East Decline	P6_W_26	E606582	CQTZT	100					0.10	0.00	0.00	0.75	9.67	3.10	2.64	79.11	3	6.83
Bellekeno_East Decline	P6_W_26	E606583	CQTZT	90	GSCH	10			0.30	0.00	0.00	0.75	18.83	3.10	2.64	154.10	4	7.12
Bellekeno_East Decline	P6_W_19.8	E606584	CQTZT	95	GSCH	5			0.10	0.00	0.00	0.75	8.19	3.15	2.64	68.11	4	7.45
Bellekeno_East Decline	P6_W_19.8	E606585	CQTZT	95	GSCH	5			0.10	0.00	0.00	0.75	8.19	3.15	2.64	68.11	4	7.99
Bellekeno_East Decline	P6_W_19.8	E606586	CQTZT	95	GSCH	5			0.10	0.00	0.00	0.75	8.19	3.15	2.64	68.11	4	8.28
Bellekeno_East Decline	P6_W_29.1	E606587	CQTZT	100					0.10	0.00	0.00	0.75	7.51	3.90	2.64	77.32	4	7.29
Bellekeno_East Decline	P6_W_29.1	E606588	CQTZT	90	GSCH	10			0.30	0.00	0.00	0.75	7.99	3.90	2.64	82.27	4	7.25
Bellekeno_East Decline	P6_W_29.1	E606589	CQTZT	95	GSCH	5			0.50	0.00	0.00	0.75	5.73	3.90	2.64	59.00	4	7.95
Bellekeno_East Decline	P6_W_33	E606590	CQTZT	100					0.10	0.00	0.00	0.75	8.78	3.25	2.64	75.33	4	7.53
Bellekeno_East Decline	P6_W_33	E606591	CQTZT	90	GSCH	10			0.30	0.00	0.00	0.75	10.94	3.25	2.64	93.87	4	8.05
Bellekeno_East Decline	P6_W_33	E606592	CQTZT	90	GSCH	10			0.50	0.00	0.00	0.75	2.92	3.25	2.64	25.05	4	8.01
Bellekeno_East Decline	P6_W_39.5	E606593	CQTZT	100					0.20	0.00	0.00	0.75	10.72	4.50	2.64	127.35	4	6.91
Bellekeno_East Decline	P6_W_39.5	E606594	CQTZT	60	GSCH	40			0.30	0.00	0.00	0.75	4.77	4.50	2.64	56.67	4	7.20
Bellekeno_East Decline	P6_W_39.5	E606595	CQTZT	80	GSCH	20			0.20	0.00	0.00	0.75	14.68	4.50	2.64	174.40	4	7.40
Bellekeno_East Decline	P6_W_36.25	E606596	CQTZT	95	GSCH	5			0.10	0.00	0.00	0.75	8.23	3.25	2.64	70.61	4	7.40
Bellekeno_East Decline	P6_W_36.25	E606597	CQTZT	95	GSCH	5			0.20	0.00	0.00	0.75	8.23	3.25	2.64	70.61	4	8.65
Bellekeno_East Decline	P6_W_36.25	E606598	CQTZT	95	GSCH	5			0.30	0.00	0.00	0.75	8.23	3.25	2.64	70.61	4	7.71
Bellekeno_East Decline	P6_W_44	E606599	CQTZT	100					0.10	0.00	0.00	0.75	9.33	5.50	2.64	135.47	4	7.60
Bellekeno_East Decline	P6_W_44	E606600	CQTZT	100					0.10	0.00	0.00	0.75	9.33	5.50	2.64	135.47	4	7.84
Bellekeno_East Decline	P6_W_44	E606601	CQTZT	100					0.10	0.00	0.00	0.75	9.33	5.50	2.64	135.47	4	7.75
Bellekeno_East Decline	P6_W_49.5	E606602	CQTZT	100					0.10	0.00	0.00	0.75	6.77	3.20	2.64	57.19	4	7.77
Bellekeno_East Decline	P6_W_49.5	E606603	CQTZT	100					0.50	0.00	0.00	0.75	7.57	3.20	2.64	63.95	4	7.81
Bellekeno_East Decline	P6_W_49.5	E606604	CQTZT	100					0.50	0.00	0.00	0.75	10.56	3.20	2.64	89.21	4	7.95
Bellekeno_East Decline	P6_W_52.7	E606605	CQTZT	100					0.00	0.00	0.00	0.75	5.83	3.28	2.64	50.48	4	7.35
Bellekeno_East Decline	P6_W_52.7	E606606	CQTZT	70	GSCH	30			0.10	0.00	0.00	0.75	11.16	3.28	2.64	96.64	4	7.35
Bellekeno_East Decline	P6_W_52.7	E606607	CQTZT	90	GSCH	10			0.50	0.00	0.00	0.75	11.25	3.28	2.64	97.42	4	7.43
Bellekeno_East Decline	P7_W_7.5	E606608	CQTZT	70	GSCH	30			0.50	0.00	0.00	0.75	4.89	3.95	2.64	50.99	4	7.48
Bellekeno_East Decline	P7_W_7.5	E606609	CQTZT	95	GSCH	5			0.50	0.00	0.00	0.75	10.26	3.95	2.64	106.99	4	7.30
Bellekeno_East Decline	P7_W_7.5	E606610	CQTZT	95	GSCH	5			0.10	0.00	0.00	0.75	9.06	3.95	2.64	94.48	4	7.00
Bellekeno_East Decline	P7_W_11.45	E606611	CQTZT	100					0.20	0.00	0.00	0.75	5.83	3.95	2.64	60.80	4	7.80
Bellekeno_East Decline	P7_W_11.45	E606612	CQTZT	100					0.20	0.00	0.00	0.75	11.16	3.95	2.64	116.38	4	8.12
Bellekeno_East Decline	P7_W_11.45	E606613	CQTZT	100					0.20	0.00	0.00	0.75	11.25	3.95	2.64	117.32	4	7.75
Bellekeno_East Decline	P7_W_15.4	E606614	CQTZT	90	GSCH	10			0.20	0.00	0.00	0.75	4.35	3.60	2.64	41.34	4	8.00
Bellekeno_East Decline	P7_W_15.4	E606615	CQTZT	70	VN	30			0.20	0.00	0.00	0.75	13.47	3.60	2.64	128.02	4	8.57
Bellekeno_East Decline	P7_W_15.4	E606616	CQTZT	80	GSCH	20			0.20	0.00	0.00	0.75	6.36	3.60	2.64	60.45	4	8.40
Bellekeno_East Decline	P7_W_19	E606617	CQTZT	70	GSCH	30			0.30	0.00	0.00	0.75	6.47	3.20	2.64	54.66	4	8.64
Bellekeno_East Decline	P7_W_19	E606618	CQTZT	100					0.10	0.00	0.00	0.75	7.89	3.20	2.64	66.65	4	7.85
Bellekeno_East Decline	P7_W_19	E606619	CQTZT	80	GSCH	20			0.20	0.00	0.00	0.75	7.04	3.20	2.64	59.47	3	7.90
Bellekeno_East Decline	P7_W_22.2	E606620	CQTZT	70	GSCH	30			0.10	0.00	0.00	0.75	10.71	4.00	2.64	113.10	4	7.75
Bellekeno_East Decline	P7_W_22.2	E606621	CQTZT	50	GSCH	50			0.10	0.00	0.00	0.75	3.68	4.00	2.64	38.86	3	7.69
Bellekeno_East Decline	P7_W_22.2	E606622	CQTZT	70	GSCH	30			0.10	0.00	0.00	0.75	8.17	4.00	2.64	86.28	4	7.62
Bellekeno_East Decline	P7_W_26.2	E606623	CQTZT	100					0.10	0.00	0.00	0.75	10.71	4.00	2.64	113.10	4	7.87
Bellekeno_East Decline	P7_W_26.2	E606624	CQTZT	100					0.10	0.00	0.00	0.75	3.68	4.00	2.64	38.86	4	7.76
Bellekeno_East Decline	P7_W_26.2	E606625	CQTZT	100					0.10	0.00	0.00	0.75	8.17	4.00	2.64	86.28	4	7.98
Bellekeno_East Decline	P7_W_30.2	E606626	CQTZT	60	GSCH	40			0.20	0.00	0.00	0.75	4.83	3.80	2.64	48.42	4	7.74
Bellekeno_East Decline	P7_W_30.2	E606627	VN	50	GSCH	50			0.20	0.00	0.00	0.75	3.92	3.80	2.65	39.47	4	7.93
Bellekeno_East Decline	P7_W_30.2	E606628	CQTZT	80	GSCH	20			0.20	0.00	0.00	0.75	12.88	3.80	2.64	129.17	4	8.08
Bellekeno_East Decline	P7_W_34	E606629	CQTZT	100					0.00	0.00	0.00	0.75	7.10	3.80	2.64	71.23	4	8.38
Bellekeno_East Decline	P7_W_34	E606630	CQTZT	100					0.00	0.00	0.00	0.75	7.10	3.80	2.64	71.23	4	8.44
Bellekeno_East Decline	P7_W_34	E606631	CQTZT	100					0.00	0.00	0.00	0.75	7.10	3.80	2.64	71.23	4	8.06
Bellekeno_East Decline	P7_W_37.8	E606632	CQTZT	90	GSCH	10			0.10	0.00	0.00	0.75	2.01	6.80	2.64	36.04	3	8.06
Bellekeno_East Decline	P7_W_37.8	E606633	CQTZT	60	GSCH	40			0.10	0.00	0.00	0.75	1.74	6.80	2.64	31.25	4	7.76
Bellekeno_East Decline	P7_W_37.8	E606634	CQTZT	90	GSCH	10			0.10	0.00	0.00	0.75	18.83	6.80	2.64	338.12	4	8.58
Bellekeno_East Decline	P8_W_6.6	E606646	CQTZT	90	GSCH	10			0.00	0.00	0.00	0.75	1.65	0.90	2.64	3.92	4	9.12
Bellekeno_East Decline	P8_W_6.6	E606647	CQTZT	70	VN	30			0.00	0.00	0.00	0.75	5.59	0.90	2.64	13.28	4	9.41
Bellekeno_East Decline	P8_W_6.6	E606648	CQTZT	90	GSCH	10			0.00	0.00	0.00	0.75	17.39	0.90	2.64	41.32	4	9.20
Bellekeno_East Decline	P8_W_11.2	E606653	CQTZT	90	GSCH	10			0.20	0.00	0.00	0.75	3.82	2.80	2.64	28.24	4	9.21
Bellekeno_East Decline	P8_W_11.2	E606654	GSCH	70	GSCH	30			0.20	0.00	0.00	0.75	2.80	2.80	2.63	20.62	4	9.32
Bellekeno_East Decline	P8_W_11.2	E606655	CQTZT	100					0.20	0.00	0.00	0.75	16.21	2.80	2.64	119.82	4	9.17
Bellekeno_East Decline	P8_W_14	E606656	CQTZT	100					0.00	0.00	0.00	0.75	12.00	2.80	2.64	88.70	4	8.92
Bellekeno_East Decline	P8_W_14	E606657	CQTZT	90	GSCH	10			0.00	0.00	0.00	0.75	12.00	2.80	2.64	88.70	4	9.10
Bellekeno_East Decline	P8_W_16.8	E606658	CQTZT	100					0.00	0.00	0.00	0.75	13.95	5.00	2.64	184.14	3	8.97
Bellekeno_East Decline	P8_W_16.8	E606659	CQTZT	70	CSCH	30			0.00	0.00	0.00	0.75	5.13	5.00	2.64	67.72	4	9.24
Bellekeno_East Decline	P8_W_16.8	E606660	CQTZT	100					0.00	0.00	0.00	0.75	2.11	5.00	2.64	27.85	4	9.14
Bellekeno_East Decline	P8_W_16.8	E606661	VN	100					0.50	0.00	0.00	0.75	0.53	5.00	2.65	7.02	4	9.32
Bellekeno_East Decline	P8_W_21.8	E606662	CQTZT	100					0.00	0.00	0.00	0.75	25.00	5.00	2.64	330.00	4	8.70
Bellekeno_East Decline	P8_W_26.8	E606663	CQTZT	90	GSCH	10			0.00	0.00	0.00	0.75	16.12	1.70	2.64	72.35	3	9.05
Bellekeno_East Decline	P8_W_26.8	E606664	CQTZT	80	GSCH	20			0.00	0.00	0.00	0.75	7.07	1.70	2.64	31.73	4	9.39
Bellekeno_East Decline	P8_W_28.5	E606665	CQTZT	100					0.00	0.00	0.00	0.75	25.00	1.70	2.64	112.20	4	9.06
Bellekeno_East Decline	P8_W_30.2	E606666	CQTZT	100					0.00	0.00	0.00	0.75	15.26	4.15	2.64	167.19	3	9.12
Bellekeno_East Decline	P8_W_30.2	E606667	CQTZT	50	VN	50			0.00	0.00	0.00	0.75	7.10	4.15	2.64	77.79	3	9.18
Bellekeno_East Decline	P8_W_34.4	E606668	CQTZT	100					0.00	0.00	0.00	0.75	25.00	4.15	2.64	273.90	4	8.97
Bellekeno_East Decline	P8_W_38.5	E606669	CQTZT	100					0.00	0.00	0.00	0.75	7.96	4.50	2.64	94.56	4	9.22
Bellekeno_East Decline	P8_W_38.5	E606670	CQTZT	50	VN				0.00	0.00	0.00	0.75	6.41	4.50	2.64	76.15	4	9.26
Bellekeno_East Decline	P8_W_38.5	E606671	CQTZT	80	GSCH	20			0.00	0.00	0.00	0.75	8.71	4.50	2.64	103.47	3	8.37
Bellekeno_East Decline	P8_W_43	E606672	CQTZT	100					0.00	0.00	0.00	0.75	7.05	4.60	2.64	85.62	4	9.31
Bellekeno_East Decline	P8_W_43	E606673	CQTZT	100					0.00	0.00	0.00	0.75	7.05	4.60	2.64	85.62	4	8.94
Bellekeno_East Decline	P8_W_43	E606674	CQTZT	100					0.00	0.00	0.00	0.75	7.05	4.60	2.64	85.62	4	8.78
Bellekeno_East Decline	P8_W_47.6	E606675	CQTZT	100					0.00	0.00	0.00	0.75	2.09	3.90	2.64	21.52	4	9.20
Bellekeno_East Decline	P8_W_47.6	E606676	CQTZT	100					0.00	0.00	0.00	0.75	3.41	3.90	2.64	35.11	3	9.32
Bellekeno_East Decline	P8_W_47.6	E606677	CQTZT	100					0.00	0.00	0.00	0.75	11.44	3.90	2.64	117.79	3	9.21
Bellekeno_East Decline	P8_W_47.6	E606678	CQTZT	80	CSCH	20			0.00	0.00	0.00	0.75	7.31	3.90	2.64	75.26	3	9.00
Bellekeno_East Decline	P8_W_51.5	E606679	CQTZT	100					0.10	0.00	0.00	0.75	5.06	3.80	2.64	50.74	4	9.03
Bellekeno_East Decline	P8_W_51.5	E606680	CQTZT	100					0.10	0.00	0.00	0.75	6.48	3.80	2.64	65.04	4	9.11
Bellekeno_East Decline	P8_W_51.5	E606681	CQTZT	100					0.10	0.00	0.00	0.75	8.82	3.80	2.64	88.53	4	9.18
Bellekeno_East Decline	P8_W_55.3	E606682	CQTZT	100					0.10	0.00	0.00	0.75	5.06	3.20	2.64	42.73	4	9.10
Bellekeno_East Decline	P8_W_55.3	E606683	CQTZT	100					0.10	0.00	0.00	0.75	6.48	3.20	2.64	54.77	4	9.16

Development	Face ID	Sample ID	Lith1	Lith1%	Lith2	Lith2%	Lith3	Lith3%	Vis. Py %	Vis. Ga %	Vis. Sph %	Vis. CaCO3 %	Area m2	Length m	SG	Tonnes	Fizz Rating	Paste pH
Bellekeno_East Decline	P8_W_55.3	E606684	CQTZT	100					0.10	0.00	0.00	0.75	8.82	3.20	2.64	74.55	4	9.04
Bellekeno_East Decline	P8_W_58.5	E606685	CQTZT	100					0.00	0.00	0.00	0.75	7.10	5.70	2.64	106.84	4	9.37
Bellekeno_East Decline	P8_W_58.5	E606686	CQTZT	100					0.00	0.00	0.00	0.75	7.10	5.70	2.64	106.84	4	8.97
Bellekeno_East Decline	P8_W_58.5	E606687	CQTZT	100					0.00	0.00	0.00	0.75	7.10	5.70	2.64	106.84	4	8.75
Bellekeno_East Decline	P13_W_16.3	E606688	CQTZT	100					0.00	0.00	0.00	0.75	7.10	4.90	2.64	91.85	4	8.87
Bellekeno_East Decline	P13_W_16.3	E606689	CQTZT	100					0.00	0.00	0.00	0.75	7.10	4.90	2.64	91.85	3	8.91
Bellekeno_East Decline	P13_W_16.3	E606690	CQTZT	100					0.00	0.00	0.00	0.75	7.10	4.90	2.64	91.85	4	9.00
Bellekeno_East Decline	P13_W_21	E606691	CQTZT	90	GSCH	10			0.00	0.00	0.00	0.75	8.11	3.10	2.64	66.36	4	9.00
Bellekeno_East Decline	P13_W_21	E606692	VN	100					0.00	0.00	0.00	0.75	2.74	3.10	2.65	22.51	4	9.00
Bellekeno_East Decline	P13_W_21	E606693	CQTZT	50	GSCH	50			0.00	0.00	0.00	0.75	5.36	3.10	2.64	43.90	4	8.92
Bellekeno_East Decline	P13_W_21	E606694	CQTZT	100					0.00	0.00	0.00	0.75	4.92	3.10	2.64	40.30	2	9.00
Bellekeno_East Decline	P13_W_24.1	E606695	CQTZT	100					0.00	0.00	0.00	0.75	7.10	3.10	2.64	58.11	4	8.94
Bellekeno_East Decline	P13_W_24.1	E606696	CQTZT	100					0.00	0.00	0.00	0.75	7.10	3.10	2.64	58.11	4	9.00
Bellekeno_East Decline	P13_W_24.1	E606697	CQTZT	100					0.00	0.00	0.00	0.75	7.10	3.10	2.64	58.11	4	8.87
Bellekeno_East Decline	P13_W_27.2	E606698	CQTZT	100					0.10	0.00	0.00	0.75	1.65	2.25	2.64	9.80	4	9.00
Bellekeno_East Decline	P13_W_27.2	E606699	VN	80	CQTZT	20			0.10	0.00	0.00	0.75	3.65	2.25	2.65	21.76	3	9.00
Bellekeno_East Decline	P13_W_27.2	E606700	GSCH	100					0.50	0.00	0.00	0.75	2.41	2.25	2.63	14.26	4	9.00
Bellekeno_Bypass	P14_W_15.7	E607286	CQTZT	100					0.00	0.00	0.00	0.75	3.66	3.40	2.64	32.85	2	8.00
Bellekeno_Bypass	P14_W_15.7	E607287	CQTZT	90	GSCH	10			0.00	0.00	0.00	0.75	4.03	3.40	2.64	36.17	2	7.80
Bellekeno_Bypass	P14_W_15.7	E607288	CQTZT	90	VN	10			0.00	0.00	0.00	0.75	3.13	3.40	2.64	28.09	4	7.89
Bellekeno_Bypass	P14_SW_22.9	E607289	CQTZT	90	VN	10			0.00	0.00	0.00	0.75	3.93	3.80	2.64	39.43	4	8.02
Bellekeno_Bypass	P14_SW_22.9	E607290	CQTZT	70	VN	30			0.00	0.00	0.00	0.75	1.89	3.80	2.64	18.96	4	8.01
Bellekeno_Bypass	P14_SW_22.9	E607293	CQTZT	80	GSCH	20			0.00	0.00	0.00	0.75	4.89	3.80	2.64	49.06	4	8.16
Bellekeno_Bypass	P16_SW_7.3	E607294	CQTZT	100					0.25	0.00	0.00	0.75	0.70	4.00	2.64	7.39	4	9.06
Bellekeno_Bypass	P16_SW_7.3	E607295	CQTZT	50	GSCH	50			0.50	0.00	0.00	0.75	2.20	4.00	2.64	23.23	3	8.67
Bellekeno_Bypass	P16_SW_7.3	E607296	CQTZT	70	GSCH	30			0.25	0.00	0.00	0.75	4.30	4.00	2.64	45.41	3	8.75
Bellekeno_Bypass	P16_SW_11.3	E607297	GSCH	80	CQTZT	20			0.50	0.00	0.00	0.75	1.30	2.60	2.63	8.89	2	7.87
Bellekeno_Bypass	P16_SW_11.3	E607298	CQTZT	100					0.25	0.00	0.00	0.75	2.90	2.60	2.64	19.91	4	8.86
Bellekeno_Bypass	P16_SW_11.3	E607299	CQTZT	70	GSCH	30			0.25	0.00	0.00	0.75	3.50	2.60	2.64	24.02	4	8.60
Bellekeno_Bypass	P16_SW_22.1	E607300	CQTZT	100					0.00	0.00	0.00	0.75	1.28	3.40	2.64	11.49	2	8.35
Bellekeno_Bypass	P10_W_19.1	E607316	GSCH	70	CQTZT	30			0.00	0.00	0.00	0.75	2.75	5.35	2.63	38.69	4	8.75
Bellekeno_Bypass	P10_W_19.1	E607317	CQTZT	100					0.00	0.00	0.00	0.75	2.86	5.35	2.64	40.39	4	8.49
Bellekeno_Bypass	P10_W_19.1	E607318	CQTZT	100					0.00	0.00	0.00	0.75	1.22	5.35	2.64	17.23	2	8.70
Bellekeno_Bypass	P10_W_24.45	E607319	CQTZT	100					0.00	0.00	0.00	0.75	2.75	5.35	2.64	38.84	4	8.45
Bellekeno_Bypass	P10_W_24.45	E607320	CQTZT	100					0.00	0.00	0.00	0.75	2.75	5.35	2.64	38.84	4	8.57
Bellekeno_Bypass	P10_SE_29.8	E607322	CQTZT	90	VN	10			0.00	0.00	0.00	0.75	4.41	3.40	2.64	39.58	4	8.54
Bellekeno_Bypass	P10_SE_29.8	E607323	GSCH	50	VN	30	CQTZT	20	0.00	0.00	0.00	0.75	1.36	3.40	2.63	12.16	4	8.64
Bellekeno_Bypass	P10_SE_29.8	E607324	CQTZT	100					0.00	0.00	0.00	0.75	3.36	3.40	2.64	30.16	4	8.92
Bellekeno_Bypass	P10_SE_33.2	E607325	GSCH	100					0.10	0.00	0.00	0.75	1.04	3.10	2.63	8.48	2	8.67
Bellekeno_Bypass	P10_SE_33.2	E607326	CQTZT	80	GSCH	20			0.00	0.00	0.00	0.75	1.11	3.10	2.64	9.08	3	8.56
Bellekeno_Bypass	P10_SE_33.2	E607327	CQTZT	100					0.00	0.00	0.00	0.75	7.76	3.10	2.64	63.51	4	8.79
Bellekeno_Bypass	P10_SW_36.3	E607328	CQTZT	100					0.00	0.00	0.00	0.75	4.87	3.40	2.64	43.71	3	8.13
Bellekeno_Bypass	P10_SW_36.3	E607329	CQTZT	95	GSCH	5			0.00	0.00	0.00	0.75	3.11	3.40	2.64	27.92	4	8.92
Bellekeno_Bypass	P10_SW_36.3	E607330	CQTZT	100					0.00	0.00	0.00	0.75	4.01	3.40	2.64	35.99	3	8.37
Bellekeno_Bypass	P14_W_12.5	E607331	CQTZT	90	GSCH	10			0.10	0.00	0.00	0.75	3.58	3.20	2.64	30.24	4	8.07
Bellekeno_Bypass	P14_W_12.5	E607332	CQTZT	100					0.00	0.00	0.00	0.75	4.33	3.20	2.64	36.58	3	8.05
Bellekeno_Bypass	P14_W_12.5	E607333	CQTZT	100					0.00	0.00	0.00	0.75	3.68	3.20	2.64	31.09	2	7.86
Bellekeno_Bypass	P16_SW_13.9	E607334	CQTZT	100					0.00	0.00	0.00	0.75	2.25	5.00	2.64	29.70	2	8.17
Bellekeno_Bypass	P16_SW_13.9	E607335	CQTZT	40	GSCH	40	VN	20	0.50	0.00	0.00	0.75	2.09	5.00	2.64	27.59	3	6.85
Bellekeno_Bypass	P16_SW_13.9	E607336	CQTZT	100					0.00	0.00	0.00	0.75	9.83	5.00	2.64	129.76	4	8.48
Bellekeno_Bypass	P16_SW_18.9	E607337	CQTZT	100					0.00	0.00	0.00	0.75	0.71	3.20	2.64	6.00	2	8.46
Bellekeno_Bypass	P16_SW_18.9	E607338	GSCH	40	CQTZT	40	VN	20	0.50	0.00	0.00	0.75	2.32	3.20	2.63	19.53	2	7.81
Bellekeno_Bypass	P16_SW_18.9	E607339	CQTZT	95	GSCH	5			0.25	0.00	0.00	0.75	3.83	3.20	2.64	32.36	3	8.27
Bellekeno_Bypass	P16_SW_22.1	E607340	GSCH	50	CQTZT	30	VN	20	0.25	0.00	0.00	0.75	1.27	3.40	2.63	11.36	2	8.11
Bellekeno_Bypass	P16_SW_22.1	E607341	CQTZT	90	VN	10			0.25	0.00	0.00	0.75	3.74	3.40	2.64	33.57	3	8.43
Bellekeno_Bypass	P16_W_25.5	E607342	GSCH	70	CQTZT	30			0.25	0.00	0.00	0.75	1.31	3.40	2.63	11.71	4	8.23
Bellekeno_Bypass	P16_W_25.5	E607343	CQTZT	95	GSCH	5			0.00	0.00	0.00	0.75	2.34	3.40	2.64	21.00	4	8.60
Bellekeno_Bypass	P16_W_25.5	E607344	CQTZT	100					0.00	0.00	0.00	0.75	2.67	3.40	2.64	23.97	2	8.19
Bellekeno_Bypass	P16_SW_28.9	E607345	GSCH	70	CQTZT	30			0.50	0.00	0.00	0.75	1.89	3.90	2.63	19.39	3	7.85
Bellekeno_Bypass	P16_SW_28.9	E607346	CQTZT	95	GSCH	5			0.00	0.00	0.00	0.75	1.54	3.90	2.64	15.86	4	8.60
Bellekeno_Bypass	P16_SW_28.9	E607347	GSCH	60	CQTZT	40			0.25	0.00	0.00	0.75	4.18	3.90	2.63	42.87	4	8.15
Bellekeno_Bypass	P16_SW_32.8	E607348	CQTZT	50	GSCH	50			0.25	0.00	0.00	0.75	2.77	3.90	2.64	28.52	4	9.15
Bellekeno_Bypass	P16_SW_32.8	E607349	CQTZT	80	GSCH	20			0.00	0.00	0.00	0.75	1.02	3.90	2.64	10.50	2	7.85
Bellekeno_Bypass	P16_SW_32.8	E607350	GSCH	80	CQTZT	20			0.00	0.00	0.00	0.75	2.28	3.90	2.63	23.39	2	7.79
Bellekeno_Bypass	P16_SW_32.8	E607451	CQTZT	100					0.00	0.00	0.00	0.75	1.57	3.90	2.64	16.16	4	9.05
Bellekeno_Bypass	P16_SW_36.7	E607452	CQTZT	80	GSCH	20			0.25	0.00	0.00	0.75	2.36	3.30	2.64	20.56	2	8.36
Bellekeno_Bypass	P16_SW_36.7	E607453	CQTZT	100					0.00	0.00	0.00	0.75	3.45	3.30	2.64	30.06	4	8.54
Bellekeno_Bypass	P16_SW_36.7	E607454	GSCH	50	CQTZT	50			0.25	0.00	0.00	0.75	0.58	3.30	2.63	5.03	2	8.10
Bellekeno_Bypass	P20_SW_12.4	E607455	CQTZT	100					0.00	0.00	0.00	0.75	2.81	3.90	2.64	28.93	2	8.54
Bellekeno_Bypass	P20_SW_12.4	E607456	GSCH	70	CQTZT	30			0.25	0.00	0.00	0.75	1.21	3.90	2.63	12.41	2	8.15
Bellekeno_Bypass	P20_SW_12.4	E607457	CQTZT	100					0.00	0.00	0.00	0.75	2.24	3.90	2.64	23.06	4	8.62
Bellekeno_Bypass	P20_SW_16.3	E607458	CQTZT	100					0.00	0.00	0.00	0.75	1.08	3.90	2.64	11.12	3	9.38
Bellekeno_Bypass	P20_SW_16.3	E607459	CQTZT	95	GSCH	5			0.01	0.00	0.00	0.75	1.99	3.90	2.64	20.49	4	8.46
Bellekeno_Bypass	P20_SW_16.3	E607460	CQTZT	100					0.00	0.00	0.00	0.75	3.86	3.90	2.64	39.74	3	8.72
Bellekeno_Bypass	P20_SW_20.2	E607461	CQTZT	80	GSCH	20			0.00	0.00	0.00	0.75	3.85	3.60	2.64	36.59	4	8.78
Bellekeno_Bypass	P20_SW_20.2	E607462	CQTZT	60	GSCH	40			0.00	0.00	0.00	0.75	2.29	3.60	2.64	21.76	4	8.80
Bellekeno_Bypass	P20_SW_20.2	E607463	CQTZT	100					0.00	0.00	0.00	0.75	1.03	3.60	2.64	9.79	2	8.52
Bellekeno_Bypass	P20_SW_23.8	E607464	CQTZT	100					0.00	0.00	0.00	0.75	3.91	3.50	2.64	36.13	4	7.20
Bellekeno_Bypass	P20_SW_23.8	E607465	GSCH	100					0.25	0.00	0.00	0.75	1.22	3.50	2.63	11.23	3	8.15
Bellekeno_Bypass	P20_SW_23.8	E607466	CQTZT	70	GSCH	30			0.25	0.00	0.00	0.75	1.66	3.50	2.64	15.34	4	9.64
Bellekeno_Bypass	P20_SW_27.3	E607467	CQTZT	90	VN	10			0.25	0.00	0.00	0.75	1.57	2.60	2.64	10.78	4	9.52
Bellekeno_Bypass	P20_SW_27.3	E607468	CQTZT	50	VN	30	GSCH	20	0.25	0.00	0.00	0.75	3.86	2.60	2.64	26.50	4	9.50
Bellekeno_Bypass	P20_SW_27.3	E607469	CQTZT	95	VN	5			0.00	0.00	0.00	0.75	1.07	2.60	2.64	7.34	4	9.76
Bellekeno_Bypass	P20_SW_31.6	E607470	CHSCH	100					0.25	0.00	0.00	0.75	5.15	4.40	2.71	61.41	3	8.19
Bellekeno_Bypass	P20_SW_36	E607471	CHSCH	100					0.25	0.00	0.00	0.75	5.76	4.30	2.71	67.12	3	9.08
Bellekeno_Bypass	P20_SW_40.3	E607472	CHSCH	100					0.25	0.00	0.00	0.75	4.67	4.30	2.71	54.42	3	9.02
Bellekeno_Bypass	P20_SW_40.3	E607473	CHSCH	100					0.25	0.00	0.00	0.75	4.64	4.30	2.71	54.07	3	9.40
Bellekeno_Bypass	P22_SW_11.6	E607474	CHSCH	100					0.25	0.00	0.00	0.75	4.75	3.80	2.71	48.92	2	9.12
Bellekeno_Bypass	P22_SW_11.6	E607475	CHSCH	100					0.25	0.00	0.00	0.75	3.59	3.80	2.71	36.97	3	9.34
Bellekeno_Bypass	P22_SW_15.4	E607476	CHSCH	90	GSCH	10			0.25	0.00	0.00	0.75	4.22	3.40	2.71	38.88	3	9.56
Bellekeno_Bypass	P22_SW_15.4	E607477	CHSCH	90	GSCH	10			0.25	0.00	0.00	0.75	2.17	3.40	2.71	19.99	3	9.30
Bellekeno_Bypass	P22_SW_18.8	E607478	GSCH	100					0.25	0.00	0.00	0.75	2.69	4.10	2.63	29.01	3	9.46
Bellekeno_Bypass	P22_SW_18.8	E607479	GSCH	80	QTZT	10			0.25	0.00	0.00	0.75	0.65	4.10	2.63	7.01	2	8.50
Bellekeno_Bypass	P22_SW_18.8	E607480	GSCH	100					0.25	0.00	0.00	0.75	6.19	4.10	2.63	66.75	3	9.30
Bellekeno_Bypass	P22_SW_22.9	E607481	GSCH	100					0.25	0.00	0.00	0.75	2.50	4.00	2.63	26.30	3	9.60
Bellekeno_Bypass	P22_SW_22.9	E607482	GSCH	95	VN	5			0.25	0.00	0.00	0.75	5.28	4.00	2.63	55.55	4	9.25
Bellekeno_Bypass	P22_SW_22.9	E607483	GSCH	100					0.25	0.00	0.00	0.75	1.99	4.00	2.63	20.93	3	8.81
Bellekeno_Bypass	P22_SW_26.9	E607484	GSCH	90	CQTZT	5	VN	5	0.25	0.00	0.00	0.75	4.61	3.60	2.63	43.65	4	9.37
Bellekeno_Bypass	P22_SW_26.9	E607485	GSCH	100					0.25	0.00	0.00	0.75	4.15	3.60	2.63	39.29	4	9.40
Bellekeno_Bypass	P25_SW_10	E607486	CQTZT	90	GSCH	10			0.25	0.00	0.00	0.75	2.68	3.10	2.64	21.93	4	9.38
Bellekeno_Bypass	P25_SW_10	E607487	GSCH	80	CQTZT	20			0.25	0.00	0.00	0.75	1.12	3.10	2.63	9.13	4	9.05
Bellekeno_Bypass	P25_SW_10	E607488	CQTZT	90	GSCH	10			0.25	0.00	0.00	0.75	1.55	3.10	2.64	12.69	4	9.71
Bellekeno_Bypass	P25_SW_10	E607489	GSCH	80	CQTZT	20			0.25	0.00	0.00	0.75	4.22	3.10	2.63	34.41	4	9.38
Bellekeno_Bypass	P25_SW_13.1	E607490	CQTZT	100					0.00	0.00	0.00	0.75	2.11	1.90	2.64	10.58	4	9.23
Bellekeno_Bypass	P25_SW_13.1	E607491	CQTZT	95	GSCH	5			0.00	0.00	0.00	0.75	7.45	1.90	2.64	37.37	4	9.64
Bellekeno_Bypass	P25_SW_15	E607492	CQTZT	100					0.00	0.00	0.00	0.75	1.87	3.00	2.64	14.81	4	9.45
Bellekeno_Bypass	P25_SW_15	E607493	CQTZT	100					0.00	0.00	0.00	0.75	5.97	3.00	2.64	47.28	3	9.48
Bellekeno_Bypass	P25_SW_18	E607494	CQTZT	90					0.00	0.00	0.00	0.75	2.32	2.40	2.64	14.70	4	9.47
Bellekeno_Bypass	P25_SW_18	E607495	CQTZT	100					0.00	0.00	0.00	0.75	1.46	2.40	2.64	9.25	4	9.15
Bellekeno_Bypass	P25_SW_18	E607496	CQTZT	90	GSCH	10			0.00	0.00	0.00	0.75	2.77	2.40	2.64	17.55	4	9.24
Bellekeno_Bypass	P27_SW_5.7	E607497	CQTZT	90	GSCH	10			0.00	0.00	0.00	0.75	5.76	1.70	2.64	25.85	4	9.03
Bellekeno_Bypass	P27_SW_7.3	E607498	CQTZT	100					0.00	0.00	0.00	0.75	2.48	4.70	2.64	30.77	4	9.65
Bellekeno_Bypass	P27_SW_7.3	E607499	CQTZT	50	GSCH	50			0.25	0.00	0.00	0.75	0.80	4.70	2.64	9.93	4	9.11
Bellekeno_Bypass	P27_SW_7.3	E607500	CQTZT	100					0.00	0.00	0.00	0.75	3.04	4.70	2.64	37.72	4	9.56

Development	Face ID	Sample ID	Tonnes	Fizz_Rating	Paste_pH	Ag_ppm	Pb_ppm	Zn_ppm	Al_pct	Ars_ppm	Ba_ppm	Ca_pct	Cd_ppm	Cu_ppm	Fe_pct	K_pct	Mg_pct	Mn_ppm	Na_pct	S_pct	S_IR08
Bellekeno_Bypass	P27_SW_16.6	E604507	12.31	4	9.60	1.00	153.00	754.00	0.29	-5.00	80.00	9.80	10.00	40.00	1.42	0.09	0.06	1765.00	0.01	0.20	0.19
Bellekeno_Bypass	P27_SW_16.6	E604508	6.85	4	8.95	-0.50	17.00	120.00	2.40	14.00	660.00	2.49	0.80	31.00	2.30	0.68	0.22	338.00	0.04	0.23	0.22
Bellekeno_Bypass	P27_SW_16.6	E604509	17.66	4	8.03	0.60	18.00	107.00	0.67	6.00	190.00	3.14	-0.50	43.00	2.33	0.17	0.09	349.00	0.01	0.08	0.08
Bellekeno_East Decline	P28_W_39.3	E606051	5.78	2	8.27	0.70	16.00	73.00	6.25	25.00	890.00	0.93	-0.50	43.00	3.41	1.64	0.34	218.00	0.18	1.06	
Bellekeno_East Decline	P28_W_39.3	E606052	201.01	4	9.27	-0.50	11.00	33.00	1.00	13.00	180.00	1.76	-0.50	48.00	2.59	0.22	0.19	1475.00	0.03	0.69	
Bellekeno_East Decline	P31_W_23.4	E606088	73.33	4	8.95	-0.50	9.00	26.00	1.11	8.00	210.00	0.83	-0.50	31.00	2.01	0.25	0.14	140.00	0.04	0.55	
Bellekeno_East Decline	P31_W_23.4	E606089	68.85	4	9.03	-0.50	7.00	12.00	0.69	9.00	110.00	0.94	-0.50	30.00	1.51	0.17	0.08	123.00	0.02	0.23	
Bellekeno_East Decline	P31_W_23.4	E606090	68.04	4	8.77	0.60	9.00	87.00	4.74	9.00	740.00	3.68	-0.50	31.00	3.02	1.07	0.54	181.00	0.11	0.62	
Bellekeno_East Decline	P41_W_21.2	E606109	94.94	4	8.94	-0.50	8.00	40.00	2.68	12.00	230.00	4.38	-0.50	53.00	3.08	0.31	0.63	404.00	0.04	0.49	
Bellekeno_East Decline	P41_W_21.2	E606110	99.05	4	9.12	-0.50	9.00	31.00	1.48	7.00	230.00	3.24	-0.50	36.00	1.84	0.32	0.27	161.00	0.03	0.35	
Bellekeno_East Decline	P41_W_21.2	E606111	44.84	4	9.14	0.50	21.00	56.00	3.86	12.00	620.00	4.41	-0.50	23.00	2.48	0.98	0.46	153.00	0.12	0.74	
Bellekeno_East Decline	P42_W_40	E606146	41.03	2	8.29	1.60	363.00	653.00	5.08	34.00	820.00	0.75	5.40	36.00	3.52	1.78	0.24	5140.00	0.10	0.24	
Bellekeno_East Decline	P42_W_40	E606147	133.34	2	8.33	1.60	337.00	610.00	6.27	47.00	1020.00	0.68	5.30	33.00	4.08	2.05	0.37	4870.00	0.14	0.51	
Bellekeno_East Decline	P42_W_40	E606148	111.94	2	8.14	-0.50	22.00	215.00	1.40	16.00	220.00	0.30	1.70	22.00	2.32	0.50	0.06	3770.00	0.03	0.24	
Bellekeno_East Decline	P19_W_16.1	E606309	50.27	4	9.46	0.60	14.00	21.00	0.50	6.00	80.00	4.38	-0.50	23.00	1.13	0.14	0.07	194.00	0.01	0.16	
Bellekeno_East Decline	P19_W_16.1	E606310	68.85	2	9.20	-0.50	8.00	34.00	1.65	15.00	230.00	2.19	-0.50	21.00	2.00	0.33	0.23	195.00	0.07	0.96	
Bellekeno_East Decline	P19_W_16.1	E606311	84.37	2	9.02	-0.50	11.00	47.00	1.54	15.00	300.00	1.83	-0.50	30.00	2.62	0.37	0.47	208.00	0.05	0.70	
Bellekeno_East Decline	P21_W_16.1	E606329	58.30	4	9.31	-0.50	15.00	53.00	0.88	10.00	130.00	4.22	-0.50	48.00	2.02	0.28	0.10	237.00	0.02	0.42	
Bellekeno_East Decline	P21_W_16.1	E606330	86.61	3	9.40	-0.50	14.00	30.00	1.26	15.00	180.00	1.25	-0.50	37.00	2.30	0.35	0.11	168.00	0.04	0.73	
Bellekeno_East Decline	P21_W_16.1	E606331	56.41	4	9.30	0.80	27.00	76.00	3.12	22.00	510.00	5.38	0.60	42.00	2.88	1.02	0.32	624.00	0.05	0.47	
Bellekeno_East Decline	P23_W_23.9	E606396	56.46	4	9.40	-0.50	8.00	57.00	2.70	-5.00	460.00	3.24	-0.50	39.00	2.97	0.60	0.55	269.00	0.09	0.53	0.49
Bellekeno_East Decline	P23_W_23.9	E606397	59.32	4	9.15	-0.50	17.00	74.00	3.77	-5.00	540.00	1.72	-0.50	58.00	3.72	0.69	0.56	361.00	0.08	0.18	0.16
Bellekeno_East Decline	P23_W_23.9	E606398	105.15	4	9.26	0.70	11.00	63.00	2.83	-5.00	460.00	1.50	-0.50	64.00	3.54	0.61	0.41	330.00	0.07	0.46	0.45
Bellekeno_East Decline	P18_W_19.6	E606436	66.03	4	8.75	-0.50	10.00	32.00	2.04	11.00	260.00	5.61	-0.50	22.00	2.12	0.42	0.17	148.00	0.07	1.01	
Bellekeno_East Decline	P18_W_19.6	E606437	66.03	4	9.18	-0.50	6.00	12.00	0.68	6.00	110.00	1.76	-0.50	16.00	1.34	0.14	0.09	104.00	0.02	0.34	
Bellekeno_East Decline	P18_W_19.6	E606438	123.39	4	8.53	-0.50	6.00	31.00	1.13	10.00	190.00	2.95	-0.50	17.00	1.48	0.17	0.22	112.00	0.04	0.52	
Bellekeno_East Decline	P13_W_34.35	E606459	49.32	4	8.54	-0.50	8.00	22.00	1.30	38.00	190.00	1.69	-0.50	22.00	1.94	0.29	0.19	145.00	0.03	0.28	
Bellekeno_East Decline	P13_W_34.35	E606460	49.32	4	8.72	-0.50	9.00	35.00	1.67	53.00	250.00	1.04	-0.50	22.00	2.08	0.38	0.14	117.00	0.05	0.52	
Bellekeno_East Decline	P13_W_34.35	E606461	49.32	4	8.78	-0.50	8.00	18.00	1.11	72.00	160.00	3.14	-0.50	22.00	1.81	0.25	0.10	135.00	0.03	0.35	
Bellekeno_East Decline	P15_W_41.3	E606494	67.50	3	8.06	-0.50	6.00	8.00	0.39	9.00	50.00	0.65	-0.50	15.00	1.31	0.07	0.07	93.00	0.01	0.13	
Bellekeno_East Decline	P15_W_41.3	E606495	26.59	3	8.13	-0.50	10.00	42.00	0.61	9.00	90.00	0.48	-0.50	19.00	1.55	0.16	0.08	105.00	0.01	0.25	
Bellekeno_East Decline	P15_W_41.3	E606496	10.44	4	8.10	0.80	43.00	97.00	3.31	21.00	490.00	1.28	1.00	40.00	3.37	0.87	0.17	194.00	0.10	1.61	
Bellekeno_East Decline	P15_W_41.3	E606497	37.35	4	8.52	-0.50	9.00	10.00	0.36	9.00	60.00	1.30	-0.50	27.00	1.82	0.09	0.05	128.00	0.01	0.18	
Bellekeno_East Decline	P4_W_21.22	E606529	45.02	4	8.56	-0.50	11.00	42.00	2.06	16.00	510.00	17.65	0.50	13.00	1.22	0.29	0.22	217.00	0.07	0.12	
Bellekeno_East Decline	P4_W_21.22	E606530	23.06	4	8.52	-0.50	12.00	43.00	1.74	12.00	380.00	2.69	-0.50	24.00	1.72	0.23	0.04	276.00	0.07	0.14	
Bellekeno_East Decline	P4_W_21.22	E606531	45.02	2	8.60	0.50	8.00	25.00	0.89	-5.00	160.00	0.51	-0.50	23.00	1.57	0.12	0.02	123.00	0.05	0.14	
Bellekeno_East Decline	P4_W_21.22	E606532	45.02	2	8.20	-0.50	7.00	11.00	0.43	7.00	50.00	0.28	-0.50	25.00	1.63	0.06	-0.01	111.00	0.02	0.05	
Bellekeno_East Decline	P4_W_21.22	E606533	45.02	3	8.24	-0.50	8.00	20.00	0.69	7.00	80.00	0.61	-0.50	23.00	1.74	0.08	0.02	187.00	0.02	0.11	
Bellekeno_East Decline	P4_W_32.5	E606544	88.55	3	8.85	0.60	8.00	10.00	0.39	-5.00	110.00	0.79	-0.50	33.00	2.89	0.06	-0.01	289.00	0.01	0.08	
Bellekeno_East Decline	P4_W_32.5	E606546	81.26	2	7.80	-0.50	8.00	19.00	0.48	5.00	50.00	0.33	-0.50	29.00	2.73	0.06	-0.01	260.00	0.02	0.18	
Bellekeno_East Decline	P4_W_42	E606552	21.36	4	8.18	0.50	14.00	34.00	1.56	5.00	180.00	2.86	-0.50	16.00	1.46	0.18	0.03	126.00	0.06	0.08	
Bellekeno_East Decline	P5_W_24.4	E606564	29.17	4	8.79	-0.50	5.00	32.00	0.94	8.00	150.00	3.57	-0.50	26.00	1.91	0.15	0.06	671.00	0.02	0.16	
Bellekeno_East Decline	P5_W_24.4	E606565	42.92	4	8.10	-0.50	8.00	19.00	0.93	8.00	120.00	1.78	-0.50	33.00	1.87	0.13	0.03	170.00	0.03	0.30	
Bellekeno_East Decline	P5_W_24.4	E606566	37.23	4	8.28	-0.50	9.00	33.00	2.13	-5.00	270.00	4.83	-0.50	18.00	1.98	0.35	0.19	187.00	0.06	0.77	
Bellekeno_East Decline	P5_W_31	E606570	23.75	4	8.22	0.50	9.00	35.00	0.68	8.00	110.00	5.94	-0.50	8.00	0.99	0.09	0.02	872.00	0.02	0.09	
Bellekeno_East Decline	P6_W_23	E606581	119.08	4	6.56	-0.50	11.00	21.00	1.18	5.00	160.00	6.72	-0.50	14.00	1.61	0.21	0.15	168.00	0.03	0.30	
Bellekeno_East Decline	P6_W_19.8	E606586	68.11	4	8.28	-0.50	13.00	15.00	0.52	-5.00	80.00	3.07	-0.50	11.00	1.05	0.10	0.08	139.00	0.01	0.15	
Bellekeno_East Decline	P6_W_39.5	E606593	127.35	4	6.91	-0.50	3.00	6.00	0.33	-5.00	50.00	1.22	-0.50	4.00	0.49	0.06	0.03	79.00	0.01	0.13	
Bellekeno_East Decline	P6_W_39.5	E606594	56.67	4	7.20	-0.50	8.00	19.00	0.90	-5.00	330.00	4.38	-0.50	6.00	0.80	0.18	0.17	97.00	0.03	0.42	

Development	Face ID	Sample ID	Tonnes	Fizz_Rating	Paste_pH	Ag_ppm	Pb_ppm	Zn_ppm	Al_pct	Ars_ppm	Ba_ppm	Ca_pct	Cd_ppm	Cu_ppm	Fe_pct	K_pct	Mg_pct	Mn_ppm	Na_pct	S_pct	S_IR08
Bellekeno_East Decline	P6_W_39.5	E606595	174.40	4	7.40	-0.50	9.00	25.00	1.14	6.00	150.00	3.36	-0.50	9.00	1.35	0.21	0.16	234.00	0.03	0.27	
Bellekeno_East Decline	P7_W_22.2	E606621	38.86	3	7.69	0.50	11.00	61.00	4.59	-5.00	630.00	1.66	-0.50	18.00	2.15	1.00	0.32	122.00	0.13	0.73	
Bellekeno_East Decline	P7_W_22.2	E606622	86.28	4	7.62	-0.50	5.00	12.00	0.90	-5.00	130.00	1.52	-0.50	4.00	0.88	0.18	0.07	97.00	0.03	0.21	
Bellekeno_East Decline	P8_W_6.6	E606646	3.92	4	9.12	0.50	6.00	15.00	1.30	5.00	270.00	3.46	-0.50	5.00	0.71	0.24	0.15	148.00	0.04	0.30	
Bellekeno_East Decline	P8_W_6.6	E606647	13.28	4	9.41	-0.50	-2.00	8.00	0.59	-5.00	140.00	0.96	-0.50	5.00	0.48	0.13	0.11	82.00	0.02	0.14	
Bellekeno_East Decline	P8_W_6.6	E606648	41.32	4	9.20	0.60	3.00	23.00	1.33	8.00	220.00	0.82	-0.50	8.00	0.74	0.28	0.19	84.00	0.04	0.26	
Bellekeno_East Decline	P8_W_43	E606672	85.62	4	9.31	0.60	7.00	24.00	1.39	10.00	380.00	2.60	-0.50	30.00	2.12	0.28	0.18	154.00	0.04	0.52	
Bellekeno_East Decline	P8_W_43	E606673	85.62	4	8.94	0.50	8.00	24.00	1.46	14.00	300.00	2.38	-0.50	30.00	2.13	0.29	0.19	153.00	0.05	0.52	
Bellekeno_East Decline	P8_W_43	E606674	85.62	4	8.78	-0.50	5.00	60.00	1.50	10.00	290.00	1.81	-0.50	23.00	1.80	0.31	0.17	135.00	0.04	0.49	
Bellekeno_Bypass	P10_SE_29.8	E607322	39.58	4	8.54	0.80	15.00	64.00	0.90	18.00	310.00	1.43	-0.50	16.00	1.45	0.22	0.13	238.00	0.04	0.27	
Bellekeno_Bypass	P10_SE_29.8	E607323	12.16	4	8.64	0.90	15.00	143.00	2.70	40.00	400.00	4.96	0.50	19.00	2.22	0.67	0.45	330.00	0.12	0.94	
Bellekeno_Bypass	P10_SE_29.8	E607324	30.16	4	8.92	-0.50	2.00	117.00	0.34	8.00	80.00	4.98	0.60	9.00	0.80	0.08	0.08	219.00	0.02	0.14	

Development	Sample ID	Comp. Start	Comp. End	Comp. Length m	Ag_ppm	Pb_ppm	Zn_ppm	Al_pct	Ars_ppm	Ba_ppm	Ca_pct	Cd_ppm	Cu_ppm	Fe_pct	K_pct	Mn_ppm	Na_pct	S_pct	NNP	NP	pH	NP_MPA	S_IR08
Bellekeno_Bypass	E607432	P27_SW_31.7	P29_SW_13.6	10.9	1.30	60.00	309.00	0.30	133.00	70.00	0.06	3.60	136.00	1.91	0.10	1695.00	0.01	0.03					0.02
Bellekeno_Bypass	E607444	P29_SW_17.5	P29_SW_27.9	13.4	0.50	120.00	197.00	0.57	96.00	130.00	0.16	2.00	79.00	2.00	0.18	840.00	0.02	0.03					0.04
Bellekeno_Bypass	E607421	P25_SW_13.1	P25_SW_18	7.3	0.50	58.00	204.00	0.74	30.00	150.00	1.86	2.20	57.00	1.83	0.22	803.00	0.02	0.05					0.04
Bellekeno_Bypass	E607351	1_W_24.36	P2_W_29.68	32.66	-0.50	8.00	29.00	1.22	6.00	270.00	4.65	-0.50	20.00	1.30	0.18	168.00	0.04	0.06	120.00	122.00	8.20	65.07	0.06
Bellekeno_Bypass	E607358	1_W_24.36	P2_W_14.27	11.02	0.60	9.00	37.00	1.57	6.00	390.00	7.17	-0.50	17.00	1.21	0.25	234.00	0.05	0.06					0.06
Bellekeno_Bypass	E607359	P2_W_17.35	P2_W_25.91	12.32	-0.50	8.00	29.00	1.14	7.00	240.00	3.96	-0.50	16.00	1.14	0.18	147.00	0.03	0.07					0.07
Bellekeno_Bypass	E607360	P2_W_29.68	P4_W_21.22	10.31	0.60	7.00	23.00	0.94	-5.00	200.00	3.84	-0.50	21.00	1.30	0.13	162.00	0.03	0.10	92.00	95.00	8.10	30.40	0.11
Bellekeno_Bypass	E607352	P4_W_18.16	P5_West_13.4	31.34	-0.50	8.00	25.00	1.25	7.00	190.00	3.07	-0.50	23.00	1.55	0.19	163.00	0.03	0.11	68.00	74.00	8.20	13.16	0.18
Bellekeno_Bypass	E605501	P4_W_21.22	P4_W_21.22	3.48	0.60	3.00	24.00	1.06	12.00	230.00	4.99	-0.50	24.00	2.31	0.14	279.00	0.04	0.11					0.10
Bellekeno_Bypass	E607398	P16_SW_36.7	P20_SW_16.3	11.1	-0.50	7.00	32.00	1.01	-5.00	210.00	2.03	-0.50	19.00	1.50	0.27	179.00	0.03	0.14					0.17
Bellekeno_Bypass	E607429	P27_SW_14.4	P27_SW_18.8	6.6	-0.50	47.00	167.00	0.95	14.00	300.00	4.10	1.50	37.00	1.95	0.26	480.00	0.02	0.14	109.00	113.00	8.40	25.83	0.14
Bellekeno_Bypass	E607431	P27_SW_16.6	P27_SW_16.6	2.2	-0.50	66.00	301.00	0.83	10.00	230.00	5.14	3.20	40.00	1.70	0.22	755.00	0.02	0.14					0.12
Bellekeno_Bypass	E607422	P27_SW_5.7	P27_SW_12	8.8	0.70	176.00	836.00	1.95	15.00	500.00	1.65	6.90	38.00	2.75	0.52	3500.00	0.05	0.14					0.14
Bellekeno_Bypass	E607361	P4_W_24.7	P4_W_28.3	10.3	0.60	13.00	31.00	1.34	6.00	190.00	3.01	-0.50	22.00	1.49	0.21	132.00	0.04	0.17					0.16
Bellekeno_Bypass	E607388	P10_W_19.1	P10_W_24.45	10.7	-0.50	7.00	82.00	0.73	16.00	130.00	3.28	-0.50	20.00	2.01	0.17	249.00	0.03	0.20					0.18
Bellekeno_Bypass	E607363	P4_W_42	P5_W_17.8	10.21	-0.50	8.00	26.00	1.44	-5.00	220.00	2.79	-0.50	21.00	1.47	0.23	129.00	0.04	0.20					0.20
Bellekeno_Bypass	E607369	P7_W_37.8	P8_W_11.2	10.5	-0.50	7.00	44.00	1.09	7.00	160.00	1.22	-0.50	7.00	0.87	0.23	98.00	0.02	0.21	23.00	30.00	8.60	4.36	0.22
Bellekeno_Bypass	E607403	P10_W_19.1	P14_W_15.7	31.5	-0.50	6.00	60.00	0.85	11.00	140.00	2.24	-0.50	17.00	1.47	0.21	159.00	0.04	0.22	48.00	56.00	8.00	6.89	0.26
Bellekeno_Bypass	E607364	P5_W_20.45	P5_W_26.45	10.55	0.60	8.00	26.00	1.99	-5.00	300.00	3.27	-0.50	28.00	1.83	0.37	187.00	0.06	0.22	61.00	72.00	7.90	6.40	0.37
Bellekeno_Bypass	E607355	P6_W_19.8	P6_W_26	9.25	-0.50	9.00	20.00	0.83	-5.00	110.00	3.83	-0.50	15.00	1.12	0.16	119.00	0.02	0.22					0.20
Bellekeno_Bypass	E607362	P4_W_32.5	P4_W_35.5	11.81	-0.50	8.00	30.00	1.53	-5.00	220.00	4.30	-0.50	19.00	1.43	0.27	242.00	0.04	0.23					0.23
Bellekeno_East Decline	E607378	P7_W_7.5	P8_W_11.2	40.80	-0.50	8.00	22.00	1.17	-5.00	170.00	2.04	-0.50	7.00	0.82	0.26	143.00	0.02	0.23	42.00	49.00	8.50	6.53	0.24
Bellekeno_East Decline	E607389	P10_SE_29.8	P10_SW_36.3	10.3	-0.50	9.00	56.00	0.96	11.00	160.00	2.28	-0.50	16.00	1.73	0.24	194.00	0.04	0.24	52.00	62.00	7.90	6.40	0.29
Bellekeno_East Decline	E605503	P6_W_39.5	P6_W_39.5	4.5	0.50	8.00	14.00	0.81	-5.00	130.00	2.54	-0.50	7.00	0.94	0.14	141.00	0.02	0.24					0.22
Bellekeno_East Decline	E607368	P7_W_26.2	P7_W_34	11.6	-0.50	52.00	21.00	0.91	6.00	120.00	2.11	-0.50	6.00	0.79	0.19	230.00	0.01	0.24					0.21
Bellekeno_East Decline	E607418	P22_SW_11.6	P22_SW_18.8	11.3	-0.50	30.00	114.00	8.14	14.00	1290.00	2.05	-0.50	49.00	5.09	1.55	308.00	0.38	0.25					0.24
Bellekeno_East Decline	E605507	P15_W_41.3	P15_W_41.3	2.7	0.50	7.00	20.00	0.60	8.00	100.00	0.81	-0.50	25.00	2.11	0.14	184.00	0.02	0.25					0.23
Bellekeno_East Decline	E605504	P8_W_6.6	P8_W_6.6	0.9	0.50	4.00	27.00	1.18	-5.00	190.00	1.05	-0.50	8.00	1.21	0.25	144.00	0.03	0.25					0.24
Bellekeno_East Decline	E607377	P15_W_37.2	P15_W_47.4	13.7	-0.50	9.00	20.00	0.81	7.00	130.00	1.77	-0.50	30.00	2.01	0.20	127.00	0.01	0.26	40.00	48.00	8.80	5.69	0.27
Bellekeno_East Decline	E607354	P6_W_23	P6_W_52.7	32.98	-0.50	5.00	26.00	1.27	-5.00	180.00	3.60	-0.50	9.00	0.89	0.23	96.00	0.03	0.26	80.00	88.00	8.20	10.83	0.26
Bellekeno_East Decline	E607408	P21_W_35.2	P21_W_41	8.25	-0.50	28.00	77.00	0.56	7.00	100.00	1.23	0.80	62.00	3.45	0.17	431.00	0.01	0.28					
Bellekeno_East Decline	E607357	P6_W_39.5	P6_W_49.5	13.2	-0.50	8.00	27.00	1.33	-5.00	180.00	3.39	-0.50	7.00	0.87	0.26	125.00	0.03	0.28	74.00	83.00	8.10	9.49	0.29
Bellekeno_East Decline	E607419	P22_SW_22.9	P25_SW_10	10.7	-0.50	25.00	116.00	6.56	18.00	910.00	2.13	-0.50	64.00	3.94	1.18	300.00	0.27	0.29					0.30
Bellekeno_East Decline	E607353	P5_W_17.8	P6_W_26	30.34	-0.50	7.00	27.00	1.66	-5.00	240.00	3.05	-0.50	23.00	1.77	0.28	154.00	0.05	0.29	65.00	76.00	8.20	7.15	0.34
Bellekeno_East Decline	E607366	P6_W_52.7	P7_W_11.45	11.18	-0.50	64.00	27.00	1.17	-5.00	170.00	2.77	-0.50	6.00	0.95	0.23	122.00	0.03	0.29					0.23
Bellekeno_East Decline	E607381	P13_W_44.3	P15_W_47.4	41.03	-0.50	11.00	32.00	1.47	13.00	250.00	3.13	-0.50	27.00	2.03	0.36	133.00	0.03	0.30	74.00	84.00	8.80	8.67	0.31
Bellekeno_East Decline	E605515	P10_SE_29.8	P10_SE_29.8	3.4	-0.50	12.00	97.00	0.91	20.00	140.00	3.22	-0.50	13.00	1.76	0.24	288.00	0.04	0.31					0.30
Bellekeno_East Decline	E607406	P16_SW_36.7	P20_SW_40.3	33.8	-0.50	16.00	74.00	4.38	10.00	650.00	2.65	-0.50	42.00	3.54	0.82	251.00	0.16	0.31	75.00	85.00	8.40	8.77	0.31
Bellekeno_East Decline	E607439	P31_W_26.8	P31_W_34.7	11.35	-0.50	11.00	24.00	1.10	8.00	200.00	3.16	-0.50	74.00	1.86	0.27	151.00	0.03	0.31					0.31
Bellekeno_East Decline	E607391	P14_SW_22.9	P16_SW_11.3	10.4	0.50	10.00	60.00	3.07	6.00	420.00	4.32	-0.50	41.00	3.15	0.63	293.00	0.09	0.31	107.00	119.00	8.10	9.76	0.39
Bellekeno_East Decline	E607424	P23_W_23.9	P23_W_33.9	11.62	-0.50	13.00	59.00	2.93	9.00	480.00	1.88	-0.50	60.00	3.35	0.60	303.00	0.07	0.33	65.00	75.00	8.50	7.27	0.33
Bellekeno_East Decline	E607356	P6_W_29.1	P6_W_36.25	10.4	-0.50	6.00	25.00	1.30	-5.00	180.00	4.22	-0.50	6.00	0.88	0.25	121.00	0.03	0.33					0.33
Bellekeno_East Decline	E607371	P8_W_28.5	P8_W_43	19.1	-0.50	8.00	33.00	1.42	14.00	210.00	2.28	-0.50	29.00	2.18	0.30	170.00	0.03	0.33	61.00	73.00	8.60	6.15	0.38
Bellekeno_East Decline	E607374	P13_W_29.5	P13_W_40.7	14.8	-0.50	16.00	45.00	2.55	56.00	400.00	2.29	-0.50	28.00	2.42	0.55	136.00	0.06	0.34	63.00	74.00	8.60	6.96	0.34
Bellekeno_East Decline	E605514	P42_W_40	P42_W_40	5	0.70	219.00	451.00	3.93	31.00	660.00	0.52	3.80	30.00	3.61	1.40	4400.00	0.10	0.34					0.35
Bellekeno_East Decline	E607379	P8_W_14	P8_W_43	33.6	-0.50	9.00	30.00	1.48	13.00	220.00	2.10	-0.50	17.00	1.45	0.32	101.00	0.03	0.34	46.00	57.00	8.50	5.36	0.34
Bellekeno_East Decline	E607433	P26_N_14.3	P26_N_20.2	5.9	-0.50	16.00	46.00	1.65	-5.00	270.00	3.38	-0.50	31.00	1.92	0.51	294.00	0.05	0.34					0.33
Bellekeno_East Decline	E607382	P15_W_50.9	BLP17_N45W_3	10.3	-0.50	8.00	18.00	1.13	7.00	180.00	1.49	-0.50	31.00	2.30	0.26	169.00	0.03	0.35					0.37
Bellekeno_East Decline	E607426	P23_W_35.52	P28_W_16.7	5.95	0.50	23.00	112.00	3.53	11.00	590.00	1.29	0.70	45.00	3.03	0.76	383.00	0.08	0.35					0.32
Bellekeno_East Decline	E607435	P30_W_20.65	P30_W_31.6	18.45	-0.50	10.00	20.00	0.76	12.00	160.00	2.58	-0.50	23.00	1.71	0.18	164.00	0.03	0.35					0.37
Bellekeno_East Decline	E607367	P7_W_15.4	P7_W_22.2	10.8	-0.50	13.00	25.00	1.62	10.00	240.00	2.32	-0.50	9.00	1.06	0.35	140.00	0.04	0.35					0.28
Bellekeno_East Decline	E607416	P20_SW_20.2	P20_SW_27.3	9.7	-0.50	13.00	51.00	2.31	8.00	430.00	3.79	-0.50	61.00	3.63	0.55	298.00	0.08	0.36	92.00	104.00	8.40	8.99	0.37

Development	Sample ID	Comp. Start	Comp. End	Comp. Length m	Ag_ppm	Pb_ppm	Zn_ppm	Al_pct	Ars_ppm	Ba_ppm	Ca_pct	Cd_ppm	Cu_ppm	Fe_pct	K_pct	Mn_ppm	Na_pct	S_pct	NNP	NP	pH	NP_MPA	S_IR08
Bellekeno_East Decline	E607441	P41_W_21.2	P41_W_27.5	10	-0.50	7.00	31.00	1.66	-5.00	260.00	2.94	-0.50	40.00	1.99	0.39	176.00	0.05	0.36	76.00	87.00	8.60	7.73	0.36
Bellekeno_East Decline	E607390	P14_W_12.5	P14_W_15.7	10.4	-0.50	6.00	41.00	1.02	10.00	150.00	0.99	-0.50	23.00	2.43	0.26	204.00	0.06	0.37					0.35
Bellekeno_East Decline	E605506	P13_W_34.35	P13_W_34.35	2.65	-0.50	6.00	24.00	1.35	61.00	220.00	1.91	-0.50	24.00	2.34	0.30	191.00	0.04	0.37					0.36
Bellekeno_East Decline	E607407	P21_W_25	P21_W_31.8	10.2	-0.50	48.00	93.00	0.87	6.00	140.00	1.32	1.00	60.00	3.57	0.24	1050.00	0.02	0.37					
Bellekeno_East Decline	E607440	P31_W_38.7	P41_W_17.9	10.4	-0.50	13.00	34.00	1.94	9.00	290.00	3.46	-0.50	45.00	2.03	0.46	179.00	0.06	0.37					0.37
Bellekeno_East Decline	E607370	P8_W_14	P8_W_26.8	14.5	-0.50	33.00	29.00	1.57	8.00	240.00	2.01	-0.50	5.00	0.83	0.34	79.00	0.03	0.37					0.31
Bellekeno_East Decline	E607396	P16_SW_13.9	P16_SW_22.1	11.6	-0.50	8.00	40.00	1.34	7.00	270.00	1.52	-0.50	22.00	1.92	0.36	198.00	0.06	0.38					0.37
Bellekeno_East Decline	E607410	P21_W_43.4	P23_W_4.9	13.4	2.80	385.00	792.00	0.79	8.00	130.00	0.68	9.60	66.00	3.06	0.24	2820.00	0.02	0.38	42.00	54.00	8.40	4.43	0.39
Bellekeno_East Decline	E605511	P21_W_47	P21_W_47	3.8	3.40	558.00	1125.00	0.69	8.00	110.00	0.98	14.00	90.00	3.48	0.18	4520.00	0.02	0.38					0.39
Bellekeno_East Decline	E607404	P14_SW_22.9	P16_SW_32.8	33.2	-0.50	13.00	62.00	2.87	5.00	490.00	3.23	-0.50	33.00	2.55	0.68	236.00	0.10	0.38	74.00	88.00	8.00	6.12	0.46
Bellekeno_East Decline	E607438	P31_W_15.4	P31_W_23.4	11.4	-0.50	6.00	27.00	1.26	7.00	230.00	1.74	-0.50	31.00	1.88	0.32	141.00	0.04	0.39	39.00	51.00	8.60	4.08	0.40
Bellekeno_East Decline	E607387	P15_W_50.9	P18_W_12.7	29.9	-0.50	7.00	21.00	1.07	9.00	180.00	2.96	-0.50	23.00	1.85	0.25	122.00	0.04	0.40	74.00	86.00	8.40	6.88	0.40
Bellekeno_East Decline	E607425	P23_W_23.9	P23_W_23.9	3.5	-0.50	15.00	63.00	2.88	8.00	470.00	2.00	-0.50	54.00	3.07	0.59	262.00	0.08	0.40					0.38
Bellekeno_East Decline	E607428	P28_W_29.1	P28_W_36	10.83	0.50	15.00	48.00	1.46	12.00	250.00	2.90	-0.50	59.00	2.52	0.32	293.00	0.04	0.40					0.37
Bellekeno_East Decline	E607415	P24_N_5.9	P24_N_14.6	13.3	0.80	63.00	472.00	4.28	13.00	740.00	2.57	4.40	44.00	4.36	0.92	3320.00	0.08	0.40					
Bellekeno_East Decline	E607417	P20_SW_31.6	P20_SW_40.3	13	-0.50	27.00	147.00	9.04	25.00	1380.00	1.74	0.50	58.00	6.10	1.63	340.00	0.41	0.41					
Bellekeno_East Decline	E607376	P15_W_21.7	P15_W_31.08	13.18	-0.50	11.00	31.00	1.39	9.00	240.00	4.04	-0.50	23.00	1.81	0.35	130.00	0.02	0.41					0.34
Bellekeno_East Decline	E605513	P31_W_23.4	P31_W_23.4	3.4	-0.50	12.00	42.00	1.92	10.00	340.00	1.78	-0.50	31.00	2.57	0.48	216.00	0.06	0.41					0.43
Bellekeno_East Decline	E607380	P8_W_47.6	P13_W_40.7	44.75	-0.50	10.00	31.00	1.73	53.00	270.00	2.03	-0.50	26.00	2.08	0.39	131.00	0.04	0.41	47.00	60.00	8.70	4.68	0.41
Bellekeno_East Decline	E607399	P19_W_35.8	P21_W_13.1	9	1.00	128.00	370.00	1.36	13.00	250.00	2.46	3.30	32.00	2.87	0.39	1965.00	0.04	0.42					0.47
Bellekeno_East Decline	E607443	P41_W_31.2	P42_W_11.1	15.1	-0.50	8.00	41.00	2.13	9.00	340.00	4.11	-0.50	52.00	2.34	0.46	213.00	0.06	0.42					0.41
Bellekeno_East Decline	E607450	P42_W_36.7	P42_W_40	8.3	0.70	199.00	464.00	3.92	26.00	660.00	0.91	3.70	42.00	3.52	1.31	4190.00	0.10	0.42	28.00	41.00	8.20	3.12	0.42
Bellekeno_East Decline	E607405	P19_W_35.8	P21_W_31.8	28.1	0.90	104.00	329.00	1.12	11.00	190.00	2.77	2.80	58.00	2.78	0.35	1870.00	0.03	0.43	72.00	86.00	8.50	6.25	0.44
Bellekeno_East Decline	E607437	P31_W_5.3	P31_W_12.7	10.1	-0.50	7.00	23.00	0.99	9.00	200.00	2.63	-0.50	27.00	1.72	0.25	166.00	0.04	0.43					0.43
Bellekeno_East Decline	E607372	P8_W_47.6	P8_W_58.5	16.6	-0.50	25.00	25.00	1.18	26.00	180.00	2.48	-0.50	35.00	2.38	0.27	155.00	0.03	0.43					0.35
Bellekeno_East Decline	E607383	BLP17_W_26.2	BLP17_W_37.4	10.1	-0.50	7.00	15.00	0.93	5.00	150.00	3.28	-0.50	26.00	2.05	0.23	151.00	0.03	0.44					0.44
Bellekeno_East Decline	E607365	P5_W_31	P5_W_40.7	13.15	-0.50	8.00	30.00	1.63	-5.00	220.00	2.99	-0.50	21.00	1.53	0.27	149.00	0.05	0.44					0.44
Bellekeno_East Decline	E607394	P19_W_16.1	P19_W_22.75	9.9	0.60	33.00	70.00	1.46	14.00	250.00	2.05	0.50	31.00	2.35	0.34	258.00	0.05	0.45	49.00	64.00	8.40	4.18	0.49
Bellekeno_East Decline	E607400	P21_W_16.1	P21_W_21.6	8.9	0.90	42.00	136.00	1.03	12.00	190.00	3.40	1.00	74.00	2.65	0.32	1140.00	0.03	0.46	99.00	113.00	8.70	7.86	0.43
Bellekeno_East Decline	E607442	P41_W_21.2	P41_W_21.2	3.7	-0.50	9.00	40.00	2.25	10.00	300.00	3.94	-0.50	50.00	3.03	0.44	317.00	0.05	0.46					0.46
Bellekeno_East Decline	E605502	P5_W_24.4	P5_W_24.4	2.05	-0.50	4.00	26.00	1.39	5.00	200.00	3.34	-0.50	30.00	2.32	0.21	363.00	0.04	0.46					0.43
Bellekeno_East Decline	E607414	P24_N_5.9	P26_N_20.2	28.6	-0.50	30.00	139.00	1.91	9.00	340.00	2.55	1.20	62.00	3.49	0.50	979.00	0.05	0.46	61.00	75.00	8.70	5.22	0.46
Bellekeno_East Decline	E607386	P18_W_27.5	P18_W_34	9.7	0.60	18.00	40.00	2.07	8.00	350.00	2.50	-0.50	22.00	2.64	0.42	221.00	0.07	0.47					0.46
Bellekeno_East Decline	E607412	P23_W_15.9	P23_W_21	8	-0.50	26.00	107.00	5.13	17.00	830.00	2.15	0.60	54.00	4.43	1.01	414.00	0.11	0.47					
Bellekeno_East Decline	E605505	P8_W_43	P8_W_43	4.6	-0.50	4.00	41.00	1.41	10.00	210.00	2.18	-0.50	35.00	2.41	0.28	198.00	0.04	0.47					0.47
Bellekeno_East Decline	E607448	P42_W_15.8	P42_W_22.7	10.3	-0.50	8.00	57.00	1.24	10.00	260.00	3.53	-0.50	35.00	2.09	0.31	181.00	0.05	0.48					0.50
Bellekeno_East Decline	E607384	BLP17_W_40.5	P18_W_12.7	9.5	-0.50	7.00	14.00	0.94	-5.00	140.00	3.19	-0.50	19.00	1.74	0.21	133.00	0.03	0.49					0.48
Bellekeno_East Decline	E607385	P18_W_15.5	P18_W_23.5	12.1	-0.50	7.00	30.00	1.18	6.00	200.00	2.80	-0.50	20.00	1.74	0.23	126.00	0.04	0.49	59.00	75.00	8.40	4.71	0.51
Bellekeno_East Decline	E607401	P18_W_15.5	P18_W_43.1	31.6	-0.50	6.00	38.00	1.87	6.00	310.00	2.87	-0.50	20.00	2.12	0.37	160.00	0.06	0.49	64.00	79.00	8.40	5.16	0.49
Bellekeno_East Decline	E607434	P28_W_39.3	P30_W_17.15	10.00	-0.50	42.00	119.00	0.90	16.00	180.00	1.56	1.00	46.00	2.55	0.26	1700.00	0.03	0.49	32.00	47.00	8.20	3.07	0.49
Bellekeno_East Decline	E607375	P13_W_44.3	P13_W_54.2	14.15	-0.50	12.00	44.00	2.29	15.00	400.00	3.82	-0.50	30.00	2.41	0.55	154.00	0.05	0.50					0.40
Bellekeno_East Decline	E607392	P18_W_37.2	P18_W_40.15	9.9	0.70	7.00	52.00	2.54	11.00	420.00	2.75	-0.50	24.00	2.80	0.51	220.00	0.07	0.52					0.48
Bellekeno_East Decline	E607411	P23_W_7.05	P23_W_13	8.9	1.10	129.00	740.00	4.62	16.00	820.00	1.74	9.40	80.00	4.49	1.10	2010.00	0.10	0.53					
Bellekeno_East Decline	E607397	P16_W_25.5	P16_SW_32.8	11.2	0.70	11.00	68.00	3.11	6.00	580.00	4.06	-0.50	33.00	2.91	0.79	307.00	0.11	0.54					0.51
Bellekeno_East Decline	E605516	P20_SW_20.2	P20_SW_20.2	3.6	-0.50	15.00	61.00	2.62	10.00	470.00	3.45	-0.50	53.00	3.40	0.70	255.00	0.10	0.54					0.55
Bellekeno_East Decline	E605508	P18_W_19.6	P18_W_19.6	4	-0.50	3.00	22.00	1.18	9.00	190.00	3.22	-0.50	20.00	2.04	0.21	170.00	0.05	0.56					0.54
Bellekeno_East Decline	E607402	P18_W_47.1	P19_W_32.7	29.9	1.30	102.00	168.00	2.02	8.00	350.00	2.68	1.70	25.00	2.47	0.51	637.00	0.06	0.56	64.00	82.00	8.40	4.60	0.57
Bellekeno_East Decline	E605510	P21_W_16.1	P21_W_16.1	2.75	0.70	15.00	38.00	1.61	14.00	260.00	3.26	-0.50	55.00	2.80	0.49	362.00	0.04	0.56					0.53
Bellekeno_East Decline	E607427	P28_W_19.8	P28_W_25.4	9.6	3.30	408.00	749.00	2.72	14.00	470.00	3.15	9.00	102.00	3.35	0.66	2530.00	0.06	0.56					0.51
Bellekeno_East Decline	E607449	P42_W_26.3	P42_W_33.4	10.4	-0.50	49.00	133.00	1.48	18.00	240.00	2.38	1.00	41.00	2.74	0.36	748.00	0.04	0.57					0.58
Bellekeno_East Decline	E607373	P13_W_16.3	P13_W_27.2	13.35	-0.50	7.00	33.00	1.88	55.00	280.00	1.74	-0.50	24.00	2.08	0.42	129.00	0.06	0.58					0.47
Bellekeno_North Lateral	E607423	P24_N_19.2	P26_N_11.4	9.4	0.90	38.00	91.00	1.13	17.00	200.00	2.54	0.70	93.00	2.67	0.32	356.00	0.04	0.60					0.56

ICP and ABA Composite Data

Development	Sample ID	Comp. Start	Comp. End	Comp. Length m	Ag_ppm	Pb_ppm	Zn_ppm	Al_pct	Ars_ppm	Ba_ppm	Ca_pct	Cd_ppm	Cu_ppm	Fe_pct	K_pct	Mn_ppm	Na_pct	S_pct	NNP	NP	pH	NP_MPA	S_IR08
Bellekeno_North Lateral	E605509	P19_W_16.1	P19_W_16.1	3.4	0.70	7.00	32.00	1.28	14.00	230.00	2.50	-0.50	32.00	2.46	0.29	240.00	0.05	0.63					0.59
Bellekeno_North Lateral	E605512	P28_W_39.3	P28_W_39.3	3.8	-0.50	16.00	55.00	1.07	16.00	200.00	1.67	-0.50	74.00	3.01	0.25	1405.00	0.03	0.63					0.64
Bellekeno_North Lateral	E607393	P18_W_47.1	P19_W_13.1	10.2	0.50	14.00	63.00	2.10	10.00	360.00	3.05	-0.50	25.00	2.72	0.47	257.00	0.07	0.66					0.59
Bellekeno_Bypass	E607395	P19_W_26	P19_W_32.7	9.8	2.60	238.00	339.00	2.45	19.00	420.00	2.97	3.70	32.00	3.14	0.70	1400.00	0.06	0.71					0.68
Bellekeno_Bypass	E607430	P27_SW_22.1	P27_SW_28.4	9.6	1.50	205.00	314.00	3.39	85.00	650.00	1.40	2.50	53.00	3.22	0.81	1515.00	0.18	0.89					0.89

APPENDIX C

DESIGN CRITERIA

i) CIVIL DESIGN CRITERIA

ii) MECHANICAL DESIGN CRITERIA

iii) PIPING DESIGN CRITERIA

iv) BUILDING SERVICES DESIGN CRITERIA

v) STRUCTURAL DESIGN CRITERIA

vi) INSTRUMENTATION DESIGN CRITERIA

vii) ELECTRICAL DESIGN CRITERIA

ALEXCO WARDROP Engineering Inc.	CIVIL 31 00 00 Design Criteria	**Project Number:** 09539601.00 **Project Name:** Bellekeno Project

Revision No.	Date Revised	Engineering Specification	Signatures				
			Prepared By	Checked By	Approved By	Project Manager	Client
A	21 Apr 2009	Issued for Internal Review	CW	MB		JA	
B	09 July 2009	Issued for Information	CW	MB		JA	

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1.0 CODES AND SPECIFICATIONS

Unless stated otherwise, the design of all structures and facilities will be based on, but not be limited to, applicable portions of the most current edition of the following codes, specifications, industry standards, regulations and other reference documents.

1.1 FEDERAL GOVERNMENT OF CANADA

- National Building Code of Canada
- Supplement No. 1 – Climatic Information for Building Design in Canada
- Northern Inland Waters Act and Regulations
- Fisheries Act and Regulations
- Territorial Lands Act and Regulations
- Yukon Territories Water Act and Regulations
- Explosives Act
- Guidelines for Canadian Drinking Water Quality, latest edition.
- Health and Safety Act
- Water License.

1.2 ROADS AND TRANSPORTATION ASSOCIATION OF CANADA (RTAC)

- Design of Surface Mine Haulage Roads-Bureau of Mines Information Circular 8758
- Geometric Design Standards for Canadian Roads and Streets
- Drainage Manual.

1.3 YUKON TERRITORIAL GOVERNMENT

- Mining Safety Act and Regulations
- Environmental Protection Act and Regulations
- Commissioner's Land Act and Regulations
- Explosive Use Act
- Fire Prevention Act
- Yukon Department of Transportation.

2.0 SITE INFORMATION

.1 Survey Datum

The topographic mapping, horizontal and vertical control (metric elevations) for the project have been provided by the Owner. The project site horizontal co-ordinate and grid system is based on UTM Nad 83.

.2 Road Information

- Christal Lake Haul Road – (upgrade to existing road) ~ 1580 m long, running northeast from Duncan Creek Rd (existing Yukon Highways Road) to Silver Trail Highway.
- Flame and Moth Road – (new road) ~ 250 m long, running north from Duncan Creek Rd (existing Yukon terr. Rd) to the Flame and Moth Site.
- By-Pass Road – (new road) ~ running east from Duncan Creek Rd (existing Yukon Highways Road) to the Lightning Creek Bridge – Option 1 is 270 m and Option 2 is 150 m long.
- Twin Road – (new road) ~ 400 m long running southeast above the existing public road to the Bellekeno Power Line Road and Sourdough Hill Road junction.

3.0 CIVIL SITE WORK CRITERIA

.1 Cut-and-fill quantities shall be minimized by excavating a single level area for all buildings.

.2 Different levels of pads will be used as necessary to improve operating characteristics.

.3 Building outline to make best use of ground contours and geotechnical conditions.

.4 Ground survey shall confirm site elevations.

.5 Erosion control shall conform to the drainage/water management plan developed by the Geotechnical Engineer.

3.2 AGGREGATE SUPPLY

.1 Sub-base,. maximum particle size 75 mm, to be used for road base material.

.2 Base, crushed material, maximum particle size 50 mm, to be used for road base material.

.3 Surfacing, crushed material, maximum particle size 25 mm, to be used for road and plant site surfaces.

3.3 EARTH AND ROCK WORK

.1 Recommendations on cuts, fills, compaction, material gradations, and temporary and permanent slopes to be confirmed by the Geotechnical Engineer.

4.0 ROAD DESIGN CRITERIA

.1 The road design criteria of the road type is shown in Table 1. The design vehicle used as the basis of design criteria is shown in Table 2.

- Roads shall be all-weather construction
- Off-site drainage shall be diverted around the site (by others)
- Alternating vehicular pull-outs every 500 m
- All roads are one way radio controlled
- Pull outs length equals 1.5 times the vehicle length
- Pull outs width equals 1.5 times the operating width.

Table 1 Road Design Criteria

	Haul Road
Operating Width	4 m *
Design Speed	50 km/hr
Cross fall	2%
Maximum Grade	8%
Surface	200 mm
Base	300 mm
Sub-base	500mm
Cut Side Slope	1.5 : 1
Fill Side Slope	2 : 1
Subgrade Compaction	95%
Granular Compaction	100%

** Excludes berms and ditches on both side of haul roads.*

Table 2 Design Vehicle

Road Type	Haul
Design Vehicle	Volvo A30E
Width	2.94 m
Length	10.3 m
Height	3.3 m
Weight	51 060 kg

5.0 DESIGN LOADS

Volvo A30E 28 t capacity:

	Loaded	Empty
	51 060 kg	28 000 kg
Front Axle	14 990 kg	12 500 kg
Drive Axle	36 070 kg	15 560 kg
Wheel Base	2.216 m	
Tire Pressure	267 kPa	

5.1 SITE GRADING

.1 Plant site final grading will be a minimum of 150 mm below adjacent floor slabs.

.2 Plant site final grading will generally have a minimum finish grade slope of 2% away from structures towards storm drainage facilities.

.3 The plant site area will generally be covered by 300 mm of Base material overlain with 200 mm of Surfacing material – subject to geotechnical conditions.

5.2 RUN-OFF CONTROL

.1 Drainage outside the plant site or road will be the responsibility of others.

.2 Within the plant site and building run off, resulting from rainfall, will be conveyed to drainage ditches by sloping the plant site surface.

.3 Storm run-off quantities for small areas in the plantsite shall be determined by the Rational Method using a minimum time of concentration of 15 minutes.

.4 Interception ditches will, where possible, divert non-contact runoff from areas uphill of the disturbed areas (this work by others).

.5 Precipitation and freshet design data for run-off control/drainage facilities will be determined in consultation with the Owner and EBA.

.6 Ditches shall be trapezoidal design with a 300 mm minimal bottom width. Ditch bottom will be 500mm below the road sub-grade. Side slopes shall not be steeper than 1 vertical, 1.5 horizontal. Longitudinal slopes shall ensure passage of run-off; where velocity exceeds 1.0 meters per second, ditch linings and energy dissipating structures will be provided. Ditching will be avoided in ice rich till areas.

.7 Open channel flow calculations shall be made according to the Manning Formula.

.8 Culverts will be galvanized corrugated steel pipe, with a 600 mm minimum diameter.

.9 Culverts shall have a minimum backfill cover of 450mm or the diameter divided by 2, whichever is greater.

END OF SECTION

SPECIFICATION REVISION INDEX

Revision No.	Date Revised	Engineering Specification	Signatures				
			Prepared By	Checked By	Approved By	Project Manager	Client
A	01 May 2009	Issued for Internal Review	MM	AF		JA	BT
B	09 July 2009	Issued for Information	MM	AF		JA	BT

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1.0 GENERAL

1.1 SCOPE

.1 This design criterion outlines the basis for the overall design parameters and criteria to be adopted in the selection of mechanical equipment and systems used for the project.

.2 The Bellekeno Project consists of an underground zinc and lead mine. The run-of-mine-feed will be designed to crushed and feed at nominal 408 tonnes per day of ore feed to the grinding and flotation circuits. The process facilities will consist of a primary and secondary crushing facility followed by the grinding and flotation processes.

1.2 CODES AND STANDARDS

.1 All design material, equipment manufacturing, fabrication, testing, installation and construction shall be in accordance with the latest edition of the applicable codes and standards of the following organizations. The organizations include, but are not limited to, the following:

ABMA	American Bearing Manufacturers' Association
ACI	American Concrete Institute
AGMA	American Gear Manufacturers' Association
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
API	American Petroleum Institute
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	American Welding Society
AWWA	American Water Works Association
CEC	Canadian Electrical Code
CEMA	Conveyor Equipment Manufacturers' Association
CISC	Canadian Institute of Steel Construction
CSA	Canadian Standards Association
CWB	Canadian Welding Bureau
EEMAC	Electrical Equipment Manufacturers Association
FM	Factory Mutual
HI	Hydraulic Institute
ICEA	Insulated Cable Engineers Association
IEEE	Institute of Electrical and Electronics Engineers

IESNA	Illuminating Engineering Society of North America
IFE	Industrial Fasteners Institute
ISA	Instrument Society of America
ISMA	Industrial Silencer Manufacturers' Association
ISO	International Organization for Standardization
JIC	Joint Industrial Council
MHIA	Material Handling Industry of America
MHEA	Material Handling Engineers Association
MPTA	Mechanical Power Transmission Association
MSHA	Mine Safety and Health Administration
MSS	Manufacturers' Standardization Society
NACE	National Association of Corrosion Engineers
NBC	National Building Code of Canada
NEC	National Electrical Code (US)
NEMA	National Electrical Manufacturers' Association
NESC	National Electrical Safety Code
NFC	National Fire Code
NFPA	National Fire Protection Association
NFPI	National Fluid Power Institute
OSHA	Occupational Safety and Health Act
PFI	Pipe Fabrication Institute
PPI	Plastics Pipe Institute
RMA	Rubber Manufacturers' Association
SNT	Society of Non-Destructive Testing
SAE	Society of Automotive Engineers
SSPC	Steel Structure Painting Council
TEMA	Tubular Exchanger Manufacturers' Association
UL	Underwriters Laboratories
CUL	Underwriters Laboratories of Canada
WHMIS	Workplace Hazardous Materials Information System
YWCHSB	Yukon Workers' Compensation Health and Safety Board

.2 The codes and laws of the Yukon Territory, municipality or jurisdiction may take precedence over the aforementioned codes.

1.3 REFERENCE SPECIFICATIONS

.1 For equipment general specification, weather and all site data refer "02 10 00 – Site Conditions and Equipment Standards" unless otherwise noted in the equipment Criteria.

.2 For all piping data and information (pipe velocity, pipe material, buried pipe) see "40 00 00 Piping Design Criteria".

.3 For all structural data and information see "05 00 00 Structural Design Criteria".

.4 For all electrical data and information see "26 00 00 Electrical Design Criteria".

.5 For all instrumentation data and control information see "40 90 00 Instrumentation Design Criteria".

.6 For all building services datas, fire fighting systems and dust control systems information see "23 00 00 Building Services Design Criteria".

1.4 LAYOUT

.1 Equipment shall be arranged in accordance with the current and approved process flowsheets.

.2 The design criteria for equipment layout are as follows:

- Gravity and natural properties of material flow shall be utilized to the maximum extent possible, to reduce energy inputs.
- Arrangements shall provide a smooth process flow, and allow for merging with other process flow streams.
- All material transfer points shall be designed to minimize spillage.
- Adequate accessibility and clearance around equipment shall be provided for operation and maintenance.
- Suitable Safe Working Load (SWL) rated cranes, monorails and hoists shall be provided for operation and maintenance purposes and at all equipment that may require replacement.
- Wherever possible, ladders and catladders shall be avoided, and only after discussion with the Owner and/or the Owner's Representative shall they be used in a design.
- Optimal use of the structures and available space within the structures shall be implemented.
- Floors shall be suitably sloped and drains/sumps shall be provided and positioned at the lowest point to collect spillage and wash-down water. Each area's slope will be determined based on possible spills particle size and will be shown on the layout drawings. The slope range will be between 2% to 10%.

1.5 EQUIPMENT SELECTION CRITERIA

.1 Manufacturers and fabricators shall be given the latitude to use their experience to employ the best design, installation practice and/or procedure, except where the latter would contravene Standard Operating Procedures (SOP) or other standards of the mine or this criteria.

.2 The equipment shall be robust and fit for heavy-duty applications found in a mining environment.

.3 All equipment shall be conservatively rated and sized to withstand capacity changes due to process upsets and variations.

.4 All equipment shall be designed to meet site conditions, such as altitude, ambient temperatures, seismic, wind, rain, humidity and any corrosive surrounding atmosphere.

.5 The equipment shall meet or exceed the project specified production requirements for the 10 years expected plant life.

.6 Wherever possible, standard "off the shelf" equipment and components shall be used.

.7 All materials used in the construction or assembly of equipment shall be new and free of any defects. Material Test Certificate (MTC) and (NDT) shall be requested where applicable.

.8 The equipment shall meet or exceed the current environmental standards of the jurisdiction in which it is installed, as well as any environmental restriction(s) that could or should be anticipated.

.9 Where required for operation, maintenance or cleaning, equipment shall be provided with appropriate access. This access may include stairs and/or ladders, walkways and platforms complete with handrails, kneerails and kickboards that comply with the current applicable health and safety regulations.

.10 All equipment shall be designed and/or selected in accordance with the process and site condition requirements. Other factors to be considered for equipment selection shall include the following:

- Maximization of personnel health, safety and protection.
- Ease of installation, operation, inspection, cleaning, maintenance, equipment removal and repairs.
- Minimization of vibration and excessive noise.
- Minimization of thermal expansion stresses.
- Maximization of standardized components.
- Availability of spare parts.
- Demonstrate a successful operational history of comparable equipment and components in similar installations.

.11 Noise levels shall be controlled and not exceed the most stringent of the values stated in MSHA regulations or “02 10 00 – Site Conditions and Equipment Standards”.

.12 All equipment heavier than 34 kg shall be provided with lifting lugs or another convenient lifting arrangement.

.13 Personnel health, safety and protection shall be prime factors in the mechanical design and layout of equipment. Equipment shall be in complete accordance with MSHA, NFC, OSHA and all other applicable codes and regulations.

.14 All mechanical moving parts shall be guarded. The design of the guards shall allow their removal without having to remove other items of equipment.

.15 All openings, sumps, vessels, bins, hoppers, elevated platforms or pits that constitute a hazard shall be adequately fenced or otherwise guarded.

.16 Equipment shall be provided with appropriate access areas where required for operation, maintenance or cleaning.

1.6 PAINTING AND PROTECTIVE COATINGS

.1 Manufacturer standard coating system shall be used for all supplied equipment. Suppliers shall provide their painting system for Owner and/or the Owner’s Representative review.

.2 For all fabricated items such as tanks and steel works for mechanical equipment surface preparation, priming and finish coating shall comply with “02 10 00 Site Conditions and Equipment Standards”.

.3 Under no circumstances shall machined parts be packaged for delivery without a suitable protective coating.

1.7 INSULATION

.1 Wherever insulation is required, Supplier’s standard insulation shall be used only after Supplier’s proposed insulation system has been reviewed by the Owner and/or the Owner’s Representative.

.2 Insulation thickness shall be calculated and insulation/cladding material shall be selected as per whether data outlined in “02 10 00 Site Conditions and Equipment Standards”.

.3 All other insulation requirements shall conform to insulation specification and Health and Safety Regulations, provided by the Owner and/or the Owner’s Representative.

2.0 DESIGN CONSIDERATION

2.1 PROCESS EQUIPMENT

.1 Process equipment shall be specified in accordance with the process design criteria and flow sheets.

.2 All process equipment design flows rates are based the plant design feed rate as stated in the Process Design Criteria and flow diagrams so no safety factor/margins shall be added to the equipment flow rates and throughputs specified in the Process Design Criteria or flow diagrams.

2.2 LIFTING DEVICES

CRANES & HOISTS

.1 All cranes and hoists shall be designed, manufactured, tested and certified in accordance with the latest applicable editions of Crane Manufacturers Association of America (CMAA) Specifications #70 and #74 as well as the Hoist Manufacturers Institute (HMI) specification "100-74 – Standard Specification for Electric Wire Rope Hoists".

.2 The Mill building will be equipped with two cranes on the same rail. The large crane (25 t) shall be used for erection and heavy maintenance purposes. A small crane (5 t) shall be used for light maintenance duties. The cranes have been selected based on the heaviest possible load during maintenance/erection period, as applicable.

.3 The crushing area crane (5 t) shall be used for maintenance purposes only. The crane capacity may not cover the weight of the heaviest possible load during maintenance period in this area.

MONO RAILS

.1 Monorail hoists shall be designed, manufactured, tested and certified in accordance with the latest applicable editions of Crane Manufacturers Association of America (CMAA) Specifications #70 and #74 as well as the Hoist Manufacturers Institute (HMI) specification "100-74 – Standard Specification for Electric Wire Rope Hoists".

.2 A mono rail crane for the reagent area shall be provided. The hoist capacity shall be adequate for lifting and loading/unloading of the reagent bags and or drums.

.3 A mono rail crane for the rod mill bin area shall be provided. The hoist capacity shall be adequate for maintenance of the bin vent system.

.4 A mono rail crane for the crushing and screening conveyor tower shall be provided. The hoist capacity shall be adequate for maintenance of the bin vent system.

2.3 STEEL TANKS

.1 Tank sizing shall be as specified in the process design criteria and flow sheets.

.2 Steel tanks can be bolted (only for field erected tanks) or welded construction.

.3 Any tanks with the diameter less than 4200 mm shall be shop fabricated. All other larger diameter tanks shall come in maximum possible shippable sizes to reduce workmanship at site.

.4 Tanks shall be designed with a minimum 300 mm freeboard for surges. Frothing allowance shall be determined on a case-by-case basis. Overflow will be designed for 150% of inflow capacity, and routed to the floor, which will be sloped to a sump or trench. Tank materials shall be suitable for the application and shall be evaluated on a case-by-case basis.

.5 Outdoor tanks shall be heated and insulated as per process requirements for freeze protection. Heating will be electrical and if tanks require heat tracing, tank fabricator shall provide lugs or clips for tracing installation.

2.4 FIBRE REINFORCED PLASTIC (FRP) VESSELS AND TANKS

.1 Process equipment shall be specified in accordance with the process design criteria and flow sheets.

.2 FRP Vessels and Tanks shall be designed to the requirements of ASME RTP-1 “Reinforced Thermoset Plastic corrosion Resistant Equipment” latest edition or BS 4994 "Design and Construction of Vessels and Tanks in Reinforced Plastic”.

.3 Tanks shall be designed with a minimum 300 mm freeboard for surges. Frothing allowance shall be determined on a case-by-case basis. Overflow will be designed for 150% of inflow capacity, and routed to the floor, which will be sloped to a sump or trench.

.4 The FRP tank agitators (if any) shall be preferably supported from separate steelwork above the tanks, thus limiting the static and dynamic loads on the tank walls.

.5 Where applicable, tanks shall be fitted with lifting lugs at suitable positions to ensure a level lift. Each individual lug shall be designed to support the total tank weight and stiffeners shall be added to ensure that no deformation of the tank occurs during installation.

3.0 PROCESS DISTRIBUTION SYSTEMS

3.1 COMPRESSED AIR SYSTEM

.1 Compressed air system shall be designed considering maximum operational flexibility, good efficiency over a wide range of operating conditions, low maintenance and lifecycle cost with highest availability.

.2 Three separate compressed air system shall be provided for:

- Mill building compressed air system to provide both plant and instrument air; complete with air receivers and air dryer. This system will also provide compressed air for the underground mine operations.
- Crusher building compressed air system for plant and instrument air c/w air receiver and air dryer. This shall provide compressed air for maintenance (tools) and instrumentation.
- Boiler house compressed air system for plant air c/w air receiver. This system will provide compressed air for soot blowing at the boilers.

.3 All compressor stations will be indoors.

.4 The Mill building compressors will supply compressed air to the following areas/equipment:

Area/Equipment	Pressure (kPa)	Air Receiver	Note
Mine area	690	No	
Mills clutches	690	Yes	
Filter presses	690	Yes	Pressure to be confirmed
Mill building	690	Yes	General use
Disc Filter	690	Yes	
Column Cells	690	Yes	
Instrument air	690	Yes	Dry air (separate piping system)

.5 The following air tools shall be used in the compressed air capacity calculation for the mill building compressed air system:

Tools	Quantity	Air Requirements (Nm^3/min)	Service Factor	Note
Grinders	5	1.4	10%	
Drills	5	2.5	10%	
Wrenches	6	2.5	10%	
Chipping hammers	1	1	10%	
Paint spray	4	0.5	5%	

.6 The crusher building compressor will supply compressed air to the following areas/equipment:

Area/Equipment	Pressure (kPa)	Air Receiver	Note
Instrument air	690	Yes	Dry air

.7 The following air tools shall be used in the compressed air capacity calculation for the crusher building compressed air system:

Tools	Quantity	Air Requirements	Service Factor	Note
Grinders	5	1.4	10%	
Drills	5	2.5	10%	
Wrenches	6	2.5	10%	
Chipping hammers	1	1	10%	
Paint spray	4	0.5	5%	

.8 The boiler house compressors will supply compressed air to the following areas/equipment:

Area/Equipment	Pressure (kPa)	Air Receiver	Note
Soot blowing	690	Yes	

.9 Compressors shall be a packaged skid mounted type, electric motor driven, air cooled screw compressors that provide instrument air, plant air and mining air for the entire facility.

.10 A safety factor of 30% will be applied to the final air requirements.

.11 The mill building compressed air system will be designed for “n + 1” units where n is the number of units required to be running continuously to handle the projected continuous operating load.

.12 No stand by units will be considered for the crusher building and the boiler house compressed air systems.

.13 Compressors shall be rated considering site conditions and elevation as specified in “02 10 00 – Site Conditions and Equipment Standards”. Air compressors shall be derated for the site condition and elevation.

.14 Instrument air systems for the mill building and crusher building shall have their own air filter, heatless desiccant type air dryer for instrument air supply and air receiver.

3.2 REAGENT SYSTEMS

.1 Reagent system consists of the following units:

- SIPX system, in drums with 14 days of storage
- Copper sulphate system, in 1000 kg tote solid
- Sodium Sulphite System
- Zinc sulphate system, in 25 kg bags
- Bulk hydrated lime system (Quick Lime)
- Flocculant system (Magnafloc 10)
- Aerophine 3418A Collector system, in drums
- MIBC system, in drums

.2 Reagent systems shall be sized and designed based on the Process Design Criteria and flow diagrams.

.3 All reagent packages equipment will be specified individually and form part of different packages, such as tank package, mixer package and metering pump package.

.4 Reagent systems with common non toxic and non hazardous properties will each have a separate containment area. Possible spills for such reagents will be collected in each sump individually.

.5 Reagent systems with toxic or hazardous or specific properties will have dedicated containment areas. Possible spills for such reagents will be collected separately.

.6 A minimum of two weeks of total reagent supply will be stored at site.

.7 Reagent delivery and handling will be as per Process Design Criteria.

3.3 LIME SLAKING SYSTEM

.1 Lime slaking system will be sized and designed based on the Process Design Criteria and flow diagrams.

.2 Lime will be delivered in powder.

.3 Lime slaking system exclusive of the holding tank and pump will be specified as a packaged unit.

.4 Lime will be delivered by truck in bulk.

.5 This package shall consist of a transfer system, a silo, a feeder, mixing tank, agitator and circulating pumps as per process flow diagrams.

.6 Lime for slaking will be measured by timing control at the feeder.

.7 Lime feed to the process will be by metering pumps.

3.4 FLOCCULANT SYSTEM

.1 Flocculant system will be sized and designed based on the Process Design Criteria and flow diagrams.

.2 Flocculant will be delivered in 25kg bags.

.3 Flocculant system will be purchased as a vendor package.

.4 Flocculant will be delivered to site in bags.

.5 This package shall consist of a bag breaking system, a hopper, a screw feeder, blower, mixing tank and mixer as per process flow diagrams.

.6 Flocculant feed to the process will be by metering pumps.

3.5 CEMENT SYSTEM

.1 Cement system will be sized and designed based on the Process Design Criteria and flow diagrams.

.2 Cement system will be purchased as a package. Suitable for reclaiming cement, delivered to site by truck or 5 tonne jumbo bags.

.3 This package shall incorporate an emptying system suitable for both truck and jumbo bag deliveries, a 500 tonnes silo, a screw feeder and transfer system. The area layout will further define possible additional requirements for jumbo bags handling and storage.

3.6 FUEL SYSTEM

.1 Fuel system will be a design, supply and installation package. Supplier shall design supply all necessary equipment including fuel delivery system from the fuel tanker to the storage tanks including pumps (if necessary), dispensers, internal piping and instrumentation on the tank farm and transfer system. Inter connection piping shall be recommended but excluded.

.2 Three types of fuel shall be used as follows:

- Diesel fuel oil for diesel generator sets, boilers and surface vehicles
- Diesel fuel for underground mine mobile fleet (low sulphur)
- Gasoline for light vehicles

.3 Diesel fuel oil shall be Arctic type suitable for the climatic conditions.

.4 Fuel delivery shall be by Fuel tanker. Fuel tanker size and fuel delivery frequency shall be as per supplier's recommendations.

.5 Fuel tank(s) capacity shall be sized based on storage duration as specified below:

Consumer	Fuel type	Storage Required (days)	Total Storage (m^3)
Diesel generators, surface fleet	Diesel fuel	14	840
Mine trucks	Diesel fuel (low sulphur)	14	200
Gasoline vehicles	Gasoline	14	2.5

.6 Fuel tank(s) shall be aboveground, single wall, vertical or horizontal. Supplier to recommend tank type and size. All tanks will be located in a dike area to prevent any possible contamination (environmental permit requirements). Dike area's volume shall meet all necessary applicable codes requirements and at minimum shall be large enough to contain 110% of the largest tank volume.

.7 Feed to the diesel generator sets will be via day tanks supplied by diesel generator units.

.8 Fuel filling dispensing stations shall have spill containment pads.

4.0 WATER AND SOLUTION PUMP SYSTEM

4.1 WATER AND SOLUTION PUMP

.1 Pump design flow rates will be operating flowrates as specified in the Process Flow Diagrams multiplied by a process variation factor of 1.2.

.2 System friction head losses shall be calculated using the Darcy or Hazen and Williams formulae.

.3 The rated impeller size shall not exceed 90% of the maximum impeller size and not less than 110% of the minimum impeller size.

.4 Pump TDH will be calculated based on the design flow rates (excluding the froth factor). The design factor for TDH will be 20% on friction loss or 1.1X of TDH, which ever is greater.

.5 Where possible the operating point on the head-capacity curve shall be close to, or just to the left of, the best efficiency point shown on the pump performance curve.

.6 Particular attention shall be paid to the NPSH requirement. Available NPSH shall exceed required NPSH by a minimum of 10% or 1 m, whichever is greater.

.7 Open type impellers are preferred whenever entrained air is likely.

.8 A 20% contingency will normally be added to calculated friction heads.

4.2 POTABLE WATER SYSTEM (BY OTHERS)

.1 Potable water system will be design as per the Process Design Criteria and flow diagrams.

.2 Well water will be pumped to potable water treatment package and treated water stored in a Potable water storage tank. Potable water is then distributed by potable water distribution pumps.

.3 Pump flow will be as per process design criteria and pump head will be calculated based on the maximum pressure requirements at the farthest consumer.

4.3 RECLAIM WATER SYSTEM

.1 Reclaim water system will be design as per the Process Design Criteria and flow diagrams.

.2 Reclaim water from the Tailing Ponds and Underground Mine Water Settling pond will be collected in the Reclaim Water tank. Water will be distributed by Reclaim Water pumps.

.3 The Reclaim Water Pumps flow will be as per process design criteria and pump head will be calculated based on the maximum pressure requirements by the farthest consumer.

.4 The Reclaim water pumping system and related piping design shall consider the requirement for ensuring the system operating integrity for the climatic condition.

4.4 FRESH WATER SYSTEM

.1 Fresh water system will be designed as per the Process Design Criteria and flow diagrams.

.2 Fresh water from the mine dewatering lines will be collected in the Fresh Water Pond.

.3 Collected water in the Fresh Water Pond will be transferred to the fresh water tank by Fresh water pond pumping system. Water from this tank will be distributed by the fresh water pump and distribution system.

.4 Pump flow will be as per process design criteria and pump head will be calculated based on the maximum pressure requirements by the farthest consumer.

4.5 GLAND WATER SYSTEM

.1 Gland water flow requirements will be as per the Process Design Criteria and flow diagrams.

.2 Gland water pressure (P) for each pump will be calculated as follows:

- P = Suction pressure + 0.25 x (Discharge pressure – suction pressure) + 100 kPa

.3 Gland water will be distributed by the gland water pumps from the fresh water tank. For high pressure gland water requirements a separate high pressure pump will be provided.

.4 Pump flow will be as per process design criteria and pump head will be calculated based on the maximum pressure requirements by the gland of the farthest pump.

4.6 MINE WATER SYSTEM

.1 Mine water system will be as per the Process Design Criteria and flow diagrams.

.2 Mine contact water will be collected in the underground mine water settling ponds No. 1 and 2. The collected water will be transferred to underground for mining purposes, to the reclaim water tank and also for distribution to hose stations in the mill building.

.3 Pump flow will be as per Process Design Criteria and pump head will be calculated based on the maximum pressure requirements at the end point.

4.7 FIRE WATER SYSTEM

.1 Fire water system will be as per The Fire Protection Design Criteria.

.2 Fire water tank will be fed by the well water pumps. Fire water will be transferred into the distribution system by fire pumps. Pumps type and quantity will be as per Fire Protection Design Criteria.

.3 A jockey pump will keep the fire water ring under pressure.

.4 Pump flow will be as per Fire Protection Design Criteria and pump head will be calculated based on the maximum pressure requirements by the farthest hydrant/user.

.5 Fire water tank and fire pumps for the camp will be by others. Tie in point on the tank will be provided to connect to the fire pumps for industrial area.

5.0 WATER AND SLURRY PUMP SYSTEM

5.1 SLURRY PUMPS

.1 Pump design flow rates will be operating flowrates as specified in the Process Flow Diagrams multiplied by a process variation factor of 1.1 and a mechanical flow factor to compensate impeller wear equal to 1.05 to 1.1.

.2 The rated impeller size shall not exceed 90% of the maximum impeller size and not less than 110% of the minimum impeller size.

.3 Pump TDH will be calculated based on the design flow rates (excluding the froth factor). The design factor for TDH will be 20% on friction loss or 1.1X of TDH, which ever is greater.

.4 When pumping slurries, head losses and pump hydraulic efficiencies shall be adjusted where appropriate to reflect the “solids effect” of the slurry. The pump supplier shall confirm the head and efficiency de-rating factors used to calculate pump speed and brake power (kW).

.5 When pumping abrasive slurries, impeller tip speeds shall preferably not exceed 19 m/s for rubber lined impellers and 25 m/s for hard metal impellers.

.6 Where possible the operating point on the head-capacity curve shall be close to, or just to the left of, the best efficiency point shown on the pump performance curve.

.7 Previous experience of pumping similar slurries shall be employed to specify the type of material to be used for the impellers and casings. Supplier recommendation shall also be requested.

.8 Particular attention shall be paid to the NPSH requirement. Available NPSH shall exceed required NPSH by a minimum of 10% or 1 m, whichever is greater.

.9 Open type impellers are preferred whenever entrained air is likely.

.10 Froth factor will applied to pump flow rates as necessary.

.11 The froth factor is a multiplier that increases the process design capacity to allow for the increased passing volume caused by the gas in the froth. The factored volume usually causes the pump to be at least one pipe size larger than would normally be selected. Depending on the manufacturer and the application, the factor applied will vary; typical values are 1.5 to 4. Froth factor for each pump will be applied as necessary. Froth factors value will be shown in pumps schedule as per process requirements.

6.0 MATERIAL HANDLING

6.1 CONVEYORS

.1 Design factor shall be 1.2.

.2 The conveyors shall operate at fixed speed.

.3 Maximum speed of conveyors shall not exceed 1.5 m/s.

.4 Maximum angle of incline at all loading zones shall be limited to seven (7) degrees.

.5 Maximum incline of rock and tailing conveyor shall not exceed fifteen (15) degrees.

.6 Conveyors shall be selected for the design capacity tonnage as shown in Data Sheets.

.7 Belt sag on carry side shall not exceed 2%.

.8 Belt sag on the return side of the belt shall not exceed 3%.

.9 All belt transition distances at the tail pulley loading zone shall be “full trough” design, and the length shall be according to CEMA’s latest edition for specific trough angle.

.10 All belt transition distances at the discharge point shall be “half trough” design, and the length shall be according to CEMA’s latest edition for specific trough angle.

.11 All conveyors shall be designed in accordance with the most current issue of the Conveyor Equipment Manufacturer’s Association (CEMA) manual.

.12 Snub pulleys or other measures shall be utilized to ensure a positive traction of the driven pulley to ensure no belt slippage. Any modus operandi with the exception of the snub pulley is subject to approval by the Owner's Representative.

.13 Conveyor size optimization shall be given high priority.

.14 Each conveyor shall have one primary and one secondary belt cleaner, and single mining duty V or Diagonal Plow.

.15 Tracking of the belt shall be supported by Tru-Trainers, no substitution.

.16 Impact absorbing media at any impact loading zone shall be impact cradles (beds).

.17 Belt support at non-impact areas shall be provided by means of support cradles (beds).

.18 Minimum maintenance clearances shall be as per “02 10 00 – Site Conditions and Equipment Standards”.

.19 All skirting shall be self adjusting/tensioning type that follows belt undulations, keep positive contact, and comes in contact with the belt at trough angle– 20 degrees. The rubber shall be wear resistant type.

6.2 BELTING

.1 Crushing Conveyors and the Belt Feeders shall have RMA – 1 or better impact-rip-tear resistant grade of rubber covers.

.2 Process conveyors shall have RMA – 2 grade of rubber covers.

.3 Fabric for crushing conveyors shall have high impact-rip-tear resistance. Straight–warp such as in US-Flex type of belts is recommended.

.4 Grade of rubber covers shall be selected in compliance with climatic conditions defined in "02 10 00 – Site Conditions and Equipment Standards".

6.3 CHUTES AND PLATEWORK

.1 Chute shall be designed according to "02 10 00 – Site Conditions and Equipment Standards", and 05 00 00 – "Structural Design Criteria".

.2 All chutes and skirtboards shall be designed to withstand plugged conditions, impact and wear without deformation or failure of the walls and/or structural steel members or platework, and to loosen the bonding between wear liners and the plates.

.3 Minimum cross sectional area of the chute shall be not less than four (4) times the cross sectional area of the load operating at full capacity.

.4 Chutes shall be equipped with inspection doors placed on the "clean" side of the chute.

.5 Chutes shall be designed so the trajectory shall strike material contained in the rock boxes or where unavoidable liner plates.

.6 The minimum valley angle in chutes shall be 60 degrees from the horizontal where achievable.

.7 Material free fall height shall be limited where practical by use of rock boxes or accelerating chutes where applicable.

.8 Wherever possible, chute exits shall be designed to transfer the momentum of the material in the direction of flow of the downstream equipment.

.9 Where required, multiple material diversions of flow paths (multiple rock boxes) shall be put into service.

.10 "Accelerating" chute design shall be employed for chutes transferring material from slow moving belts, feeders onto much faster moving belt conveyors.

.11 The Mass Flow chute design shall be implemented for bin discharge where possible, in order to improve material evacuation.

.12 Chute design shall allow sufficient space for installation of a secondary cleaner within the chute where possible.

.13 Chute back walls beyond the secondary cleaner shall have a minimum angle of 70 degrees.

.14 Any non impact wall that shall have contact with removed carryback shall be lined with low friction material (UHMW) or similar liner.

.15 Chute sections shall be flanged for field bolting and shall be made dust- tight by sealing the joints with rubber or felt gaskets. Flange connections shall be straight and welds shall be continuous.

END OF DESIGN CRITERIA

ALEXCO WARDROP Engineering Inc.	**PIPING** **40 00 00** **Design Criteria**	**Project Number:** 09539601.00 **Project Name:** Bellekeno Project

Revision No.	Date Revised	Engineering Specification	Signatures				
			Prepared By	Checked By	Approved By	Project Manager	Client
A	21 Apr 2009	Issued for Internal Review					
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TABLE OF CONTENTS

1.0 SCOPE

This Piping Design Criteria outlines the basis for the overall design of the piping systems, and the general requirements of the piping components and drawings.

All measurements (lengths, flows, pressures, temperatures) will be expressed in units of the metric system.

The base design codes shall be CSA Standard B51-2003.

2.0 CODES AND STANDARDS

2.1 REQUIREMENTS

The components of piping systems will comply, as a minimum and as appropriate, with the following standards. In the event of a conflict between codes and the technical specifications, the requirements of the more stringent shall govern:

ANSI	American National Standards Institute
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
ASME B31.1	Code for pressure Piping “Power Piping”
ASTM B31.3	Code for "Chemical Plant and Petroleum Refinery Piping”
ASTM	American Society for Testing and Materials
AWWA	American Water Works Associations
AWS	American Welding Society
CSA	Canadian Standards Association
HIS	Hydraulic Institute Standards
NBC	National Building Code of Canada
NFC	National Fire Code
NFPA	National Fire Protection Association
PFI	Pipe Fabricators Institute
PPI	Plastic Pipe Institute
ULC/FM	Underwriters Laboratories Canada/Factory Mutual

2.2 OTHER REQUIREMENTS

Pressure piping systems such as steam, condensate, glycol, etc. are subject to design registration and shall be submitted for approval by the appropriate authorities.

All drawings associated with fire protection shall be submitted to the local Fire Marshal and to the insurance underwriter for approval (not required for the DFS).

3.0 GENERAL DESIGN DEFINITIONS

3.1 DESIGN PRESSURE

.1 Design pressure shall be the most severe condition of internal or external pressure under normal operating conditions.

.2 Normal operating condition is the most severe condition of pressure and temperature expected to exist when continuous operating conditions are in progress.

.3 Normal operating conditions do not include pipe pressure testing and abnormal system operation.

.4 Design pressure for unrelieved piping on pumped systems shall be the pump shut-off discharge pressure.

.5 Design pressure for vacuum piping shall be full vacuum pressure.

.6 Minimum design pressure shall be 1034 kPa.

.7 Where two piping systems of different design pressures are connected, the piping system with the higher pressure will extend to the first block valve on the lower system.

3.2 DESIGN TEMPERATURE

.1 Design temperature will be the maximum temperature under normal operating conditions as defined above.

.2 Design temperature will be consistent throughout the complete system.

4.0 PIPING MATERIALS AND METHODS

4.1 GENERAL

.1 Pipes, pipe components and valves will be classified primarily in accordance with material of pipe and components and each class group will be given a secondary classification based on service performed and/or pressure/temperature ratings. For reference see Piping Materials and Methods Specification 40 05 00.

.2 The specification for the materials includes the following:

- Piping Specification General
- Piping Materials Class Index
- Pipe Support Specification Index
- Line List
- Valve List
- Tie-in list
- Pipe Materials Specifications
- Valve Specifications
- Rubber Lining
- Thermal Insulation
- Painting Labels & Colours
- Gasket Specification

5.0 PIPING DESIGN

5.1 LINE SIZING CRITERIA

Table 1.0 Line Sizes

Description		Velocity m/s
Slurries General	pump discharge gravity flow	1.2 - 2.1 0.5 - 1
Process Solutions Lines	pump discharge gravity flow	2.0 -2.5 2.0 -3.0
Air		15.0 - 30.0
Steam		30.0 - 45.0
Water	pump discharge gravity flow	2.0 - 3.0 2.0 -3.0
Flocculant	pump discharge	0.25 - 0.5
Fuel Oil	pump discharge	1.0
Reagent	pump discharge	0.7

5.2 LINE SIZING

.1 All piping sizes will be expressed in nominal pipe size using Metric Units.

.2 Piping shall be sized for flowsheet design rated flow conditions. Provision for future increase in capacity shall be made only when specifically requested by client.

.3 Nominal Pipe size diameters 125mm, 175mm, 225mm, 325mm, 550mm, 800mm, shall not be used, except where required to connect to equipment. Conversion to standard piping shall be as near the equipment as possible.

.4 Minimum pipe size run shall be 25mm except for connections to equipment, instrument services, lube oil piping and auxiliary services such as pump and x-ray tube cooling.

.5 In pipe utilidors the minimum pipe size shall be 50mm

.6 General pipe sizing will be based on:

- Historic data for similar projects
- Economics
- Available pressure drop and power consumption
- Velocity limitations

.7 Pump suction lines will be at least one size larger than pump suction flange size.

.8 Gravity piping shall be sized in general to provide maximum design flow at 50 – 60% full pipe.

.9 Control valve bypasses on slurry piping shall be line size and on solution, air, and steam piping shall be control valve size.

5.3 PIPE SLOPES

Table 2.0 Pipe Slopes

Description	Nominal Size Fraction (mm)	Percent Solids (%)	Minimum Slope (angle)
Slurries	-	-	1 – 2
Solutions	-	-	0.5 – 1
Air and Vents	-	-	0.5 - 1
Steam and Condensate	-	-	0.5 – 1
Water	-	-	0.5 - 1

5.4 LAUNDERS

.1 Launders are defined as an open channel for carrying suspended solids in water under gravity flow conditions. Although launder sizes are calculated, specified and verified by the Process and Mechanical Engineering groups, Launder design generally conform to the following guidelines:

- The quality that will flow in as open channel is dependent on several factors, which are the cross-sectional area of the flow stream, the slope of the launders, the roughness condition of the sides and bottom of the launder and the shape of the launder as well as the flow characteristics of the pulp itself. The preferred shape of the launder is the semi-circular bottom-type, where it is possible to use. This particular shape reduces the hydraulic radius, thus allowing for a lesser slope and still maintaining a required velocity. Flat bottom launders may be used where connections to distributors are rectangular in shape. Flat bottom launders may also be used where gravity flow pipelines are collected by a common launder.
- For each launder, minimum geometric parameters to ensure adequate flow, including slopes and sizes, shall be determined by appropriate calculation methods – the Colebrook White Formula, Manning formula or an approved equivalent.
- Slurry launders will have a minimum total depth of four times the flow depth.

5.5 SLURRY PIPING

.1 All piping shall be routed as direct as possible to its destination minimizing the use of bends, and decreasing the chance of abrasion and plugging.

.2 All piping shall be routed above ground whenever possible.

.3 Erosive slurry service piping shall be rubber lined with natural rubber. Rubber lining thickness shall be minimum 6mm for pipes up to 200mm in diameter and 12mm for pipes larger than 200mm in diameter. For full detains of rubber lining refer to Rubber Lining Specification 40 05 08.

.4 Pipe bends shall have a minimum radius of three pipe diameters (3D) for pipe size 76mm and above. Five pipe diameters (5D) for pipe sizes 50mm and below unless layout constraints determine otherwise. Where necessary, material conducting hose will be used in place of bends.

.5 Piping will be jointed to allow for rotating of spools. Rotating will extend the life of the pipe spools by allowing even distribution of wear due to abrasion.

.6 Drain and flushing connections shall be provided on all pump suctions and be of the quick disconnect type. For header sizes 100 mm and smaller ball type block valves shall be used for both drainage and flushing. For header sizes 200 mm and above Knifegate type valves shall be used for drainage and Butterfly valves shall be used for flushing. Flushing lines 50 mm and larger will be hard piped. All piping will be self draining with high point vents and low point drains located to facilitate maintenance and hydro testing.

.7 Block valves shall be knifegate type fitted with replaceable natural gum rubber sleeves which allow full port flow and eliminate seat cavities preventing packing of the sleeve with solids. On smaller line sizes full port fully enclosed body style replaceable natural gum rubber sleeve pinch valves or diaphragm shall be provided.

.8 Pump suction lines shall be minimum length and the use of bends or valves will be kept to a minimum. Suction piping shall be sloped down from the pumpbox to the pump suction inlet and have fabrication reducers with 10° included angle wherever possible.

.9 High abrasion slurries shall be Carbon Steel extra heavy wall pipe butt welded and flanged, or Standard wall rubber lined pipe.

.10 Low abrasion slurries shall be Standard wall pipe butt welded and flanged.

.11 Slurry lines outside of buildings or heated areas shall be either Carbon Steel extra heavy wall pipe, Carbon Steel Standard wall rubber lined, Standard wall pipe, or HDPE flanged pipe and fittings. Wall thickness to suit pressure rating of system.

.12 Piping at pumps shall be arranged to avoid interference with access to pumps, the surrounding maintenance areas, and pull spaces during maintenance. Removable spool pieces to be provided where required (e.g. pump suction and discharges) to permit maintenance with a minimum of piping disassembly.

.13 Suitable supports and anchors shall be provided for piping at pumps such that excessive weight and stresses will not be transmitted to the pump casings. Temporary start-up strainers will be provided on non-slurry pump suctions.

.14 The number and location of sampling connections shall be provided as per P&ID. All sampling points shall have an isolating or sampling value.

5.6 GRAVITY FLOW PIPELINES

.1 Although gravity flow pipeline sizes and velocities are calculated, specified and verified by the Process and Mechanical Engineering groups, gravity flow pipelines generally conform to the following guidelines:

.2 Pipelines carrying slurries will be designed to flow from 3% to 75% full, however they are generally sized 1/3 to 2/3 full.

.3 Slopes shall be identified on P&ID's with the minimum slope.

.4 Gravity flow pipeline slopes and sizes shall be determined by appropriate calculation methods – the Colebrook White Formula, Manning formula or an approved equivalent.

5.7 SOLUTION PIPING

.1 Pressurized solution lines shall be sized as noted in Table 1.0. Exceptions shall be made for high viscosity fluids, low pressure drop requirements, and long lines where lower velocity would be used to optimize system and operating cost.

.2 All piping will be self draining. Drain and vent connections shall be provided at high and low points of the piping system to facilitate maintenance and hydro testing.

.3 Generally solution piping shall be Standard wall Carbon Steel pipe and butt welded or grooved fittings. Pipe fittings 50mm and below shall be 3000 # socket weld or threaded. If solution is corrosive, use Stainless Steel or Alloy specifications.

.4 Pockets and dead ends shall be avoided.

5.8 WATER PIPING

.1 Water system primary headers shall be "looped" so that all branch lines are fed from two directions.

.2 Suitable allowance shall be made for future demands on the system by designing pipe racks to have a 10% additional capacity to accommodate future loads.

.3 Generally water piping shall be Standard wall Carbon Steel pipe with butt weld or grooved fittings. Pipe fittings 50mm and below shall be 3000# threaded. If water is corrosive, use Stainless or Alloy Steel.

.4 Block valves shall be butterfly type for 65mm and above and ball type for 50mm and below.

.5 Combinations safety shower/eyewash stations are required adjacent to all locations where the release of harmful fluids, airborne dust, or non-toxic particles occurs.

5.9 AIR PIPING

.1 Compressed air piping shall be sized so that the pressure drop along the line shall not exceed 10% of the initial line pressure, with full capacity being delivered at the end of the line. Air piping shall be looped.

.2 All take-offs shall be from the top of the header for horizontal piping.

.3 All instrument air branch piping shall be run to within 6m of the instrument and terminated with a valve. Where clusters of instruments occur a single centrally located valved connection shall be provided.

.4 All plant air piping shall be Standard wall Carbon Steel pipe with butt weld or grooved fittings. Pipe fittings 50mm and below shall be 3000# threaded.

.5 All instrument air piping shall be Standard wall Carbon Steel Galvanised pipe with threaded or grooved fittings. Fittings 50mm and below shall be 150# Malleable iron threaded. Run out pipe and fittings from branch block valve shall be Stainless Steel tube and fittings.

5.10 UTILITY PIPING

.1 Utility stations shall supply plant air and water at convenient locations on all floors such that all parts of the floor can be reached with a 15m flexible hose.

.2 All air and utility stations shall be 25mm, equipped with 25mm ball valve and quick disconnect type hose connections.

.3 Water utility station shall be 1 ½ mm diameter.

.4 Utility headers shall be located on the top deck of pipeways whenever possible. The minimum size of process and utility headers on pipeways shall be 50mm.

5.11 PERSONNEL PROTECTION

.1 Eye wash/emergency showers shall be provided in areas where operating personnel are subject to hazardous sprays or spills.

.2 Pipes carrying hazardous chemicals shall have dual containment and safety shields at all flanged, mechanical joints and valves to protect personnel.

.3 Acid, Lime, or other pipe lines carrying hazardous liquids shall be located close to grade level whenever possible. These lines shall be identified clearly with signs to avoid unnecessary risks.

5.12 INSULATION AND HEAT TRACING

.1 Personnel protection shall be provided on uninsulated lines operating above 60°C where they constitute a hazard to the operating personnel during normal operating routine.

.2 Piping subject to freezing weather shall have insulation and heat tracing, unless otherwise authorized by client, see Table 3.0.

.3 Insulation shall be used on heated lines to minimize heat losses, see Table 3.0

.4 Cold water lines in concealed spaces shall be insulated with anti-sweat type insulation.

.5 For details on insulation see Piping Thermal Insulation Specification 40 05 09.

Table 3.0 Insulation & Heat Tracing Requirement

SERVICE	HEAT TRACING REQUIREMENTS	EMERGENCY HEAT TRACING REQUIREMENTS	INSULATION	ALTERNATIVE TO EMERGENCY HEAT TRACE
Reclaim Water	No	Yes, around pumps up to drain valve	Yes with heat tracing channel in case of retrofit	No
Fresh Water	No - buried	Yes, around pumps and any exposed pipe	Yes - exposed pipe	Slope line & provide emergency drain valves at low points of vertical lines
Potable Water	No - buried	Yes, around pumps and any exposed pipe	Yes - exposed pipe	Slope line & provide emergency drain valves at low points of vertical lines
Mine Contact Water	No - inside	No	Yes - exposed pipe	Slope line & provide emergency drain valves at low point of vertical lines
Well water (?)	No - buried	Yes - around pumps & fire water tank/WTP	Yes - exposed pipe	Slope line & provide emergency drain valves at low point of vertical

				line
Fire Water – N/R	No - buried	Yes - around tank and pumps - supplied by vendor?	Yes - exposed pipe	No
Sewage (?)	No- buried	Yes, around pumps and any exposed pipe	Yes - exposed pipe	No
Glycol – N/R	No	No	Yes	N/A
Air to Mine	No	No	Yes	N/A
Tailings	No - self draining	No - but emergency power for flush connection in mill building	Yes	N/A
Fuel	Hold depending on fuel type	Hold depending on fuel type	Hold depending on fuel type	No
Propane	No	No	No	N/A
STP Collection Sump Pump to Settling Pond	No- buried	Yes, around pumps and any exposed pipe	Yes - exposed pipe	Slope line & provide emergency drain valves at low point of vertical line
Crushing Building Sump Pump to Settling Pond	No- buried	Yes, around pumps and any exposed pipe	Yes - exposed pipe	Slope line & provide emergency drain valves at low point of vertical line
Settling Pond to Contact Water Pond	No - self draining line	No	No	N/A
Tailings Seepage Pond to Tailings Pond	No - self draining line	No	No	N/A
STP Collection Sump Pump to Fresh Water Pond	No- buried	Yes, around pumps and any exposed pipe	Yes - exposed pipe	Slope line & provide emergency drain valves at low point of vertical line

6.0 GENERAL PIPING LAYOUT

6.1 INSTALLATION

.1 Piping within buildings shall generally be installed in 6m (random) lengths, unless on a pipe rack or trestle where 12m lengths (double random, maximum) may be utilized. In highly congested areas or areas where maintaining piping will be difficult, 3m lengths may be used.

.2 Flange bolt holes shall straddle centre lines unless otherwise indicated on the drawings.

.3 Headroom clearance for piping in the aisles is 5m. Clearance of 2.1m is provided over operating platforms. Minimum clearance of 5m for Pipe Rack to road is required.

.4 All slurry and utility valves shall be accessible from floors and operating platforms. Spindle extensions and chain wheel operators are only to be installed where space constants limit normal access.

.5 Piping shall be routed in piping corridors and grouped together. The arrangement of the piping should allow operations and maintenance to be carried out with minimum effort.

.6 Piping systems shall be designed to allow for expansion and contraction. Expansion effects due to exposure to direct sunlight shall also be considered.

.7 Piping shall be arranged to maximize inherent flexibility. Expansion joints shall only be used when it is absolutely necessary.

.8 Piping shall not be routed through electrical rooms.

.9 All walls and floor penetrations shall be sleeved.

.10 All control valves shall have adequate clearance for disassembly without disturbing other equipment or piping.

.11 Valves shall be oriented so that stems and hand wheels do not project into platform or passageway areas. However, valves should be situated so that they are readily accessible.

.12 Vents and drain connections shall be provided at all high and low points on tanks. Drains shall never be less than 18mm in diameter. Vents consisting of plugged bosses shall be provided at the highpoints of all piping for hydrostatic testing. The plugs should be sealed after the hydrostatic test.

.13 All pipe systems and equipment that require draining shall be provided with Valve connections.

.14 After installation, all piping shall be cleaned by flushing with water until free of dirt, grit, welding slag, and foreign materials.

.15 All services requiring metering will have minimum upstream and downstream clearances based on Instrumentation manufacturers recommendations.

.16 In safety and environmental critical applications where absolute and verifiable shut off is required the use of a double block and bleed shall be installed.

6.2 PIPE IDENTIFICATION

.1 Pipes shall be marked by a system of identification set out in the following standards:

- ANSI Z53.1-1979, “Safety Colour Code for Marking Physical Hazards”,
- ANSI A13.1-1981 (R1985), Scheme for the Identification of Piping Systems.

.2 Pipes shall be labelled as to contents and direction of flow as follows:

- Hazard shall be identified using the following colour codes:

Table 4.0 Classification of Hazards of Materials and Designation of colours

Classification	Background Colour	Colour of Letters for Legend
Materials of Inherently Hazardous		
Flammable of Explosive	Yellow	Black
Chemically Active or Toxic	Yellow	Black
Extreme Temperatures or Pressures	Yellow	Black
Radioactive	Yellow	Black
Materials of Inherently Low Hazardous		
Liquid or Liquid Mixture	Green	White
Gas or Gaseous Mixture	Blue	White
Fire Quenching Hazard		
Water, Foam, Carbon Dioxide, Halon etc.	Red	White

Table 5.0 Size of Legend Letters and Banding

Outside Diameter of Pipe or Covering	Length of Colour Background	Size of Letters	Width of Banding Tape
mm	mm	mm	mm
10 to32	200	13	25
38 to 51	200	19	25
64 to 150	300	32	50
200 to 250	600	64	100
over 250	800	80	100

.3 Labelling and Colour may be either:

Paint and stencil: Pipe is painted as per hazard colour code then text and flow direction arrows are stencilled in.

Adhesive labels: Hazard colour Code adhesive label with flow direction arrows, banding tape applied either side of label.

.4 Location of text and arrows:

- maximum of 12 m centres on straight pipe;
- at all valves;
- at all changes in direction;
- at fittings for hose or other terminal connection;
- at 1.5 m above floor on vertical pipes;
- at 1.5 m from wall where pipe passes through the wall;
- at 1.5 m from equipment to which pipe is connected.;

When the contents of a container or pipe is a controlled product, there shall also be a WHMIS product identification label.

7.0 STRESS ANALYSIS

.1 Piping stress analysis shall be performed on lines with thermal expansion or lines where weight or fluid dynamics may cause excessive stresses.

.2 Piping stress analysis shall satisfy the requirements of applicable CSA and ANSI B31.1 codes.

.3 Piping stress analysis shall be done using computer program, manual calculation or calculation tables from the “Piping Guide” published by Syentek Inc.

.4 For pipe supporting guidelines, flexibility and pipe stress, refer to Piping Materials and Methods 40 05 02.

.5 The stress analysis of lines shall be carried out using Caesar II.

8.0 VALVES

.1 Piping will be responsible for all manual valves.

.2 On/Off activated valves (XV’s), control valves and PSV’s.

- This package falls outside the piping scope. The Instrument and Process Engineering group shall be responsible for carrying out the control valve sizing. The Instrument Engineering group shall furnish piping with information required for piping hook-up.

.3 Valves requiring attention, observation or adjustment during normal plant operation shall be located within reach from grade, platform or permanent ladder or stairway.

.4 Operating valves shall be chain-operated when the bottom of handwheel is over 2m above the high point of grade or operating platform and is not accessible from permanent ladder or stairway.

.5 The centreline of handwheel or handles on block valves used for shutdown only, located less than 4.5m above the high point of finish surface and those located in pipeways, may be accessible by portable ladder.

.6 The centreline of handwheel or handles on block valves used for shutdown only, located over 4.5m above the high point of finish surface, except those located in pipeways, shall be operable from permanent ladder or platform.

.7 Valve handwheels, handles and stems shall be kept out of operating aisles. Where this is not practical, the valve shall be elevated to 2m clear from the high point of operating surface to bottom of handwheel.

END OF SECTION

SPECIFICATION REVISION INDEX

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1.0 INTRODUCTION

.1 The following outlines the scope of work; applicable codes, standards and regulations, HVAC design parameters; description of Heating Ventilation, Fire Protection and plumbing and sanitary drainage design parameters.

2.0 SCOPE

.1 Building services shall be provided in the following areas:

- Mill Building

3.0 CODES, STANDARDS AND REGULATIONS

- National Building Code of Canada (NBC)
- Canadian Plumbing Code (CPC)
- National Fire Code of Canada (NFC)
- American National Standards Institute (ANSI)
- American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
- National Fire Protection Association (NFPA)
- Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
- Associated Air Balance Council (AABC)
- National Environmental Balancing Bureau (NEBB)
- Underwriters Laboratories of Canada Standards (UL, ULC)
- Hydronics Institute (HI)
- Canadian Electrical Code (CEC)
- Heating, Refrigeration and Air Conditioning Institute of Canada (HRAI)
- Canadian Standards Association (CSA)
- Occupational Safety and Health Act (OSHA)
- National Institute for Occupational Safety and Health (NIOSH)
- Instrument Society of America (ISA)
- American Conference of Governmental Industrial Hygienists (ACGIH)
- Air Movement and Control Association (AMCA)
- American Society for Testing and Materials (ASTM)
- Factory Mutual (FM)

- Mine Safety Act

4.0 DESIGN CRITERIA

4.1 AMBIENT DESIGN CONDITIONS

.1 The following ambient design temperature data has been provided by Meteorological Service Canada.

Ambient Design Temperatures:	Winter 1%: minus 46°C July (summer 2%), dry bulb +25°C coincidental wet bulb +16°C
Ground elevation:	850 metres above mean sea level

4.2 INTERNAL CONDITIONS

The mill building heating and ventilation systems shall be designed to maintain temperatures above freezing in the mill building, at the winter design outdoor air temperature, and no greater than 32°C when it is 25°C outside

The laboratory building heating and ventilation systems shall be designed to maintain temperatures above 20°C in the building, at the winter design outdoor air tenmperature, and no greater than +32°C when it is +25°C outside

The ventilation rate through the laboratory area will be governed by the number of exhaust hoods and fume hoods provided, however, in no case shall the rate shall be less than 15 air changes per hour. Canopy hoods shall have a minimum face velocity of 0.76 m/s (150 fpm). Fume hoods shall be exhausted at a rate recommended by the manufacturer.

The ventilation rate through the mill building shall not be less than one air change per hour in the winter, and not be less than four air changes per hour in summer.

5.0 HEATING AND VENTILATION SYSTEMS

.1 The mill building will be provided with multiple roof exhaust fans for flexibility of ventilation. During winter one or two fans will be operational and during wrmer weather the rmaining fans will be used. Make up air for the mill building will enter the building through wall louvres

.2 Air from the laboratory shall not be recirculated and the air pressure shall be negative with respect to corridors and non-laboratory areas.

.3 Mechanical ventilation shall be provided for the toilets, locker rooms, garbage rooms, battery rooms and any rooms that contain toxic or flammable materials. These rooms shall be vented directly to the outside and have a minimum of 10 l/s/m^2 (2 ft.^{3}/min. per ft.^{2}) exhaust, with make-up air coming from either heated primary air, or air transferred from adjacent areas. No contaminated air shall be recirculated. The point of discharge from all building exhausts shall be at least 1.5 m (5 ft.) from any openable window or door and 1 m (3 ft.) above and 3 m (10 ft.) away from any air intake.

.4 Make-up air for the laboratory shall be handled through a packaged propane-fired make up air unit. ..

.5 Free cooling will be utilized in all areas in lieu of air conditioning.

.6 Propane fired radiant heaters controlled by remote thermostats shall be used to provide perimeter heating in the mill building.

.7 An exhaust fan in the compressor room will operate on a reverse acting thermostat, to offset the heat gains in this room. The exhaust air will be delivered into the mill building and the make up air will enter the room from the mill building through wall louvres

6.0 FIRE PROTECTION SYSTEMS (HOLD FOR CODE COMPLIANCE)

.1 The fire protection systems shall comply with the following requirements:

- Operation of any fire protection device, including pressure switches, pull stations, smoke detectors, water flow switches and alarm valves shall be supervised and monitored by a central fire alarm panel, (CFP) which will be located in a room that is occupied 24 hours a day.
- All detection devices shall be intelligent addressable.
- Manual pull stations will be provided at exits of all buildings.
- Detection systems, and manual pull stations shall initiate audible (horns), and visual (strobic), alarms at exits.
- Each area shall be provided with its own stand alone fire alarm system, and all systems shall be networked to the central fire alarm panel.
- All like equipment shall be of the same manufacturer.
- Fire alarm panels shall incorporate batteries and battery charger for battery back up.
- In addition to requirements of this design criteria, NFPA 13 shall be the design standard for all sprinkler systems. The most stringent requirements shall prevail.

- In addition to requirements of this design criteria, NPFA 14 shall be the design standard for all standpipe systems. The most stringent requirements shall prevail.
- All automatic sprinkler system control valves, standpipe water supply control valves, and fire water tank isolating valves shall be provided with chains and padlocks.
- All hydraulic equipment and lube oil systems with fluid reservoirs over 378 liters, or a combined total in excess of 378 liters within 6 metres, shall be protected with automatic sprinklers with 71 degrees Celsius heads. Sprinklers shall extend 3 meters beyond the hazard or to the closest solid wall, whichever is closest.
- Mechanical equipment, such as hydraulic units, lube units and conveyors, which are protected by sprinkler systems, shall be equipped with interlocks to automatically shut down the equipment in the event of sprinkler flow.
- UL/ULC approved fire stop systems, with UL/ULC listed and/or FM approved materials, and UL/ULC listed fire/smoke dampers shall be provided wherever fire rated walls or floors are penetrated by piping, cables and ductwork. Combustible insulation or sealants, such as polyurethane foam, will not be accepted.
- All construction material for electrical rooms, including insulation, shall be constructed of 100% non-combustible materials.
- Hand held all-purpose ABC fire extinguishers shall be provided in all buildings for local emergency fire fighting. Fire extinguishers shall be located at spacing as specified by NFPA 10, with additional units being located at each exit door from the area.
- Clean agent hand held fire extinguishers shall be provided in all electrical rooms and control rooms, with spacing in accordance with NFPA 10, plus additional units being located at each exit door from the area.
- Water velocities shall not exceed 6 metres per second in any section of above ground fire protection piping.
- The entire fire protection system shall be designed in accordance with the seismic requirements of NFPA 13 and FM data sheet FM-2-8.
- All fire protection equipment and materials shall be UL/ULC listed and / or FM approved for the intended purpose.
- All buildings and structures in excess of 14 meters in height, or having any dimension in excess of 30 metres, will be provided with wet class 2 standpipe systems with fixed hoses. Hoses shall be located such that all areas at all levels of the buildings, conveyor transfer towers and structures are within reach of a fire hose stream.
- The fire protection systems shall be designed and installed by professionals who are experienced in the proper design, installation and testing of fire protection and fire alarm systems.
- The sprinkler system piping will be hydraulically sized, designed, installed and tested by the “Fire Protection” contractor.
- Dry alarm valves will be located in heated spaces.
- Flow switches for individual, localized sprinkler systems shall include a shut off valve with a chain and a padlock.

- All sprinkler systems shall include an inspector's test connection, located at the most hydraulically remote part of the system.
- The time interval between activation of a dry sprinkler system and water reaching the most remote head shall not exceed 60 seconds.
- Piping for dry systems shall be constructed of galvanized steel.
- Auxiliary drain valves at all sprinkler system low points will be provided, to allow the complete system to be drained.
- Conveyors shall be provided with alignment switches to shut down the respective conveyor on misalignment.

7.0 PLUMBING AND DRAINAGE

.1 The plumbing and drainage systems shall comply with the requirements of the National Plumbing Code.

.2 Sewage from the Mill Building fixtures shall be directed to a holding tank for disposal by a mobile vacuum truck.

.3 Hot and cold water piping shall be provided with individual shut off valves to all fixtures.

.4 The minimum pipe size for under-slab piping shall be 75 mm.

.5 Cleanouts shall be provided to all under-slab piping at 15 metre intervals and at each change of direction.

.6 Plumbing piping through electrical rooms shall be avoided.

.7 Stacks, drains and vents shall be sized in accordance with the National Plumbing Code.

.8 Drains shall slope downward in the direction of flow, a minimum of 1:50 except as permitted in the National Plumbing Code.

.9 Every plumbing fixture shall bear the CSA label.

.10 Floor drains shall be deep seal type, with trap primers.

.11 Water systems shall be protected against back-syphonage and back flow with back flow preventers.

.12 Laboratory wastes shall be neutralized in a collection tank, prior to being discharged into a separate drainage system from the sewer piping.

.13 Cold water piping shall be insulated for condensation control.

END OF DESIGN CRITERIA

SPECIFICATION REVISION INDEX

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1.0 GENERAL

1.1 SCOPE

.1 This design document establishes the criteria for structural engineering design and construction of the Bellekeno Project Mill Plant. The specification defines applicable codes and standards, design loads, serviceability and materials of construction.

1.2 REFERENCES

.1 Design and construction of the mine processing buildings will be in accordance with, but not limited to the following codes and standards. The publications listed below form part of this specification, and shall be used for the purposes listed. Other standards and recommended best practice will be used where applicable.

- Units of measure will be imperial.
- Client standard equipment numbering system to be used.
- Drawing numbers to be obtained from client.
- National Building Code of Canada 2005.
- Wardrop drafting standard to be used.
- Yukon Occupational Health and Safety Act.
- CAN/CSA S16.1 Limit States Design for Steel Structures.
- CAN/CSA A23.3-04, Design of Concrete Structures for Buildings.
- CAN/CSA A23.1/A23.2-04, Concrete Materials and Methods of Concrete. Construction/Methods of Test and Standard Practices for Concrete Design of Concrete Structures for Buildings.
- Yukon Environment Act.
- Yukon Employment Standards Act.

1.3 CLIMATIC DATA

.1 Based on Bellekeno Project Mill Plant Site, UTM Coordinates 7087630 N, 483918 E (Approximately 2 Km west of Keno City in Yukon):

- Snow Load, Ss (1/50) 2.50 kPa
- Rain Load, Sr (1/50) 0.10 kPa
- Hourly Wind Pressure, q (1/50) 0.35 kPa

2.0 EXECUTION

2.1 DESIGN LOAD DEFINITIONS

.1 General: Loads and forces used for design shall be as defined in NBCC and as specified below:

- Dead Loads (D): Vertical loads due to the weight of permanent structural and non-structural components of a building or structure, including empty vessels, piping, ducting, electrical cables and trays and permanent fixtures.
- Operating Loads (O): Dead loads plus the weight of any liquids or solids present within the vessels, equipment, or piping during normal operation. This includes unusual conditions such as upset conditions when fluid levels could be higher than normal operating levels.
- Live Loads (L): The loads produced by use and occupancy of the structure. They include the weight of all movable loads, including personnel, tools, miscellaneous equipment, movable partitions, cranes, hoists, parts of dismantled equipment and stored material.
- Snow Loads (S): Snow loading on roofs or other exposed surfaces including the effects of snow drifts at offsets in roof elevations and obstructions.
- Wind Loads (W): Loading on the building cladding and roofing, overall structure and structural components caused by the wind.
- Earthquake Loads (E): Rare loads due to earthquake.
- Impact Loads (I): Live loads that induce impact on structures.
- Dynamic Loads (N): Forces that are caused by vibrating machinery such as screens, crushers, blowers, fans and compressors.
- Lateral Pressure (H): Forces caused by pressure of soil, granular materials or liquids contained in tanks or bins.

2.2 DESIGN LOAD FACTORS

- Dead Loads (D) 1.25
- Operating Loads (O) 1.25
- Principal Live Loads (L) 1.5
- Companion Live Loads (L) 0.5
- Principal Snow Loads (S) 1.5
- Companion Snow Loads (S) 0.5

- Principal Wind Loads (W) 1.4
- Companion Wind Loads (W) 0.4
- Earthquake Loads (E) 1.0
- Impact Loads (I):

Description	Vertical
Monorails and trolley beams	1.25
Pendant or radio operated travelling crane girders	1.25
Supports for light machinery, shaft or motor-driven	1.2
Supports for reciprocating machinery	1.5
Supports for power-driven units	1.5

Note: Loads imposed on structural members subjected to impact forces will be multiplied by the live load factor in addition to being multiplied by the impact load factor.

- Lateral Pressure (H) 1.5

.1 Design of Cranes

- Vertical, transverse and longitudinal impact will not be considered to act concurrently.
- Bridge crane rails will be designed to resist a horizontal force applied perpendicular to the top of the rails equal to 20% of the sum of the capacity of the hoist and the weight of crane trolley. For bridge cranes this force can be equally distributed on each side.
- Bridge crane rails will be designed to resist a longitudinal force applied to the top of the rail equal to 10% of the maximum wheel loads of the crane and force from crane stops.
- Monorails will be designed to resist a horizontal force applied perpendicular to the top of the rails equal to 10% of the capacity of the hoist and the weight of the trolley.

2.3 DESIGN LOADS

- Roof Loads
  - Dead Load (including steel) 1.3 kPa
  - Weight of mechanical equipment: indicated on plans
  - Superimposed dead load (weight of mechanical/electrical ductwork, piping, cable trays, etc.) typical 1.0 kPa
  - Built-up Snow indicated on plans
  - Wind Loads determined by building layout in accordance with NBCC
- Wind Loads: Cladding and Structural Components

- Reference the NBCC 2005 Structural Commentary I for loading.

- Earthquake Loads:
  - Site Class — D
  - Seismic Importance Factor, I_E — 1.0

  The following seismic data has been interpolated using the 2005 National Building Code Seismic Hazard Calculation:

  2% probability of exceedance in 50 years:

Sa(0.2)	=	0.440
Sa(0.5)	=	0.264
Sa(1.0)	=	0.130
Sa(2.0)	=	0.072
PGA	=	0.213

- Floor Loads
  - Live Load
    - Heavy duty floor subject to vehicle traffic — 7.2 kPa
    - Normal duty floor — 4.8 kPa
  - Monorails and Bridge Cranes — indicated on plans
  - Weight of Mechanical Equipment — indicated on plans
  - Superimposed dead load (weight of mechanical/electrical ductwork, piping, cable trays, etc.):
    - Typical — 1.0 kPa
    - Electrical Room — 0.5 kPa
    - Mechanical Room — 0.5 kPa
  - Structure Self Weight:
    - Steel grating on steel floor framing — 1.5 kPa
    - 4” concrete slab on steel floor framing — 2.9 kPa
    - 6” concrete slab on steel floor framing — 4.1 kPa
  - Lay down areas designed for 44.5 kN (10 kips) over any 4’ x 8’ (1.2 m x 2.4 m) area.
  - All floor areas designed for 9 kN (2 kips) over any 2’-6” (0.76 m) square area.
  - Fall Arrest Anchor Points designed for point load of 22 kN (5000 lbs) in any direction.

- Geotechnical:
  - All designs are based on the Geotechnical Evaluation Report – Potential Mill Sites, Bellekeno Project Near Keno City, Yukon, by “EBA Engineering Consultants Ltd.”, EBA File: W14101178, dated 08 December 2008 for Alexco Resources Canada Corp.

2.4 DEFLECTION LIMITS (UNDER LIVE SERVICE LOAD)

- Roof framing — L/240
- Wall cladding and girts — L/180
- Floor framing — L/360
- Crane runway beams:
  - Vertical under full service no impact — L/600 Vertical
  - Lateral under full service no impact — L/400 Lateral
- The total deflection of crane runway beams will not exceed 1" (25 mm)
- Wind sway of building columns:
  - Buildings with Cranes — L/400 and 1" (25 mm) max.
  - Buildings without Cranes — L/180 and 2" (50 mm) max.

2.5 MATERIAL PROPERTIES

- Concrete
  - Unit weight of concrete — 23.5 kN/m^3 (150 pcf)
  - Concrete strength at 28 days — 30 MPa (4350 psi)
  - Reinforcing steel: — CSA G30.12, Grade 400, Ties and Stirrups Grade 300
  - Class of Exposure (CSA A 23.1-04 Table 1):
    - (i) For interior floors: — Class N
    - (ii) For piers, footings and grade beams: — Class F2
- Masonry
  - Unit weight of masonry concrete — 20.5 kN/m^3 (130 pcf)
  - Masonry compressive strength at 28 — 15 MPa (2176 psi)
  - 2-core light weight concrete block 8" x 8" x 16" (190 mm x 190 mm x 390 mm): — CSA A 165-94.
- Structural Steel
  - Channels, angles and plates: — CSA G40.21, 300W.
  - Wide Flange shapes: — CSA G40.21, Grade 345W (Min.)
  - Hollow Structural Sections: — CSA G40.21, Grade 350W, Class C A500, 50 ksi (345 MPa)

END OF SPECIFICATION

ALEXCO / WARDROP Engineering Inc.	INSTRUCTIONS	
	INSTRUMENTATION **40 90 00** **Design Criteria**	**Project Number:** 09539601.00 **Project Name:** Bellekeno Project

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1.0 SCOPE AND BATTERY LIMITS

.1 Electronic instrumentation and a local control system shall be provided in three distinct areas of the Bellekeno Plant:

- Primary Crushing, Conveying and Crushed Ore Storage
- Process Plant
- Paste Backfill Area

.2 A local operator control station shall be provided for the Primary Crushing, Conveying and Crushed Ore Storage operation and for the Paste Backfill Area.

.3 Local operator control stations shall be provided for Process Plant control and monitoring.

.4 All control is to be locally operated, no DCS or PLC is required for overall site.

2.0 CODES AND STANDARDS

.1 The design and manufacture of electrical, instrumentation and controls equipment shall conform to the latest versions of the following codes and standards:

- Canadian Electric Code (C22.1)
- Canadian Standards Association (CSA)
- Local Codes and Standards
- American National Standards Institute (ANSI)
- Instrument Society of America (ISA)

.2 All equipment shall be rated for a minimum elevation of 45 meters feet above sea level and an ambient temperature range of 0°C to 40°C and shall have CSA Approval Marking.

.3 Manufacturer's recommended design, installation practices and procedures shall be adhered to whenever such practices and procedures are available.

3.0 INSTRUMENTATION DESIGN AND CONSTRUCTION

3.1 GENERAL

.1 Electrical Supply – Electrical supply to field instruments, relays, solenoids where required shall be 120V-60Hz. Electrical supply to Control Systems, panel and back of panel Instruments shall be 120V-60Hz.

.2 Pneumatic transmitters shall have an output signal of 3-15 psig. Electronic transmitters shall have an output signal of 4-20 mA DC. Where possible, electronic transmitters shall be smart, programmable, microprocessor based 2-wire and powered by the signal receiver. If the electronic transmitter is externally powered (4-wire), its output signal must be isolated or floating with respect to ground so that the 4-20 mA DC signal could be transmitted to receiver without ground loop problem. If ground loop is a problem, then a signal isolator must be used.

.3 The materials of components that come into contact with process fluids (instrument wetted parts) shall be resistant to stress resulting from pressure, temperature, corrosion and erosion, and shall be made of 316 stainless steel minimum unless the process and piping specifications require a different or higher grade material.

.4 Control valves shall have integrally mounted smart electro-pneumatic positioners.

.5 Instrument Air – Instrument air supply shall be dust-free, oil-free and dry. The minimum instrument air dew point at line pressure shall be at least -40°C or -10°C below the minimum locally recorded ambient temperatures at the plant site, whichever is lower. No condensation shall occur in the distribution system or in the instruments. The minimum instrument air supply pressure on the header shall be 700 kPag.

.6 The capacity of the instrument air system shall be rated for all the connected loads plus 20%. An air receiver shall be provided for protection against loss of air. A low-pressure alarm shall be provided to indicate that the air pressure has fallen below 500 kPag. The air receiver shall be sized such that, 15 minutes after the low air pressure alarm, the instrument air header pressure shall not be below 250 kPag.

.7 Field Wiring – In general, multi-conductor cables shall be used between each local control station and field junction boxes. Single pair cables shall be used between field junction boxes and individual instruments or electrical devices.

3.2 LOCAL CONTROL STATIONS

.1 Local control stations shall be in accordance with the requirements of the associated electrical area classification. In an unclassified area the enclosures shall be NEMA 4X corrosion resistant, non-metallic, watertight and dust tight construction. Hinges and latches shall be 316 stainless steel. Cable entries shall be through cable glands in the rear of the box or side of box where feasible. Watertight seals shall be used. Terminal rails shall be mounted vertically, complete with sufficient grounding terminals. All connections within the control station shall be made via terminal blocks. Splicing of wires is not permitted.

.2 All cables, wires, terminals and any other device shall be tagged uniquely in each station. A control station layout and wiring diagram shall be provided and placed in a pocket in the rear side of the front door. Control Stations shall be tagged uniquely with a lamacoid nameplate attached to the front panel. Lamacoids shall be white with black lettering.

.3 Local control stations shall provide 120VAC-60Hz power to instrumentation where needed. Local control stations shall also house two sources of 24VDC power supply to be used for 24VDC loop powered devices (2-wire) and 24VDC powered devices (4-wire).

3.3 GROUNDING

.1 Plant electronic instrument system shall have its own dedicated grounding system. In the event that several instrument systems exist, these grounding systems shall be connected in common.

.2 Manufacturer’s recommended grounding procedures and installations shall take precedence over all grounding designs and installations.

.3 All signal cable shields shall only be grounded at the local control station end of the circuit. The field end shall be trimmed flush with the cable jacket and taped to prevent accidental ground contact.

3.4 MOUNTING AND LOCATION OF FIELD INSTRUMENTS

.1 All field instruments shall be mounted at grade or platform to provide easy access for operation and maintenance.

.2 All field mounted remote transmitters with indicators shall be mounted so that the transmitter is 54” above grade or platform and shall be located as close to the primary connection/element as possible consistent with instrument accessibility.

.3 Dial thermometers and pressure gauges that are line mounted shall be plainly visible and accessible from grade or platform.

3.5 FIELD MOUNTED INSTRUMENTS AND EQUIPMENT

.1 All field instruments shall meet the electrical classification of the area. Field mounted instrument electrical devices shall be supplied in weatherproof enclosures NEMA 4, watertight and dust-tight as a minimum.

.2 Instruments shall be installed with flanges or unions and isolation valves to permit removal without process shutdown. Isolation valves shall be provided so that inline valves and instruments can be removed for maintenance without draining tanks and equipment.

.3 Separate process connections are required for each instrument including pressure gauges. Process connections for instruments on vessels shall be dedicated to the instrument and not shared with process piping.

.4 Junction boxes shall be in accordance with the requirements of the associated electrical area classification. In an unclassified area the enclosures shall be NEMA 4X corrosion resistant, non-metallic, watertight and dust tight construction. Hinges and latches shall be 316 stainless steel. Cable entries shall be through cable glands in the bottom of the box where feasible. Watertight seals shall be used. Terminal rails shall be mounted vertically complete with sufficient grounding terminals. All connections within the junction box shall be made via terminal blocks. Splicing of wires is not permitted.

.5 All cables, wires, terminals and any other device shall be tagged uniquely in each box. A junction box layout and wiring diagram shall be provided and placed in a pocket in the rear side of the front door. Junction boxes shall be tagged uniquely with a lamacoid nameplate attached to the front panel. Lamacoids shall be white with black lettering.

3.6 INSTRUMENT ELECTRICAL WIRING

.1 Armored multi-pair instrument cables shall be individually twisted shielded pairs of stranded #16 AWG copper conductors with drain wire, cable overall shield with drain wire, FRPVC inner jacket, aluminum interlock armour, FRPVC outer jacket, Wire pairs shall be coloured black and white. Black is positive, white is negative. The number of pairs shall be as per drawings.

.2 Armored control and instrument power cables shall be Teck cable with stranded copper conductors, aluminum interlock armour, and PVC outer jacket. The number of conductors and conductor size shall be as per drawings.

.3 Power cables shall be supplied with bare copper grounding conductor.

.4 All wiring shall be clearly identified at every termination with a permanent marking system. Wire markers shall be the heat-shrunk type unless otherwise specified. The preferred method of identification is the loop number as specified on the loop diagrams.

3.7 INSTRUMENT AIR TUBING

.1 Instrument air tubing to an instrument shall be 1/4” OD 316 SS seamless unless specified larger on drawings. Instrument air tubing fittings shall be 316 SS compression type.

END OF SECTION

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1.0 GENERAL

1.1 SCOPE

.1 This design document establishes the criteria for electrical engineering design for Bellekeno Project Mill Plant. The specification defines applicable codes and standards, design loads, serviceability and materials of construction.

.2 The distinct areas of the project are:

Main plant areas:

- Mill Process Area
- Coarse Ore Storage Location

.3 Critical loads (defined as those which require power upon normal electrical supply failure) including power supplies if any, are identified during project design by area and shown on the project equipment list. These critical loads will be further defined as requiring uninterruptible power or interruptible power (i.e. time needed to start any standby generators). See Emergency power Section 3.2.1.

These loads shall be connected to the power system in such a manner that the failure of any bus or power supply would not prevent the safe shutdown of the related equipment.

2.0 CODES AND STANDARDS

.1 The design and manufacture of electrical equipment will conform, as a minimum, to the latest versions of the following International codes and standards:

CSA M421-00	Use of Electricity in Mines
CEC C22.1	Canadian Electical Code
ANSI	American National Standards Institute
IEEE	Institute of Electrical and Electronics Engineers
CSA	Canadian Standards Association
NEMA	National Electrical Manufacturer's

.2 The codes and laws of the country, state, province, municipality or jurisdiction in which a project occurs may take precedence over the aforementioned codes.

.3 In case of conflict between the referred codes, specifications, standards and manufacturer's preferred procedures, conflicts shall be resolved in consultation with the Owner and/or the Owner's Representative before equipment selection or manufacture.

3.0 POWER SYSTEM

3.1 GENERAL

.1 Main power will be provided from a overhead powerline at 69 kV. There will be a 69kV/4.16kV step down transformer at the substation. The power system will have the capacity and characteristics to support the plant electrical load and equipment.

3.2 EMERGENCY POWER

.1 A preliminary assement of critical loads in Mill building shows a 500 kW generator is sufficient to provide back-up power for such loads.

3.3 SYSTEM VOLTAGE

.1 Frequency is 60 Hz.

.2 AC voltage levels will be as follows:

Equipment	Distribution System Voltage
All drives from 0.5 HP to 250 HP	600 V, 3-phase, high resistance grounded.
Small drives below 0.5 HP	120/208 V, 3- or 1-phase, solidly grounded.
Electrical heaters over 2 kW	600 V, solidly grounded.
Electrical heaters 2.0 kW or less	120/208 V, 3- or 1-phase, solidly grounded
Lighting 120 or 347 V	1-phase solidly grounded
Small power & controls 120 V	1-phase solidly grounded
Heat tracing short lengths 208 V	1-phase solidly grounded
Heat tracing long lengths 600 V	3- or 1- phase solidly grounded

4.0 POWER DISTRIBUTION

4.1 GENERAL

.1 Electrical distribution necessary for the processing facility will consist of:

- Medium voltage switchgear, power cables for step down power transformers.
- Step down power transformers to suit the physical and electrical characteristics of the various plant areas.
- Low voltage power distribution will generally be provided by power distribution centers.
- In general, power for motors will be supplied from factory assembled motor control centers. A local “Start/Stop” pushbutton and H-O-A selector will be used. Lockout is to be done at the motor control center by qualified electricians in accordance with Owner developed lockout procedures. Remote disconnect switches will not be installed at motor locations, this fact will be included by the Owner in the above mentioned lock out procedure development.
- Power for lighting and receptacles will be supplied from lighting and power panel boards.
- Overhead power lines will be 4.16 kV.

.2 Transformers shall be design loaded to not more than load to 80 % of full capacity and 25% future expansion allowance. Dedicated purpose transformers which are part of specific equipment systems (e.g. conveyor or pump variable frequency drive systems) shall be sized according to the duty anticipated.

.3 The need for harmonic mitigation will be managed by including requirements in the overall design and in equipment specifications to address the harmonic generation limits and control outlined in IEEE 519 Guide for Harmonic Control and Reactive Compensation in Electric Power Systems. Smaller variable speed drives will be provided complete with built in reactor and dv/dt filtering while larger VFDs must be provided with minimum 12 pulse drive systems and/or isolation transformer. The need for a harmonic study will be evaluated in conjunction with identifying any harmonic limits relevant to the generation system. The harmonic tolerance (spectrum and magnitude) must be provided by the generation system vendor.

4.2 VOLTAGE DROP AND POWER FACTOR

.1 Overall voltage drop from source distribution transformer secondary to the end of last feeder shall not be more than 3 %. Overall voltage drop from the supply to point of utilization shall not exceed 5 %. Where required, capacitors for power factor correction will be concentrated at logical load centers.

5.0 EQUIPMENT DESIGN CRITERIA

5.1 ENCLOSURES

.1 Equipment and device enclosures will have the following ratings:

Location	**Rating**
Control Room, Electrical Rooms	NEMA 1A
All other areas (Non-classified)	NEMA 12, 4 or 4X as needed.

5.2 CABLES

.1 All power and control cables will be copper and will generally be installed in underground non-metallic ducts or above ground in ladder type cable trays. Cables will have interlocking aluminium armour with a PVC FT4 rated jacket and as follows:

4.16 kV System	5 kV rated, 133% Insulation
600 V System	1,000 V rated, #12 AWG minimum
Controls	600V rated, #14 AWG minimum. A minimum of 15% spare conductors will be left in each control cable where possible.
Color Coding	All power wiring will be color coded to suit local standards.

5.3 ELECTRIC MOTORS

.1 All motors supplied shall be suitable for inverter duty, IEEE 841 rated for severe industrial duty including protection from corrosive washdown liquids. (Note: No areas are anticipated to be classified as hazardous due to the presence of an explosive dust or gas concentration under normal or process upset conditions.)

5.4 LOW VOLTAGE POWER DISTRIBUTION CENTRES

.1 Low voltage power distribution centres shall be rated for use at the site elevation. Enclosure type shall be equivalent to NEMA 1A for installation indoors.

.2 Each low voltage switchboard shall be complete with an incoming main breaker section and suitable digital protective relaying including ground fault detection and alarms. Main breakers will be complete with features to allow a maintenance mode to reduce any fault duration time in order to limit the arc flash hazard. Arc flash will otherwise be managed by maintenance use of suitable personal protective equipment and appropriate lock-out and maintenance procedures.

.3 Individual distribution feeder cells will be circuit breaker type with digital protective relaying.

.4 Design loading for low voltage distribution centres shall not exceed 75% of calculated running loads including spares.

5.5 MEDIUM VOLTAGE DISTRIBUTION

.1 Medium voltage distribution equipment shall be metal-clad and rated for use at the elevation of utilization. Enclosure type shall be equivalent to NEMA 1A for indoor electrical room applications.

5.6 LOW VOLTAGE MOTOR CONTROL CENTRES

.1 MCCs shall be 600 V, 3 phase, 3 wire complete with copper bus, top mounted ground bar and bus bracing as noted on other design documents. Enclosures shall be NEMA 1A for installation in indoor modular electrical rooms or major building electrical rooms.

.2 MCCs shall have incoming sections with digital meter display of instantaneous three phase voltage, current and power parameters. All transformer fed MCCs require a main breaker sized to the transformer secondary current complete with a digital protection relay. Main breakers will be complete with features to allow a maintenance mode to reduce any fault duration time in order to limit the arc flash hazard. Arc flash will otherwise be managed by maintenance use of suitable personal protective equipment and appropriate lock-out and maintenance procedures.

.3 Where specified, individual MCC starters shall be complete with door mounted H-O-A selector switches, start-stop push buttons and LED type pilot lights.

.4 MCCs shall have smart starters and be connected to local plant control system I/O racks for control purposes where control is not strictly manual. The preferred communications system will be determined as further progress is made in plant control system design.

5.7 ELECTRIC SPACE HEATERS

.1 Electric space heaters where provided shall be complete with built-in contactors and thermostats and will have a local manual disconnect switch for isolation purposes.

5.8 LIGHTING

.1 High intensity discharge lighting will be provided in exterior locations, for roadway lighting and where specified indoors. Fluorescent lighting will be provided in the control rooms, motor control centre rooms, offices and other plant buildings. Note that, where possible at the design stage, steps will be taken to reduce energy use in all areas by:

- Use of two level switches for larger lighting area – activated by personnel entering area when needed for operations or maintenance.
- Use of detection type switches to turn off lights in office areas after periods of room being empty.
- Photocell controlled exterior lighting.

.2 Control room lighting will be electronically dimmable and fixtures shall be complete with louvers to minimize glare from operating monitors. Lighting for offices and control rooms will be via 120 V, high efficiency fluorescent type fixtures.

.3 Battery powered emergency lights and exit signs will be included for offices, labs, electrical rooms, the control room and major egress routes indoors.

.4 Where required by the nature of the process, lighting fixtures shall be of the corrosion resistant type. Outdoor floodlight circuits will be automatically controlled by photocells with a "Manual-Off-Auto" bypass selector switch. Main indoor lighting circuits will be supplied from 600/347 V lighting panels. In general, plant lighting will be switched from the supply panels, in all other areas local switching will be provided.

.5 Lighting Illumination Levels

Illumination levels shall meet the following requirements:

Areas	Level
Electrical Room	300 lux
Control Room	500 lux
Offices	600 lux
Process Areas	300 lux
Loading Areas	30lux
Yard	10 lux

5.9 GROUNDING

.1 The main generation system grounding method will be designed by using the generation system future planned fault levels and details of soils in the area.

.2 Building ground references will be provided by using the UFER grounding method, where concrete foundation exists. Depending on the native soil conditions, additional perimeter ground rods and conductor systems may be employed. All column footings will be bonded by welding anchor bolts to the rebar.

.3 The ground conductor will be connected to building steel, tanks, and equipment and the ground wire will be installed exposed wherever possible. Where corrosion presents a problem, ground wire shall have green PVC insulation. All underground connections will be exothermic type. Exposed connections and taps will be made with pressure type connectors.

.4 Grounding provisions shall be provided to limit the Ground Potential Rise (GPR) to 100V.

.5 Ground current return paths will be provided within individual cables, within discrete cable tray runs and by use of separate conductors on overhead lines.

.6 Motor control centres, medium and low voltage switchgear, unit substations, transformers, etc., will be provided with two connections to the ground grid. All medium voltage motors, control panels, tanks, vessels, and other equipment will have at least one direct connection to the ground grid. All 120 V receptacles will be grounded by means of a separate green coloured insulated wire. Ground fault circuit interrupter type receptacles will be located in areas as required throughout the plant site. A #2/0 AWG bare ground cable will be installed in all cable trays. The ground cable will be connected to all sections and fittings at intervals of not less than 15 m. Final resistance of the grounding system will be in accordance with the local codes and standards.

END OF SPECIFICATION

APPENDIX D

WASTE MANAGEMENT PLAN

WASTE MANAGEMENT PLAN

Construction Version – July 2009

BELLEKENO PROJECT

Table of Contents

1.0 INTRODUCTION

Throughout the course of the Bellekeno Project various forms of waste will be produced and require management to ensure proper disposal under the applicable legislation. As such, the following preliminary Waste Management Plan has been prepared to outline the facilities and measures that will be used to manage the waste streams. Because the Bellekeno mine will operate within the context of existing and ongoing care and maintenance and closure planning for the whole Keno Hill Silver District, existing waste management facilities and licences are already in place. It is anticipated that amendments to existing licenses will be required to accommodate wastes generated by the Bellekeno Project. As the project proceeds and permits are obtained or amended that regulate the management and disposal of waste, this plan will be revised accordingly with approvals appended.

2.0 WASTE MANAGEMENT FACILITIES

2.1 Existing Waste Management Facilities

A number of existing waste management facilities exist on site and are used in support of care and maintainance and closure activities, and will be amended in order to accommodate waste resulting from the Bellekeno Project (see Figure 1).

A Commercial Dump Permit No. 81-012 is currently held from YG Environment in accordance with the Environment Act Solid Waste Regulations as well as the Public Health and Safety Act. This permit will continue to be used in support of the Bellekeno Mine operation.

Alexco currently holds two (2) sewage disposal system permits at Elsa issued by YG Environmental Health Services: one septic system permit for the Flat Creek Camp (Permit #3012) and a septic system for the four houses (Permit #3131) constructed in 2008. Should the planned camp expansion at Flat Creek Camp require expansion of the existing septic system, plans for this expansion will be submitted as part of Phase III of the construction site plan.

Special Waste Permit No. 41-199 is currently held from YG Environment in accordance with the Environment Act Special Waste Regulations for burning waste oil, generating and/or storing waste batteries, waste oil, waste solvents, and other special wastes.

2.2 Valley Tailings Landfill

The Valley Tailings landfill will be used to accommodate solid wastes generated during construction, operation, and closure activities of the Bellekeno Mine Project. An amendment to existing commercial dump permit No. 81-012 for a will be submitted to Yukon Environment as per the *Solid Waste Regulations*. The location for this waste management area is north of the Elsa near the Valley Tailings Area (see Figure 1).

The quantity of waste projected to be collected at the commercial dump for each phase of the project has been estimated as:

- Construction (year 0) ~ 106 m^3/year
- Pre-production (year 1) ~ 106 m^3/year
- Operations (years 2 – 8) ~ 50 m^3/year
- Closure (first 3 years) ~ 100 m^3/year
- Closure (subsequent years) – minimal use, facility closed out

2.3 Incinerator

Existing Air Emission Permit No. 4201-60-026 will be used in accordance with Yukon Environment as per the *Air Emissions Regulations* in order incinerate solid waste from the Bellekeno Project. This facility is located at the Valley Tailings Landfill area (see Figure 1).

Refuse originating as camp and office waste, plus warehouse scrap will contain some organic wastes. Garbage and debris destined for disposal will be collected routinely and prior to incineration stored in wildlife proof containers / fenced short term storage areas in a manner which does not attract wildlife to the mine or mill site. Solid waste will be frequently and completely incinerated (once installed) in a manner which minimizes odours and eliminates the attraction of bears and other wildlife to the mine site. Combustible waste containing a fossil fuel by-product shall be drained prior to incineration and that material will be recycled where possible.

2.4 Land Treatment Facility

A land treatment facility is located in the vicinity of the Flat Creek Camp for the potential collection, storage and treatment of soil and/or liquid contaminated with petroleum hydrocarbons.

2.5 Sewage Disposal

Three separate locations (Elsa/Flat Creek, Flame and Moth mill site, and Bellekeno mine site) will require sewage services in order to accommodate Bellekeno mine development and operations (details below). Sewage disposal facilities currently include both permanent and portable facilities.

All disposal facilities will comply with the Public Health and Safety Act, *Sewage Disposal Systems Regulations*. In particular, septic tanks, sewage holding tanks or contained privies will be located at least 15 m from the high water level of nearby water bodies; while the soil absorption system (or pit privies) will be located not less than 30 m from the high water level of nearby water bodies. Soil absorption systems will not be located where soil conditions are unsuitable for absorption of effluent.

Two conventional septic tank/leach field systems will accept all sanitary wastewater. One system will be located adjacent to the camp and serve the camp, administrative offices, and process plant. The second system will be located at the truck shop area to serve the truck shop and the mine.

2.5.1 Flat Creek Camp and Elsa

Alexco currently holds two (2) sewage disposal system permits at Elsa issued by YG Environmental Health Services: one septic system permit for the Flat Creek Camp (Permit #3012) and a septic system for the four houses in Elsa (Permit #3131) constructed in 2008. Should the planned camp expansion at Flat Creek Camp require expansion of the existing septic system, plans for this expansion will be submitted as part of Phase III of the construction site plan.

2.5.2 Flame and Moth Mill Site

Holding tank and trucked to Flat Creek Camp.

2.5.3 Bellekeno Mine

Holding tank and trucked to Flat Creek Camp.

2.6 Sediment Control & Events Ponds

During construction the accumulated sediment within the sediment control & events ponds will be collected as required and buried below ground away from drainage flow paths and watercourses.

3.0 WASTE STREAMS & SEGREGATION

The type of waste that will be managed at the site includes:

- Solid Waste (non-hazardous)
    - Putrescible (i.e. camp refuse)
    - Non-putrescible (i.e. burnable or non-burnable)
- Special wastes (i.e. waste oil, batteries – only to be segregated and stored temporarily)

3.1 Solid Waste (non-hazardous)

Kitchen / organic waste will be stored in clear plastic bags inside a 10'x10' bear proof steel clad bin at the camp site with a 1" thick steel door with heavy clasp for security. The bin will be emptied daily and taken to the incinerator for immediate burning.

Waste that is non-burnable, non-hazardous, and non-recyclable will either be temporarily stored in steel bins at the commercial dump area (e.g. construction wastes) or in the steel clad bin at the camp site (e.g. washed out containers for non-hazardous contents). This waste, along with incinerator ash will be buried within the dump. Material will periodically be covered with a layer of soil to prevent the loss of waste through wind action.

Used tires requiring disposal and have a rim size of 24.5 inches or greater will be buried within the commercial dump. Used tires requiring disposal with a rim size of 24.5 inches or less will be dealt with in accordance with the Yukon Used Tire Management Program and transported off site to an approved facility.

3.2 Special Waste

Any special wastes, as defined by the *Special Waste Regulations* (batteries, used oil, antifreeze, solvents), will be collected and stored in specially marked containers and then shipped to an appropriate treatment or disposal facility. Wildlife-proof rig bins will be used to provide segregated storage for solid waste that cannot be burned and special wastes in compliance with *Special Waste Regulations*.

Alexco currently holds Special Waste Permit No. 41-199 for this project and will comply with the Yukon *Special Waste Regulations* and track wastes through the use of Transportation of Dangerous Goods Waste Manifests. An amendment to this permit in order to accommodate special wastes generated from the Bellekeno mine will be applied for. Special Waste Permit No. 41-199 includes authorization to use a waste oil burner at the site (in Elsa) as per the *Special Waste Regulations.* Waste oil will be burned and used as a source of heat.

A concrete floor will be provided throughout the truck maintenance area and will be sloped towards a dry sump, which will collect any wash solutions and petroleum products that result from the maintenance activities. Oil-absorbent products will also be used on the shop floors.

Any accumulated sump water will be separated and oils pumped to the waste oil tank or empty drums. All oily wastes from oil changes, including the sump separation products and absorbent, will be hauled off the site for disposal or recycling in an environmentally acceptable manner or disposed of in the waste oil burner. An oil and water separator will be used in the truck shop to capture oil, which will then be taken offsite by the oil supplier for disposal or disposed of in the waste oil burner.

The lubrication bay of the maintenance shop will have a vacuum evacuation system for waste oil. Hose reels will feed from the lubrication storage area and will dispense antifreeze, grease and various grades of oil to the lubrication bay.

3.3 Waste Management Matrix

Both controlled / hazardous and non-controlled / non-hazardous materials will be dispensed of accordingly. Signage will be in place to assist in proper segregation of wastes. The general projected types of waste expected to be disposed of at the commercial dump for the project are presented in Table 1 while Figure 1 follows and shows the general location for the commercial dump.

Table 1 Waste Management Matrix

Type of Waste Generated	On Site Storage Method	On Site Storage Location	Disposal Method
Non-Controlled Materials			
Incinerator Ash	Open top drums with sealable lids.	N/A	Incinerator ash will be removed from the incinerator with machinery and hauled directly into the dump.
Scrap Steel	N/A	Waste management area	Segregated and recycled or buried.
Wood - Burnable	N/A	Waste management area	Incinerated.
Kitchen /Camp Waste	Clear plastic bags inside 10'x10' steel clad with a 1" thick steel door with heavy clasp for security.	Within camp	Bin shall be emptied daily and taken to the incinerator for immediate burning.
Construction Waste - drywall, glass, insulation, electrical wire, etc. (non hazardous)	Steel bins.	Waste management area	Bins shall have their contents emptied into the dump and buried.
All tires with a rim size of 24.5 inches or greater.	These tires will be taken directly to the ash disposal area.	N/A	These tires will be buried.
All tires with a rim size of 24.5 inches or less.	These tires will be placed in a segregated area within the waste management area.	Shall be stored in a segregated area determined by managers. Location will be clearly labeled.	These tires will be transported off site to a regulated and permitted dump with tire segregation on an as required basis.
Plastic containers - non hazardous contents	Containers will be inside placed 10'x10' steel clad with a 1" thick steel door with heavy clasp for security. Containers shall be washed out completely and not contain any residual.	Within camp	Bin shall be emptied as required and taken to the incinerator for immediate burning.
Metal containers - non hazardous contents	Containers will be inside placed 10'x10' steel clad with a 1" thick steel door with heavy clasp for security. Containers shall be washed out completely and not contain any residual.	Within camp	Bin shall be emptied as required and taken to the dump to have the contents buried.
Glass containers - non hazardous contents	Containers will be inside placed 10'x10' steel clad with a 1" thick steel door with heavy clasp for security. Containers shall be washed out completely and not contain any residual.	Within camp	Bin shall be emptied as required and taken to the dump to have the contents buried.
Controlled Materials			
Batteries	Lined wooden box	Segregated area at waste management area. Clearly labeled.	Batteries will be placed in an upright position within a 4'x4' box. When the 4'x4' box is full, another will be built and the full box shall be shipped off site to the local Waste Management facility in Whitehorse. Appropriate measures will be taken to ensure batteries remain upright during transport (i.e. waste construction wood will be used as filler to take up extra space).
Used Oil	Used oil will be placed in a 300 gallon container located in a bermed area.	Enclosed tanker.	When the container is full, the oil will either be transported to a waste oil burner onsite or management will contact a local supplier to transport oil to a recycling facility offsite.
Fuel Filters	Open top drums with sealable lids.	Waste management area - segregated special waste storage area.	Residual oil and fuel will be drained from filters into waste oil/fuel storage containers.
Antifreeze	Closed top drums with both bungs.	Segregated lined area at waste management area. Clearly labeled. Bungs sealed tight.	When enough drums are gathered up they shall be palletized in similar groups of 4 and banded together for shipment to the local Waste Management facility in Whitehorse.
Solvents	Closed top drums with both bungs.	Segregated lined area at waste management area. Clearly labeled. Bungs sealed tight.	When enough drums are gathered up they shall be palletized in similar groups of 4 and banded together for shipment to the local Waste Management facility in Whitehorse.

Figure 1 Proposed Commercial Dump Location

4.0 ATMOSPHERIC EMISSIONS

Alexco will implement the following measures with respect to the control of atmospheric emissions:

Fugitive Dust	• Minimize activities that generate large quantities of fugitive dust; • Use dust suppression measures to control any generated fugitive dust to the maximum extent possible such as watering main haul roads (ensuring water quality standards identified for release into receiving waters are met); • Progressively reseed disturbed areas that may contribute to fugitive dust.
Combustion	• Ensure proper maintenance of vehicles, pumps, compressors, generators, and other internal combustion engines to minimize emissions of polluting gases; • Use low sulphur fuels including diesel fuel with a sulphur content <15 ppm and propane with negligible sulphur content and where appropriate, waste heat recovery and energy efficient techniques will be employed to decrease diesel use.

APPENDIX E

PRELIMINARY DECOMMISSIONING AND RECLAMATION PLAN

PRELIMINARY DECOMMISSIONING & RECLAMATION PLAN

BELLEKENO MINE
KENO HILL SILVER DISTRICT

PREPARED BY:

JULY 2009

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1. INTRODUCTION

1.1 PROJECT SUMMARY

Alexco is currently moving forward with the assessment and permitting required for the development of the Bellekeno Mine. However, should advanced underground exploration cease without moving to production, site decommissioning and reclamation would be undertaken as per the Bellekeno Exploration Closure Plan (March 2009). In accordance with Mining Land Use Approval LQ00240, Part 4, the Bellekeno Exploration Closure Plan was prepared to outline the decommissioning and reclamation activities associated with the Bellekeno advanced exploration program. All decommissioning and reclamation work must be completed by the Class 4 MLU Approval expiry date of June 16, 2018, provided the mine does not move to production in the meantime.

However, in all likelihood the Bellekeno Mine will move to production and this Preliminary Decommissioning & Reclamation Plan (DRP) has been developed based on this premise using the previously prepared Bellekeno Exploration Closure Plan as a template.

Upon cessation of mining at Bellekeno, Alexco will remain active on the property for many years undertaking the following activities:

- Development of the Existing State of Mine Closure Plan. Closure and reclamation planning for the entire district will be developed in accordance with the Subsidiary Agreement with Government of Canada and Government of Yukon and once approved this plan will be implemented;
- Continued care and maintenance, including water treatment, throughout the Keno Hill Silver District until the Existing State of Mine Closure Plan is assessed and permitted for implementation;
- Continued exploration throughout the extensive claim block including potential production at other past producing mine sites. Thus, while 3rd party rates will be used for closure costing purposes, closure activities at Bellekeno would in all likelihood be undertaken by Alexco personnel using Alexco equipment; and

- Continued use of the existing camp located at Flat Creek (including water use and wastewater disposal to the septic system) to support the listed activities.

Figure 1-1 shows the general project location within Yukon, while Figure 1-2 shows the location on a smaller scale proximate to Keno City. A certain amount of the footprint of the Bellekeno Mine is taking place on previously impacted terrain and watersheds. Certain procedures and environmental mitigative measures developed for the advanced exploration program have provided information to support the development of technically sound assumptions for this DRP for the Bellekeno Mine. Components of the exploration program overlap with components comprising the Bellekeno Mine.

The Bellekeno Mine consists of the following main components:

- Conventional flotation mill & supporting infrastructure: coarse ore stockpile, plant services, fuel storage area, miners' dry area, offices, trailers, road, portal, underground workings;
- Dry-stack tailings facility (DSTF);
- Bellekeno 625 waste rock storage areas (non-AML WRDA);
- Potentially-AML waste rock storage facilities;
- Bellekeno 625 water treatment facilities;
- Water treatment facility to treat mill wastewater;
- Temporary stock pile locations for mill tailings and mineralized rock;
- Haul roads (ore to Mill; waste rock; tailings to underground or DSTF) – upgrade power line haul road and Christal Lake haul road (from Duncan Creek road to the mill); new Keno City bypass, including new culvert at Lightning Creek;
- Power distribution system (power poles, transformers); and
- Camp.

Please refer to Figure 1-3 for the location of these components.

The closure measures that are expressed herein are based on the general approach and best management practices used by the mining industry today, which has in recent years developed a great deal of experience in different climates and physical circumstances with revelation.

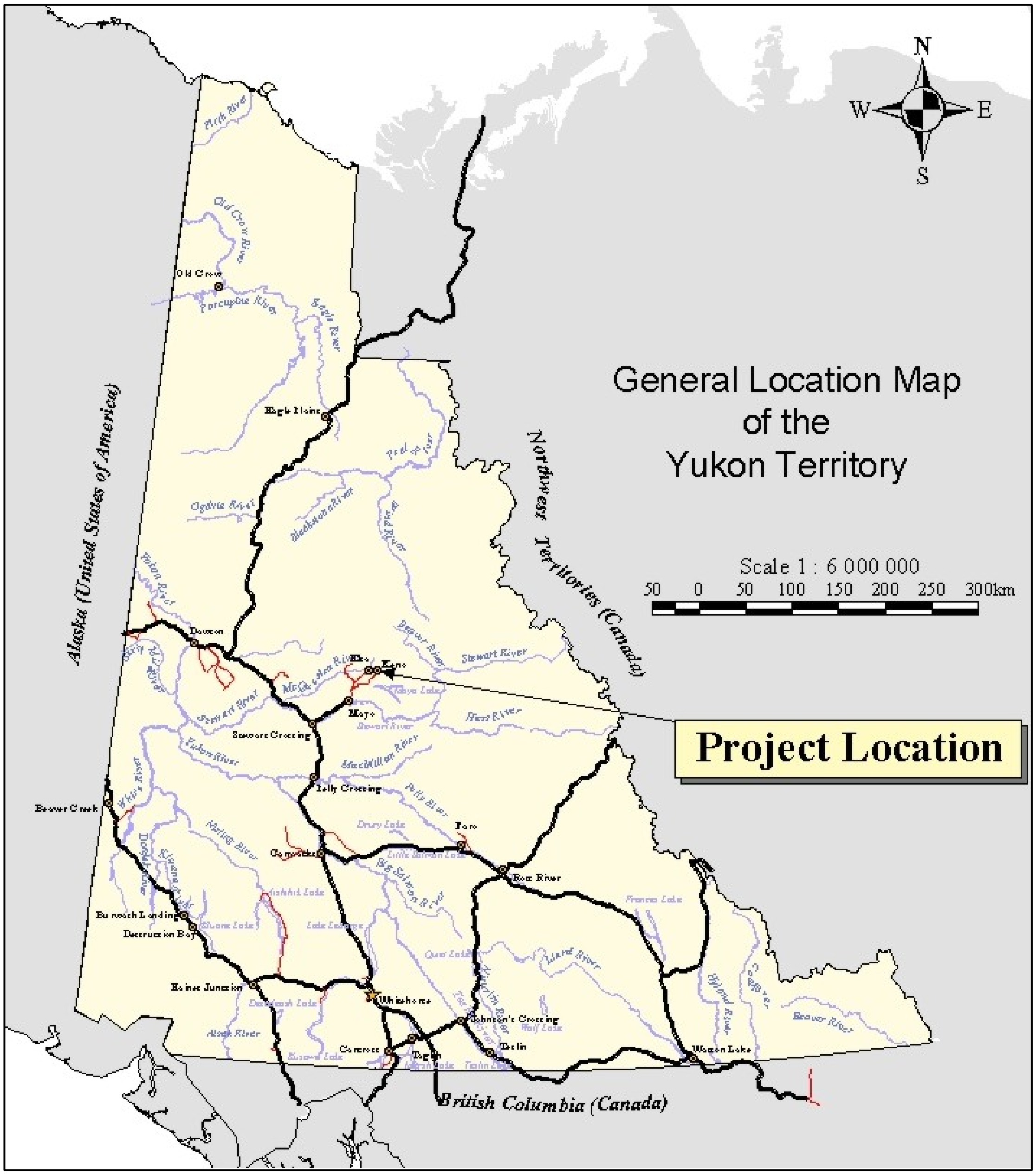
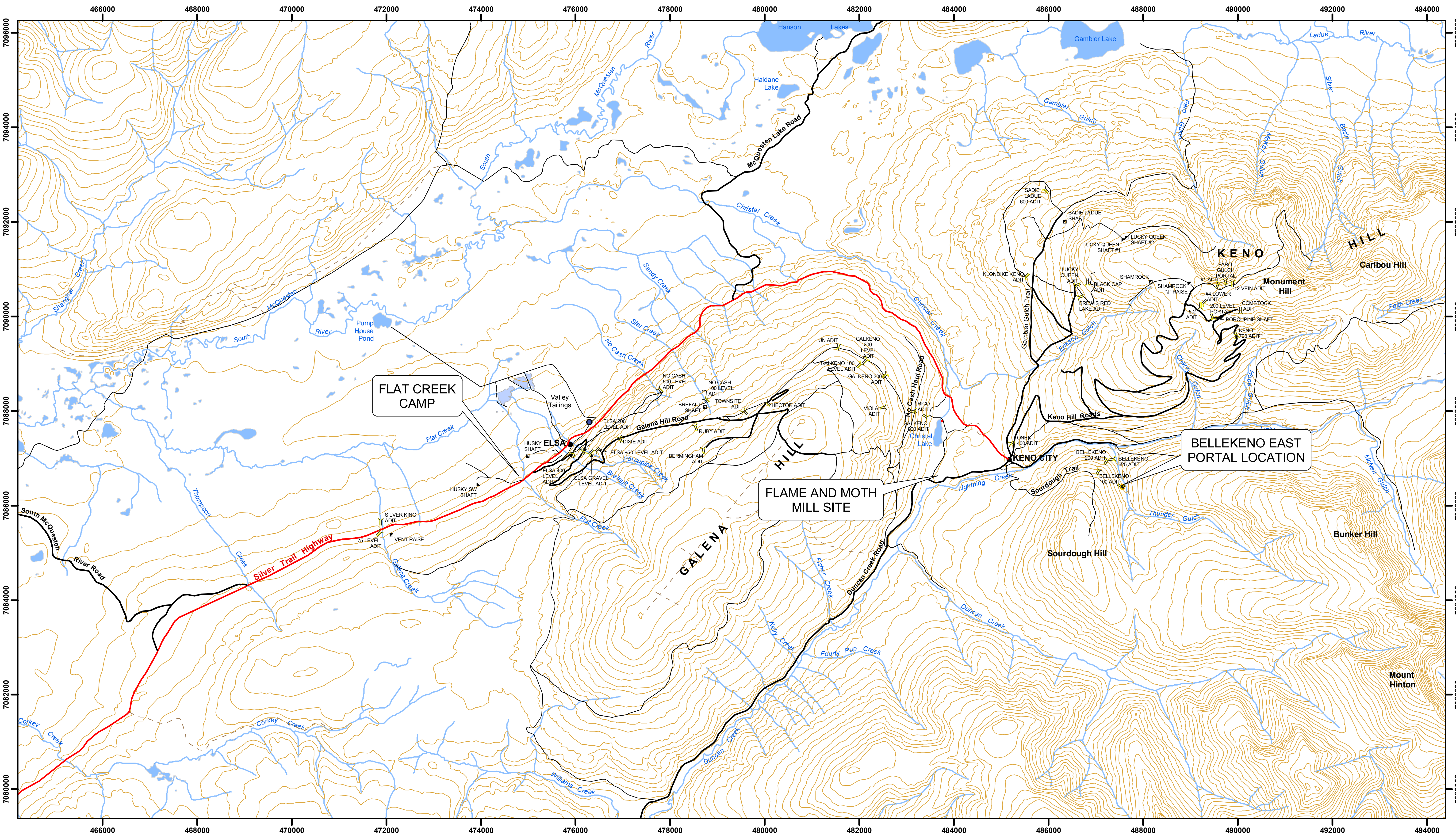


Figure 1-1 General Location Map



N

1:75,000

(when plotted on 11x17 inch sheet)

0 1 2 4 6 km

Legend

Topography

- Town
- Silver Trail
- Secondary Road
- Limited-use road
- Trail
- Watercourse
- Waterbody

Mine Workings

- Adit
- Shaft (to surface - connection to underground not determined)

Notes:
This map is for illustrative purposes only.
This is not a legal document.
National Topographic Data Base (NTDB) compiled by Natural Resources Canada at a scale of 1:50,000. Cadastral data compiled by Natural Resources Canada. Reproduced under license from © Her Majesty the Queen in Right of Canada, Department of Natural Resources Canada. All rights reserved.
Quartz claim boundaries are current as of November 21, 2008.
Data source: http://geomaticsyukon.ca.
Ownership is current as of November 26. Claim status report obtained from the Mining Recorder (Mayo)
Projection: UTM Zone 8 NAD83
NTS Sheet 105M/13 and 105M/14

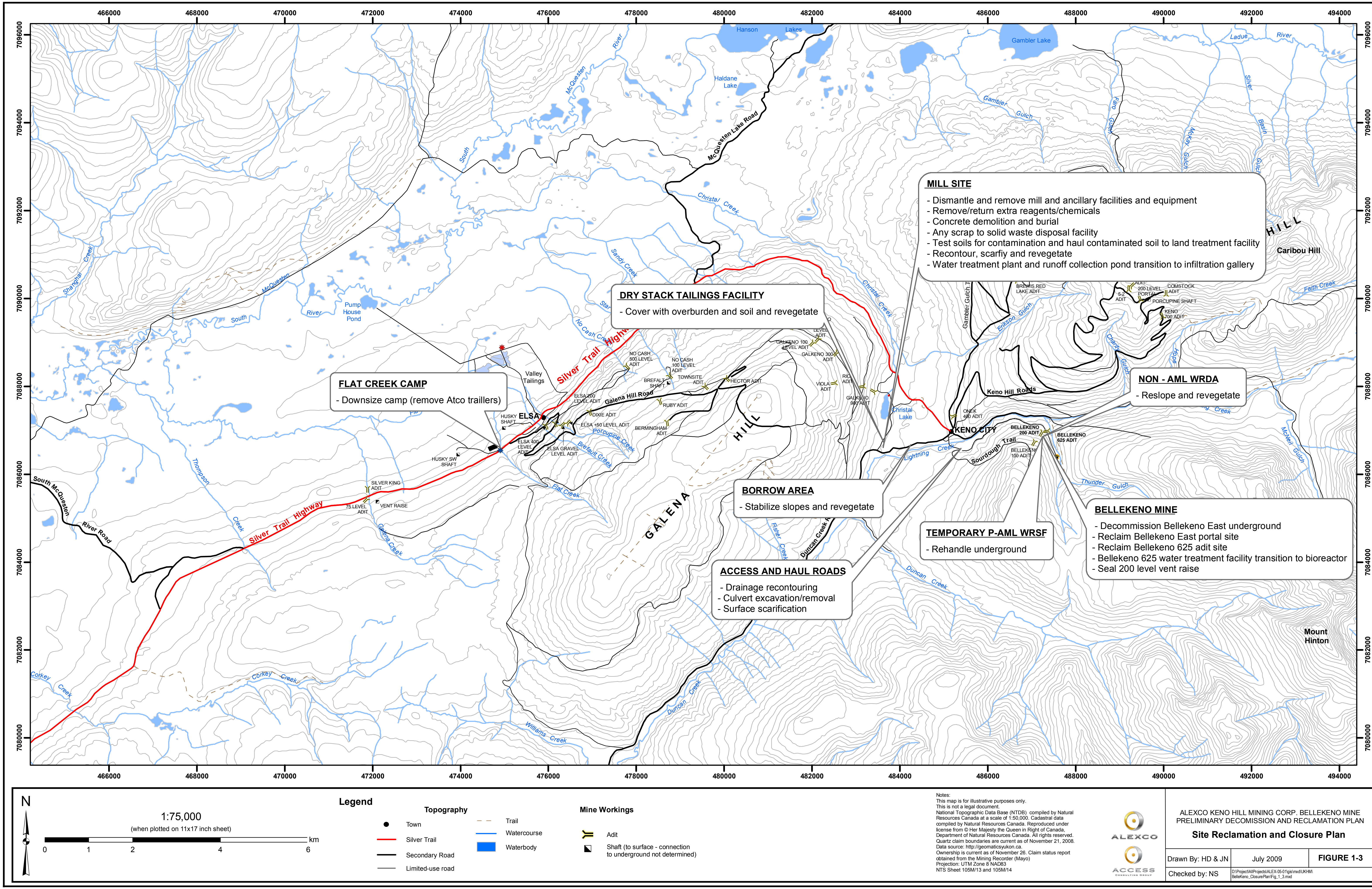
ALEXCO

ACCESS CONSULTING GROUP

ALEXCO KENO HILL MINING CORP. BELLEKENO MINE
PRELIMINARY DECOMISSION AND RECLAMATION PLAN

Property Overview

Drawn By: HD	July 2009	**FIGURE 1-2**
Checked by: NS	D:\Project\AllProjects\ALEX-05-01\gis\mxd\UKHM\PropertyOverview.mxd	


MILL SITE
- Dismantle and remove mill and ancillary facilities and equipment
- Remove/return extra reagents/chemicals
- Concrete demolition and burial
- Any scrap to solid waste disposal facility
- Test soils for contamination and haul contaminated soil to land treatment facility
- Recontour, scarfiy and revegetate
- Water treatment plant and runoff collection pond transition to infiltration gallery
DRY STACK TAILINGS FACILITY
- Cover with overburden and soil and revegetate
FLAT CREEK CAMP
- Downsize camp (remove Atco traillers)
NON - AML WRDA
- Reslope and revegetate
BORROW AREA
- Stabilize slopes and revegetate
BELLEKENO MINE
- Decommission Bellekeno East underground
- Reclaim Bellekeno East portal site
- Reclaim Bellekeno 625 adit site
- Bellekeno 625 water treatment facility transition to bioreactor
- Seal 200 level vent raise
TEMPORARY P-AML WRSF
- Rehandle underground
ACCESS AND HAUL ROADS
- Drainage recontouring
- Culvert excavation/removal
- Surface scarification
ELSA
KENO CITY
GALENA HILL
Caribou Hill
Mount Hinton
Silver Trail Highway
Galena Hill Road
Keno Hill Roads
McQuesten Lake Road
South McQuesten River Road
Christal Lake
Gambler Lake
Hanson Lakes
Haldane Lake
Pump House Pond
Valley Tailings
1:75,000
(when plotted on 11x17 inch sheet)
Legend
Topography
Town
Silver Trail
Secondary Road
Limited-use road
Trail
Watercourse
Waterbody
Mine Workings
Adit
Shaft (to surface - connection to underground not determined)
ALEXCO KENO HILL MINING CORP. BELLEKENO MINE
PRELIMINARY DECOMISSION AND RECLAMATION PLAN
Site Reclamation and Closure Plan
Drawn By: HD & JN
July 2009
FIGURE 1-3
Checked by: NS

1.2 PHILOSOPHY AND INTEGRATION WITH DISTRICT-WIDE CLOSURE PLANNING

Alexco recognizes the importance of developing a DRP for the Bellekeno Mine that is synchronized with the district-wide Existing State of Mine Closure Plan (District Plan) that is currently being developed by the company in conjunction with the Government's of Canada, Yukon, and the NNDFN. Closure objectives, issues, and options are being developed by these four parties in a thorough process that involves field investigations, pilot studies and test work to identify appropriate closure options, supplemented by public consultation, in order to ensure that closure measures with the best potential for success, as viewed by all stakeholders, are selected for implementation.

Closure planning and implementation for the Bellekeno Mine will be incorporated into the overall closure implementation for the Keno Hill District. Although the work in developing the district wide Closure Plan is still in the early stages, preliminary objectives have been developed and are undergoing discussion and refinement concurrently with the design of the Bellekeno Mine. Alexco has presented them in italics below so that reviewers of this document may appreciate the context in which this plan will also be developed:

Keno Hill Mines - Closure Planning
DRAFT Closure Plan Objectives

The following are draft objectives that are intended to guide the development of the Closure Plan for the Keno Hill Mines property. These objectives will be developed in conjunction with the local community and will assist with selection of preferred closure options and implementation of the final plan.

Public health and safety

- *Ensure that the health and safety of people using the land and water are protected*
- *Protect country and traditional food source*

Environment

- *Protect wildlife health and safety*
- *Identify and alleviate adverse environmental effects by protecting key resources such as the aquatic resources of the South McQuesten River*
- *Mitigate significant adverse environmental effects to identified Valued Components (VC's) using a risk based approach*

- *Minimize or prevent adverse environmental impact*

Community Land Use

- *Consider the relevant expectations of stakeholders for post closure land use*
- *Use traditional knowledge in the planning process to protect the culture and traditional pursuits of local First Nations.*
- *Ensure the continued traditional use of aquatic and terrestrial resources*
- *Provide a land use that allows the mine site to continue to be productive in a manner consistent with, although not necessarily identical to local and pre-mining land use.*

Socio-economic

- *Provide economic opportunities for the First Nation residents, local residents and Yukoners in general.*
- *Minimize negative socio-economic impacts in the area*

Cost Effective

- *Provide a closure plan that meets industry standards of best practice*
- *Minimize overall cost of remediation project*
- *Consider, and use where appropriate, technologies that reduce long-term liability and minimize requirements for long-term post-closure care and maintenance.*

The Bellekeno Mine is subject to approvals under the provision of the Yukon Waters Act and the Yukon Quartz Mining Act. The issuance of Water and Quartz Mining Licenses require submission of a DRP. As such, this Preliminary DRP has been developed under the requirements of the Waters Act, Quartz Mining Act and Yukon Government Mine Site Reclamation and Closure Policy.

Alexco acknowledges Yukon Government's mandate and specifications for mine site closure and reclamation. As such, the Company has developed this DRP to address regulatory and government policy for the mine closure. In keeping with its high standards for environmental and social responsibility, Alexco intends to implement an environmentally sound and technically feasible decommissioning and reclamation measures for the Bellekeno Mine. Closure planning and implementation will be undertaken with appropriate environmental care while respecting local laws, first nations agreements, and the public interest and ensuring that the Company's high environmental standards are achieved. Necessary environmental protection measures have been adopted in the development of this Plan to ensure that a healthy environment exists after closure.

To ensure that the overall closure philosophy can be achieved, the following primary closure objectives were emphasized during the development of this plan:

- protection of public health and safety;
- implementation of environmental protection measures that prevent adverse environmental impact by:
  - incorporating progressive reclamation;
  - providing slope stabilization and erosion control on linear and non-linear disturbances;
  - ensuring long-term chemical stability of the waste rock storage areas and components constructed from waste rock to minimize effects to downstream aquatic resources;
  - ensuring the long-term physical stability of key structures such as the dry stack tailings facility, Bellekeno portals, waste rock storage facilities, and access roads;
  - conducting post closure monitoring of the site and adaptive management to assess effectiveness of closure measures for the long term;
- ensuring land use commensurate with surrounding lands;
- meaningful participation of the NNDFN in the planning and progress monitoring of the closure and reclamation activities to ensure appropriate and effective closure measures;
- developing a cost effective DRP that works towards a walk-away closure scenario; and
- passive post closure monitoring and management of the site until considered an environmentally benign site, in which case a walk-away closure scenario will be realized.

These closure principles and objectives work to ensure both physical stability and chemical stability of the site in the long term and are reflective of the guidelines derived from the YG's Reclamation and Closure Policy, the development of which saw contribution from all Yukon First Nations.

It is anticipated that final determination of the effectiveness of closure measures will be the subject of review and concurrence with regulatory agencies. Under the Yukon Quartz Mining Act, the company would then apply for a certificate of closure from Yukon Government.

1.3 SCOPE OF THE CLOSURE PLAN

The approach taken in the presentation of this Plan is to provide an overview of the environmental setting for the Keno Hill Silver District (Section 2) followed by a description of progressive reclamation activities (Section 3). Section 4 then provides a brief description of each component of the exploration program and the closure objectives, measures, and estimated costs related to that component.

Closure objectives can be considered in terms of the following key areas:

- (geo)chemical stability;
- water quality;
- physical stability; and,
- land use, aesthetics and public health and safety.

At closure the facilities for which physical stability must be addressed will be the Bellekeno portals, waste rock storage areas, any access roads not decommissioned, mill pad, and dry stack tailings facility.

2. PROJECT DESCRIPTION

2.1 PROJECT LOCATION AND OVERVIEW

The Bellekeno Mine Project principal mine development activities involve continued underground development and operations at Bellekeno, (located within the Keno Hill Silver District) and building a conventional flotation mill at the Flame and Moth mill site for the processing and production of minerals from the Bellekeno mine. The Keno Hill Mining District is located in the vicinity of Keno City in central Yukon Territory, 354 km (by air) due north of Whitehorse (see previous Figure 1-1). Access to the property is via a paved, two-lane highway from Whitehorse to Mayo (407 km) and an all-weather gravel road northeast from Mayo to Elsa (45 km); a total distance of 452 km. The property lies along the broad McQuesten River valley with three prominent hills to the south of the valley (see Figure 1-2). The Bellekeno area is located about 3 km east of Keno City, while the Flame and Moth Mill site is about 1.2 km to the west.

The following Table 2-1 presents an overview of the Bellekeno Mine Project:

Table 2-1 Bellekeno Mine Project Overview

Bellekeno Mine Project Overview	
Location	3 km east of Keno City, 45 km northeast of Mayo, 354 km north of Whitehorse, YT. Located in the Traditional Territory of the First Nation of Nacho Nyak Dun within the McQuesten River Valley
Land Position	Alexco Resource Corp. and its wholly owned subsidiary Elsa Reclamation and Development Corp. owns 1,563 claims and leases covering an area of approximately 24,262 ha within the Keno Hill Silver District including the Bellekeno Mine project area. Two Fee Simple lots within the Bellekeno Mine project area total 59 ha (Lot 960 and Lot 956)
Mining Method	Year round underground narrow vein cut and fill mining
Mine Life	5 years
Total Project Life	15 years (0 – 5 years construction and mine operation; 6 – 15 years decommissioning and reclamation and closure monitoring).

Bellekeno Mine Project Overview	
Annual Production	Average annual production of 3,300,000 oz silver, 30,000,000 lb lead, and 24,500,000 lb zinc (based on current Preliminary Economic Assessment).
Total Metal Production	Current Life of Mine production of 16,500,000 oz silver, 150,700,000 lb lead, and 122,400,000 lb zinc (based on current Preliminary Economic Assessment).
Ore Production Rate	250 tonnes/day for Years 1-2 and 400 tonnes/day for Years 3-5
Mine Waste Rock	500,000 tonnes of waste rock produced from underground development
Ore Mining and Placement Schedule	Ore mining for 360 days/year Mill Operation 360 day/year 100,000 tonnes of waste material placed on surface each year
Mill Recovery Process	Conventional flotation producing separate lead/silver concentrate and zinc concentrate shipped off site for smelting. Mill location at Flame and Moth pit area Dry stack tailings technology, 50% of dry tailings placed on surface and 50% placed underground as paste backfill. Pyrite removal circuit to remove pyrite from tailings and then placed underground as paste backfill.
Effluent Testing	Metal Mining Effluent Regulations
Work Force	~ 135 production and ongoing exploration; ~ 200 peak (construction)
Airstrip	Mayo, YT
Power	Hydro grid power Yukon Energy, diesel power backup
Water Supply and Use	Water use and discharge within 2 drainages, Lightning Creek and Christal Creek. 245 m^3/day water use, 385 m^3/day water discharge Lightning Creek drainage 68 m^3/day fresh water use, 17 m^3/day water discharge Christal Lake drainage Conventional lime precipitation water treatment
Climate Setting	945 m above sea level Annual Precipitation 413 mm

Bellekeno Mine Project Overview	
	Annual Lake Evaporation 460 mm
Environmental Baseline	Site Characterization Report 1996, ongoing data collection programs through current Type B Water License QZ06-074, QZ07-078, Class Mining Land Use Approval LQ00240
First Nations	First Nation of Na cho Nyak Dun

2.2 CURRENT STATUS

In 2006, Alexco initiated a broad surface exploration program (Class 3 Mining Land Use Approval LQ00186) in the historic Keno Hill silver district with surface diamond drilling focused primarily toward systematic testing of numerous targets, validating and expanding historic mineral resources and acquiring a better understanding of the local geology and ore controls. Based on broadly successful 2006 results, in 2007 Alexco expanded its exploration to a two phase district exploration program; the first phase focused on following up prior results in the area of the historic Bellekeno mine and the second phase continuing the broad information gathering drill program elsewhere across the district. In 2008 Alexco conducted surface exploration at a number of targets throughout the district and proceeded with advanced underground exploration and development at Bellekeno (Mining Land Use Approval LQ-00240, and Yukon Water Board Licence QZ07-078). On July 9, 2008, Alexco released a Preliminary Economic Assessment (PEA) of Bellekeno prepared by SRK Consulting. The positive economics suggested by the PEA have led Alexco to proceed with pursuance of a Quartz Mining Licence and a Type A Water Licence in anticipation of a positive development plan and ultimately a production decision.

The project is presently in the permitting stage with a YESAB Designated Office Evaluation Report issued June 12, 2009 and on July 10, 2009 a YG Decision Document which recommends the project proceed subject to recommended terms and conditions of mitigation measures. This DRP is a part of the permitting stage, and is a necessary requirement for the Quartz Mining License and Water Licence.

3. ENVIRONMENTAL SETTING

Table 3-1 provides an overview of the project area and environmental setting information for the area. This information was compiled from various published and unpublished reports and is not intended to provide a thorough reflection of the environmental setting, but rather a succinct overview of the key environmental parameters.

Table 3-1 Keno Hill Silver District Setting Summary

Region:	Yukon
Topographic Map Sheets:	- NTS 105M/14 & 105M/13
Geographic Location Name Code:	- Keno City
Latitude:	- 63° 54' 32" N
Longitude:	- 135° 19’ 18” W
Drainage Region:	- Stewart River drainage region
Significant Watersheds:	- McQuesten River, Lightning Creek and Stewart River Watershed, Mayo River
Nearest Communities:	- Mayo, Keno City
Road Access:	- Silver Trail Highway
First Nations Traditional Territory:	- Nacho Nyak Dun
Surrounding Land Status:	- YG Land
Special Designations:	- None
Ecoregion:	- Yukon Plateau (North)
Study Area Elevation:	- 945 m asl (Above Sea Level)
Vegetation Communities:	- Northern boreal forests occupy lower slopes and valley bottoms, spruce, pine and alder - Grasses and sedges, mosses occupy forest floor - Heavy moss and lichen growth resident as ground cover understory of shrub willow - Open and forest fringe areas of willow and scrub birch, and various flowering plant species
Wildlife Species:	- Moose, dall sheep, grizzly and black bear, caribou, furbearers, small mammals Various terrestrial bird species including ptarmigan, birds of prey, and migratory species, including waterfowl (snow geese, eagles, peregrine falcon, gyrfalcon)
Fish Species:	- Bering and Beaufort Sea salmonids and freshwater species, including: Arctic grayling, Arctic char, lake trout, trout perch, lake whitefish, broad whitefish, burbot, inconnu, Arctic Cisco, Northern pike
Valued Environmental and Socio-economic Components:	Water quality, Arctic grayling, Chinook salmon, moose, public health and safety, trapping, traditional harvesting, tourism.

4. PROGRESSIVE RECLAMATION

Progressive reclamation efforts will help reduce slope erosion through physical slope stabilization by means of revegetation efforts, enhancing ultimate reclamation success. Progressive reclamation will be undertaken in a manner to ensure that the amount of work required at the end of the mine life to achieve the closure objectives is minimized.

Progressive reclamation limits the environmental liability and thus reduces the ongoing risk carried by the company through:

- providing remediation to reduce or eliminate chemically hazardous material and sources of chemical contamination and other wastes;
- stabilizing potential sources of erosion and sediment release;
- initiating slope stability measures to enable reclamation;
- replanting and reseeding disturbed areas not scheduled for rework;
- reducing the total area requiring reclamation at the end of exploration; and
- reducing closure security requirements as closure liability is reduced progressively.

Progressive reclamation activities will take place at every possible opportunity. Initially these activities are limited to stockpiling surface overburden and soil materials for future use in stabilization and revegetation of disturbed areas resulting from mine construction.

4.1 REVEGETATION

In general, revegetation measures can be grouped into two categories:

- Linear disturbances (roads, cut lines, power lines, etc.) that by their nature are within close proximity to natural seed sources are best prepared by decompacting the surface but allowing the surrounding flora to volunteer seed for the clearing. This has been shown to promote the most biologically authentic and hence natural performing and revegetated sites. The natural revegetation observed on the historic haul roads at Keno Hill probably took many years to become revegetated on a strictly volunteer basis because the road surfaces were compacted from truck traffic, and therefore water and seed had difficulty penetrating the surface, but none the less naturally revegetated. Therefore, simple surface preparation, known as scarification/decompacting, has been shown to produce excellent natural revegetation results and will normally suffice for revegetation. In certain circumstances, however, areas of access roads which may require drainage/erosion control will be assisted with reseeding.

- Areal disturbances (tailings area, mill pad clearing, etc.) tend to require assisted revegetation to promote biologically authentic revegetation in a timely manner. Areas that have been compacted (mill pad and other areas subject to truck traffic) will be scarified/decompacted and reseeded. The dry stack tailings facility will be covered with 0.5 m evapotranspiration soil cover and actively revegetated. Experience at other sites has shown that simple grass seeding may create large open areas of grass species that have the tendency to out-compete woody stemmed vegetation, thereby creating an unnatural 'pasture' in the boreal forest. Therefore, revegetation of these sites is focused on stabilizing the surface from erosion but allowing natural succession (willows, etc).

5. CLOSURE MEASURES

This section presents a discussion of the closure objectives and measures associated with the various components slated for reclamation (reclamation components) at the Bellekeno Mine. It is worth noting that some elements of this plan have already been developed, reviewed and approved under Mining Land Use Approval LQ00240 (such as closure measures for the Bellekeno East portal reclamation, mine access road, waste rock storage area), and security has been provided to cover the anticipated costs. These measures are repeated here with up-to-date information and costs (Section 6).

Decommissioning and reclamation measures will be reviewed regularly to ensure conformity with site wide objectives, issues and closure measures that are developed during the district wide Closure Plan discussed above. As the Decommissioning and Reclamation Plan is updated in the future, site conditions and development activities will be refined based on detailed engineering that will be required to construct facilities. It is proposed that mine development will be sufficiently advanced so that the Detailed Decommissioning and Reclamation Plan can be developed within two years of mine start up for actual as-built features and structures.

The approach to each subsection is to present a brief description of each component and related facilities with potential closure objectives and planned closure measures to ensure long term physical and chemical stability.

Summaries of the various closure measures are provided for features or groups of features shown in Figure 1-3 and discussed below.

The disturbed area has been divided into reclamation components as follows:

- Bellekeno Mine;
- Waste Rock Storage Facilities;
- Roads;
- Camp Downsizing;
- Mill; and

- Dry Stack Tailings Facility.

In addition to the closure measures proposed in the following sections, the *Yukon Mine Site and Reclamation Closure Policy* Technical Guidelines also provide direction on reclamation and closure objectives for key features of a mine. The Technical Guidelines applicable to the Bellekeno Mine and the Guidelines main objectives are listed in Table 5-1. The Guidelines themselves may be referenced for principal legal requirements, policy detail pursuant to the Yukon Mine Site Reclamation and Closure Policy, as well as possible strategies for achieving the desired objectives, which have been considered in the development of this DRP.

Table 5-1 Yukon Mine site and Reclamation Closure Policy Technical Guidelines Applicable to the Bellekeno Exploration Program

Technical Guideline #	Topic	Objectives
T-01	Water Retention & Sediment Control Structures	To ensure decommissioning of water retention and sediment control structures, and the appurtenances, in such a way that drainage at, and adjacent to the side, is stable in the long term.
T-02	Watercourses	Restore watercourses to meet current water management objectives.
T-03	Water Quality	To prevent contamination of receiving environments.
T-04	Site Contamination	To prevent exposure to and mobilization of substances that pose a risk to human health and the environment through physical and chemical stability.
T-05	Acid Rock Drainage Potential	Walk away scenario with respect to acid rock drainage and metal leaching. Reliance on long-term active treatment is not considered acceptable for reclamation and closure planning.
T-06	Tailings Management	To ensure physical and chemical stability for the long term and eliminate the need for long term active treatment.
T-07	Underground Workings & Openings to Surface	To meet water quality objectives. Except for authorized access, prevent inadvertent or intentional underground access that may be a hazard to humans and wildlife. Prevent subsidence or other changes in the topography that may result in a hazard to humans and wildlife.
T-08	Terrain Hazards	Remaining terrain hazards should present no more significant hazard to people and wildlife than is present in the surrounding vicinity.

Technical Guideline #	Topic	Objectives
T-09	Mine Rock Piles	Reclaimed rock piles and dumps must be physically and chemically stable in the long term to prevent erosion, subsidence or collapse, and such that dump runoff and surface drainage meet legal requirements.
T-10	Roads & Other Access	Protection of public safety is key objective. In decommissioning linear infrastructure the intention is to enable human and wildlife utilization in the area to revert to pre-development levels and types, all other factors being equal. If, however, an alternate future land use has been identified for the site, or population in the area has increased, alternative objectives may be identified in the approved reclamation and closure plan.
T-11	Erosion Control	Objective of erosion control is physical stability, such that upon closure, slopes, excavations and other disturbed lands are in a condition that will limit the incidence of soil erosion, slumping and other instabilities that are likely to impede revegetation of a reclaimed site, pose a threat to public safety, lead to wildlife mortality, or cause excessive sediment loads to enter nearby water bodies.
T-12	Revegetation	To ensure physical stability and to prevent a temporary loss of wildlife habitat utilization from becoming permanent, through the re-establishment of a vegetative mat (food source, hide, etc.) leading to self-sustaining native vegetation.
T-13	Mine Infrastructure	The objective following closure is to ensure physical stability and to remove potential threats to public health and safety; including identification and removal of hazards and hazardous materials.
T-15	Temporary Closure Site Conditions	To ensure public health and safety and protection of the environment in the event of a temporary closure and to manage risks associated with the potential abandonment of a site.
T-16	Geological Values & Heritage	Ensuring post-closure access to geological information identified leading up to and during mineral development and production at a mine site.

5.1 BELLEKENO MINE

Decommissioning and reclamation of the Bellekeno East portal and Bellekeno 625 adit sites will be undertaken. This includes Bellekeno East underground and portal site and Bellekeno 625 adit site and treatment facility, as well as the 200 level vent raise.

5.1.1 Closure Objectives

The objective for decommissioning mine infrastructure is to ensure physical stability and management of the mine pool. Potential threats to public health and safety will be removed, including restricting access and identification and removal of hazards and hazardous materials. Concern regarding physical stability of infrastructure at closure will be mitigated for the most part through disassembly and removal from the site and by barricading underground access. The mine pool will be managed by transitioning from actively treating adit discharge to sealing the adit and installing a contingency passive treatment system. Additional chemical stability objectives would be associated with any soil contamination by fuel, chemicals or other wastes.

5.1.2 Closure Measures

<u>Bellekeno East</u>

At closure, underground equipment (e.g. paste plant, switch gear, electrical, hydraulic control structures) will be removed from Bellekeno East and the potentially AML waste rock stockpile will be rehandled back underground to be deposited below rest water level. The Bellekeno East adit opening will be blocked to protect human health and safety and prevent wildlife access. See Figure 5-1 for a depiction of the proposed method of inserting rockfill for closure of the Bellekeno East portal. This method, in use at other northern Canadian mines, allows for movement of water and air through the opening, as well as allowing for any movement of rock walls, to prevent failure as would occur with a concrete plug for example. An adit decant channel will not be constructed as any water leaving the mine workings will flow via the Bellekeno 625 adit which is connected to the Bellekeno East decline. Reclamation measures for the Bellekeno Mine are predicated on the fact that the static water elevation will not reach the elevation of the Bellekeno East portal and therefore this portal will not discharge water. As such the sediment ponds constructed at Bellekeno East for development of the decline will be progressively reclaimed prior to mine closure.

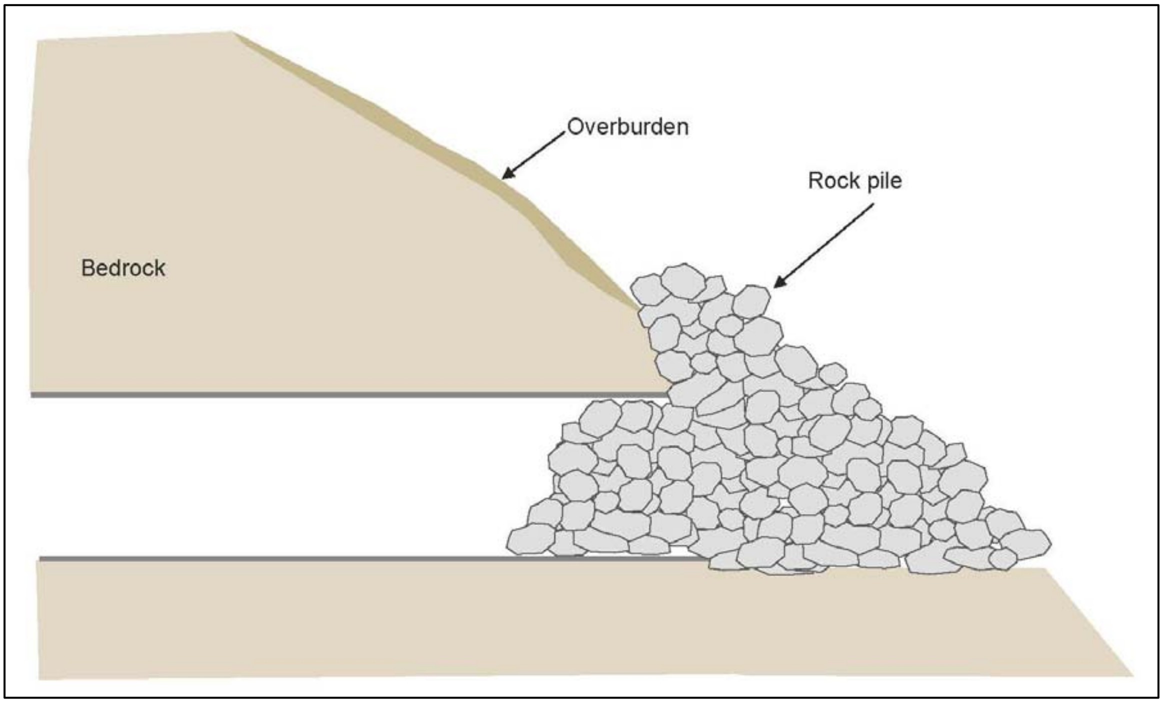


Figure 5-1 Conceptual Bellekeno East Portal Closure Rock Pile

Reclamation of the Bellekeno East portal site will include removal of the shop and other buildings (e.g. explosives and cap magazine). Fuel tanks will be cleaned and removed along with liners for reuse or landfill. Any additional debris will also be removed for reuse or proper disposal. All solid waste will be disposed of in accordance with the *Solid Waste Regulations*. Alexco has a permitted commercial solid waste facility located in Elsa. All waste petroleum products and any other special waste, as defined in the *Special Waste Regulations* will be disposed of in accordance with the Regulations. Any soils contamination will be documented through a final site contamination assessment. Contaminated soil would be removed and/or remediated in an approved manner (i.e. land treatment facility in Mayo or Elsa if one is developed there). The portal site would then be recontoured and scarified to facilitate revegetation and establish drainage (revegetation at the Bellekeno East portal site has already been undertaken). Signage will be installed to indicate the portal presence.

Bellekeno 625

Without continued dewatering and pumping after closure, the static water elevation of the Bellekeno Mine will rise and flow out the Bellekeno 625 adit. Therefore the closure measures presented for the 625 adit are predicated on a hydraulic concrete bulkhead to retain the mine pool while at the same time allow controlled discharge from the plug for additional circulation or treatment as necessary. A typical concrete plug design is shown in Figure 5-2. The size of this opening is approximately 2.5 m x 2.5 m.

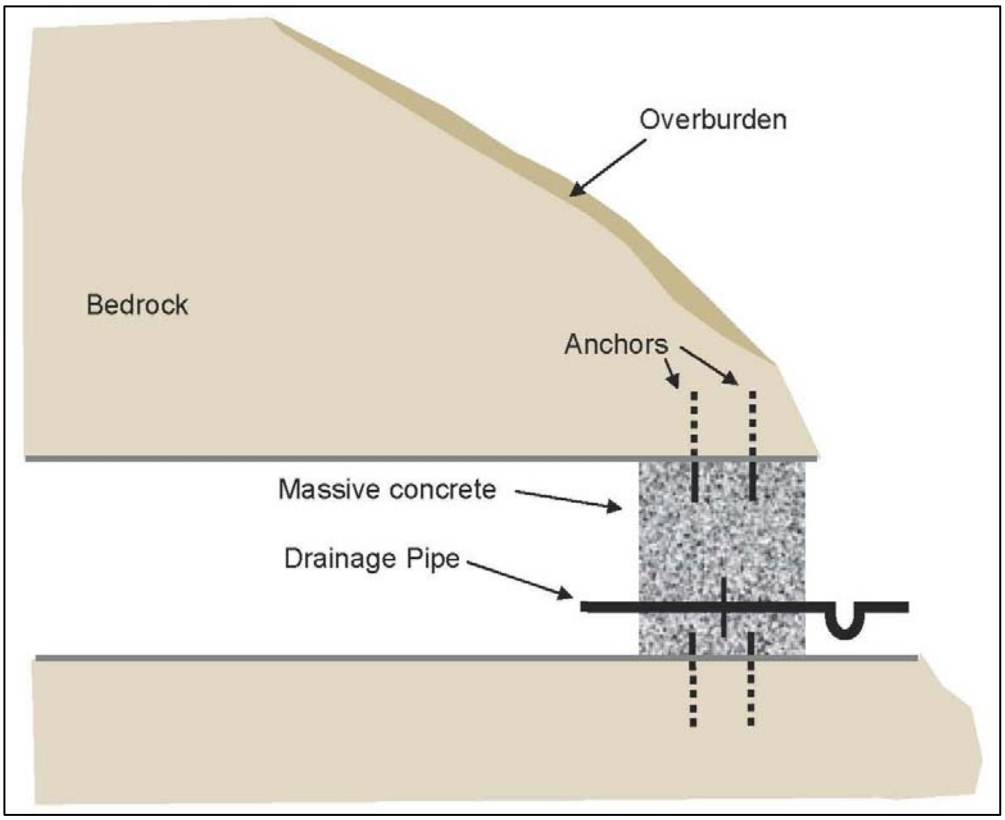


Figure 5-2 Conceptual Bellekeno 625 Adit Bulkhead

The following steps will be undertaken to decommission the Bellekeno 625 adit and treatment facility:

- A detailed hydrogeologic study of the Bellekeno Mine will be required to determine the final elevation of the static water.
- Depending on final engineering designs for the bulkhead, underground rehabilitation is anticipated. The bulkhead would be put into place as the mine pool is allowed to flood (estimated to take 6 – 9 months if not longer). Instrumentation in the form of a pressure gauge would be installed to assist with monitoring of the mine pool.
- Depending on water quality of the flooded Bellekeno Mine, in mine pool treatment using a carbon source such as molasses will be implemented to reduce soluble metals (zinc) loads. The mine pool would be accessed through the Bellekeno East decline, which would not be blocked until Bellekeno 625 has been adequately decommissioned.
- Additional polishing treatment if necessary will be conducted in the existing 625 treatment facilities, which will remain in place for an estimated 2 years for this purpose. Another option for additional treatment would be to recirculate water from Bellekeno 625 around and back into Bellekeno East for further in mine pool treatment.
- Once metals levels and conditions in the mine pool stabilize, the existing Bellekeno 625 water treatment facility will be decommissioned and a passive contingency treatment system constructed. There will be a transition period from active chemical treatment to a passive biological treatment system. Salvageable equipment will be removed along with extra reagents/chemicals. Settling ponds sediments/sludge will be disposed of as per the Sludge Management Plan and liners removed to the landfill.
- The ethanol-based, gravel infiltration gallery bioreactor currently in operation and demonstration at Galkeno 900 will be developed and operated at the site for an estimated five years.

As with Bellekeno East, reclamation of the Bellekeno 625 adit site will include removal of buildings (e.g. lab). The shop, loadout facility, compressor shack, and electrical substation and transmission line will be addressed under the District Plan and in discussion with INAC and YG respecting terrestrial liability. Any additional debris will also be removed for reuse or proper disposal. All solid waste will be disposed of in accordance with the *Solid Waste Regulations*. All waste petroleum products and any other special waste, as defined in the *Special Waste Regulations* will be disposed of in accordance with the Regulations. Any soils contamination will be documented through a final site contamination assessment. Contaminated soil would be removed and/or remediated in an approved manner (i.e. land treatment facility in Mayo or Elsa if one is developed there). The adit site would be recontoured and scarified to facilitate natural revegetation and establish drainage. Signage will be posted to indicate the presence of an adit.

<u>200 Level Vent Raise</u>

The 200 level vent raise will be capped with an engineered concrete cap similar to what is used at mines elsewhere in Canada. This cement plug will restrict physical entry and prevent air movement and possible ice plug formation at the Bellekeno 625 adit.

5.2 WASTE ROCK STORAGE

Potentially and identified AML waste rock from mine development activities is currently being placed in a temporary waste rock storage facility (WRSF) which exists south of the Bellekeno East portal (Figure 1-3).

Additional permanent potentially AML waste rock storage facilities will be constructed at alternative locations yet to be determined. Final engineering design of these facilities by EBA Engineering Consultants has been approved by YG, Energy Mines and Resources as per Mining Land Use Approval LQ00240.

Rock that is not potentially acidic or metal leaching, or “non-AML” will be deposited in a waste rock disposal area (WRDA) along the northeast flank of Sourdough Hill, northwest of the current Bellekeno 625 waste rock storage areas.

5.2.1 Closure Objectives

At closure, the physical and chemical objectives for the waste rock storage facilities and disposal areas are erosion control and geochemical stability.

5.2.2 Closure Measures

Temporary Potentially AML WRSF – Bellekeno East

This facility will be used to the extent possible during the life of mine (five years) and at closure, potentially AML rock will be rehandled back underground (Section 5.1.2). The liner will be removed and the area recontoured and revegetated.

Permanent Potentially AML WRSF

Additional, permanent WRSFs for potential AML waste rock will be constructed at alternative sites in accordance with the approved engineered designs. Waste rock will be recontoured as necessary, although waste rock deposit protocols will be developed with closure measures in mind. The facilities will be covered with a low permeable cover to prevent meteoric water from entering the cell as well as growth medium to form a 0.5 m cover that would be seeded to promote vegetative growth.

Should the need arise prior to cover placement, accumulated water will be educted using a vacuum truck and transported to either the Bellekeno 625 treatment facility or the mill site for discharge, and treatment if needed.

Non-AML WRDA – Bellekeno 625

Preliminary engineering design by EBA Engineering Consultants Ltd. of the linear benched waste rock disposal area (WRDA) to be developed adjacent to and to the east of the Bellekeno 625 adit has concluded that no additional contouring is required upon closure with regard to stability. However, in order to further increase stability and improve aesthetics, Alexco will recontour the WRDA by pulling the crests back with an excavator followed by scarification and revegetation. The final overall (crest to crest) slope of the WRDA will be 3H:1V.

A toe buttress may be required along the alluvial terrace below the toe of the WRDA which was previously placer mined. This contingency may be necessary to improve the overall stability of the embankment in the event of an earthquake, or other seismic event. Adequate backfilling or re-contouring by the placer miner may alleviate this concern, but this should be re-examined at closure.

Borrow Areas

Borrow material will be required for construction of WRSF liners and any borrow areas used will be reclaimed through slope stabilization and revegetation.

5.3 ROADS

All roads either developed new or reconstructed/upgraded from existing roads will be subject to standard road decommissioning and reclamation measures at closure. These include:

- the newly constructed haul road between BK East Portal and BK 625 Adit;
- the upgraded power line haul road;
- the new Keno City bypass including a new culvert at Lightning Creek; and
- Christal Lake road (from Duncan Creek road to the mill).

These roads will be resloped and scarified, culverts removed and seeded in areas where erosion control is necessary.

5.3.1 Closure Objectives

The primary consideration for the physical stability of roads at closure will be slope stability where culverts have been removed and intermittent drainage channels have been established through the road alignments which could lead to localized erosion.

5.3.2 Closure Measures

Standard road decommissioning and reclamation measures at closure include culvert removal, resloping banks and removal of the safety berm to reflect the natural topography as well as provide stability, and surface scarification to encourage natural revegetation. Regrading/contouring the roads will ensure that runoff sheds off the road surface. Localized seeding will take place where erosion control is necessary. A typical haul road and site road reclamation cross-section is shown in Figure 5-3.

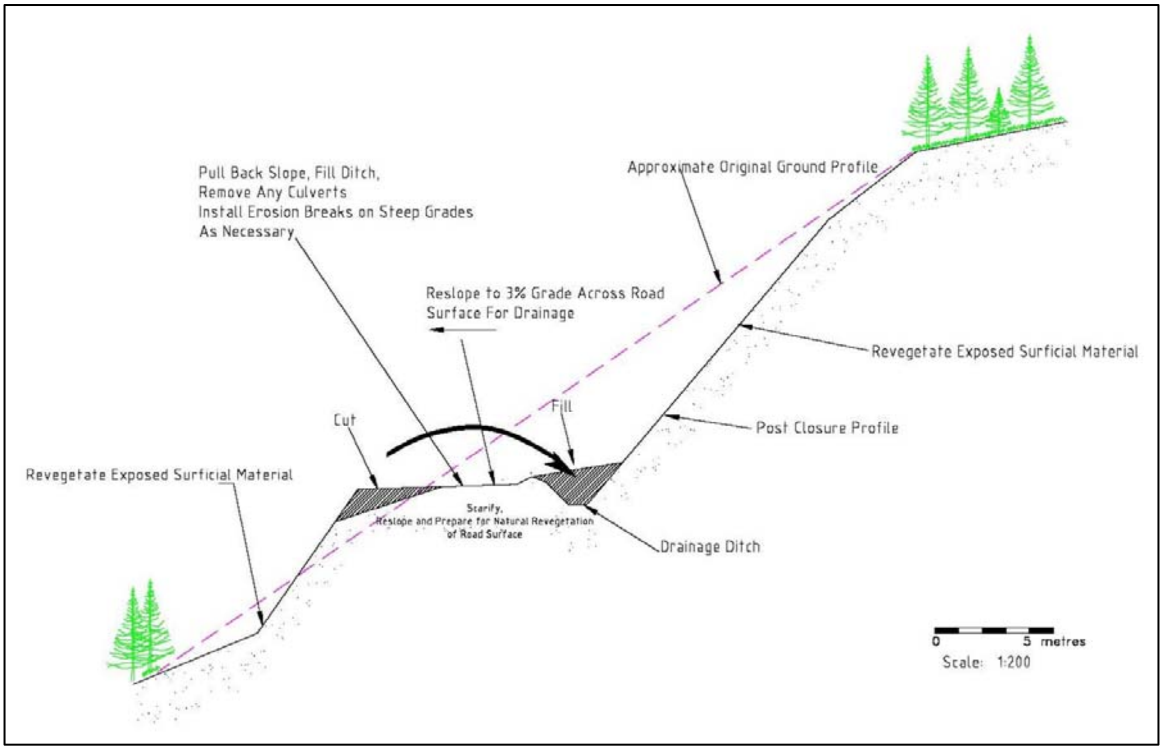


Figure 5-3 Haul Road and Site Road Typical Reclamation Cross-Section

5.4 CAMP DOWNSIZE

The camp has been expanded (roughly doubled in size) to accommodate mine contractors and drilling crews required for the advanced exploration program, and this expansion is expected to increase once again another approximately 20% to house mine construction workforce.

5.4.1 Closure Objectives and Measures

Closure objectives and measures include dismantling and removal of five trailer units to Lot 960. The expanded septic system, along with the increased freshwater supply will remain in place for continued use by the downsized camp.

5.5 MILL PAD AREA AND ANCILLARY FACILITIES

The mill pad location will be built at the Flame and Moth mill site. Ore produced during mining will be shipped to the Flame and Moth mill site coarse ore stockpile, with a separate area for high grade ore that has been designated as direct shipping ore. Selection of the mill site location has been made in consideration of the potential to use the mill for production from future producing mines. Although the mill and related infrastructure may be retained as-is and where-is for use in mining other deposits after Bellekeno is depleted, costing for mill closure is provided these plans are not complete. The closure concepts developed here assume that the site will no longer be used after the current Bellekeno mine life.

5.5.1 Closure Objectives

The objective for decommissioning the mill and ancillary facilities is to ensure physical stability and management of run-off. Potential threats to public health and safety will be removed, including identification and removal of hazards and hazardous materials. Concern regarding physical stability of these structures at closure will be mitigated for the most part by their disassembly and removal from the site. Management of surface run-off will be accomplished by transitioning from active treatment to a passive infiltration system. Additional chemical stability objectives would arise primarily from contamination of surrounding soils by metals, fuel and reagents.

5.5.2 Closure Measures

The entire mill complex and ancillary facilities (i.e. crushers, conveyors, mill equipment, trailer units, fine ore bin) will be removed from the site. Extra reagents or chemicals will be loaded up and returned to the supplier where possible. Concrete footings will be demolished and buried in situ. Any additional debris will also be removed for reuse or proper disposal. All solid waste will be disposed of in accordance with the *Solid Waste*

Regulations. All waste petroleum products and any other special waste, as defined in the *Special Waste Regulations* will be disposed of in accordance with the Regulations. Any soils contamination will be documented through a final site contamination assessment. Contaminated soil would be removed and/or remediated in an approved manner (i.e. land treatment facility in Mayo or Elsa if one is developed there). The pad area will have its embankment shoulders re-graded to prevent water ponding, and the surface will be scarified and reseeded to promote vegetative cover.

Ore stockpile pads will be concrete or rolled concrete pad, with steel rails (mine tracks) embedded for ease of rehandling ore with loader bucket. It is expected that at closure the material beneath the ore stockpiles will be processed through the mill to remove any remaining economic values as well as eliminating any potential contaminant of concern from the material. The impermeable rehandling pads will be demolished and buried once cleaned of all metal contaminants.

The mill runoff collection pond and treatment plant operation will be decommissioned and an infiltration gallery constructed. Any impounded water in the collection pond will be pumped down and sediments/sludge characterized and appropriately disposed of. The sediment pond dyke would be breached, and slopes recontoured and stabilized with erosion barriers. The discharge pipeline would be removed, diversion ditches recontoured and the area revegetated.

5.6 DRY STACK TAILINGS FACILITY

The dry stack tailings facility (DSTF) will be located adjacent to the mill site with approximately 50% of tailings stored in the facility. The DSTF will be progressively constructed and reclaimed over five years as tailings are generated by the mill. A portion of the DSTF will be built on an ongoing basis each year. In the summer of each year, granular material will be hauled and placed as a cover for the portion of the DSTF that is not actively being constructed.

5.6.1 Closure Objectives

In the closure of a DSTF, objectives to be met include:

- physical stability (erosion and dust control);
- geochemical stability;
- water management;
- reducing water infiltration with an evapotranspiration cover and revegetation; and
- decommissioning of the sediment ponds.

5.6.2 Closure Measures

Although the DSTF will be built in compacted 1 to 2 foot lifts to limit water penetration, closure measures will include covering the stack with an approximately 0.5 meter thick evapotranspiration cover. This cover will be fertilized and seeded to encourage revegetation. This cover will limit water migration through the stack.

Diversion (interceptor) ditches and collection ditches will be resloped and allowed to naturally revegetate.

If monitoring during operations indicates that treatment will be required for meteoric water after closure, a passive bioreactor treatment system will be constructed at the site immediately down slope from the DSTF. The area at the toe of the DSTF occupied by the runoff collection pond and polishing pond during operations can be reconstructed and used for the development of a gravel infiltration gallery, ethanol-based bioreactor cell (similar to the one currently in use at Galkeno 900 adit across Christal Lake). The operational phase active lime water treatment plant will be removed once active treatment is no longer required.

6. CLOSURE MANAGEMENT AND MONITORING

The closure phase of the Bellekeno mine will commence with the cessation of economic mining. Closure management and monitoring of the site will be guided by licence requirements, the performance of physical structures remaining on site and the ability to achieve and demonstrate long-term compliance with effluent discharge standards. Once overall closure performance has been demonstrated for all aspects of decommissioning, the necessity of maintaining licences or permits would be examined. At this point, a Certificate of Closure, under the Quartz Mining Act would be requested. The following sections provide a general outline of the site management approach that will be taken at the Bellekeno mine during the closure phase.

Care & maintenance personnel will be on-site to implement decommissioning and reclamation tasks. Generally these tasks entail closure of mine components, salvage and removal of infrastructure, equipment and reagents, maintaining contingency water treatment facilities, decommissioning of roads and reclamation and revegetation of disturbed lands. A site contamination assessment plan will be prepared leading up to closure which:

- Locates through a site investigation program all contaminated material, if any, on the mine site arising from any operation, transportation, storage, handling or processing;
- Characterizes the type, level and horizontal and vertical extent of the contamination; and
- Proposes methods for dealing with the contamination.

These activities would be undertaken on a seasonal basis and directed by an on-site manager responsible for decommissioning and reclamation of the Bellekeno mine.

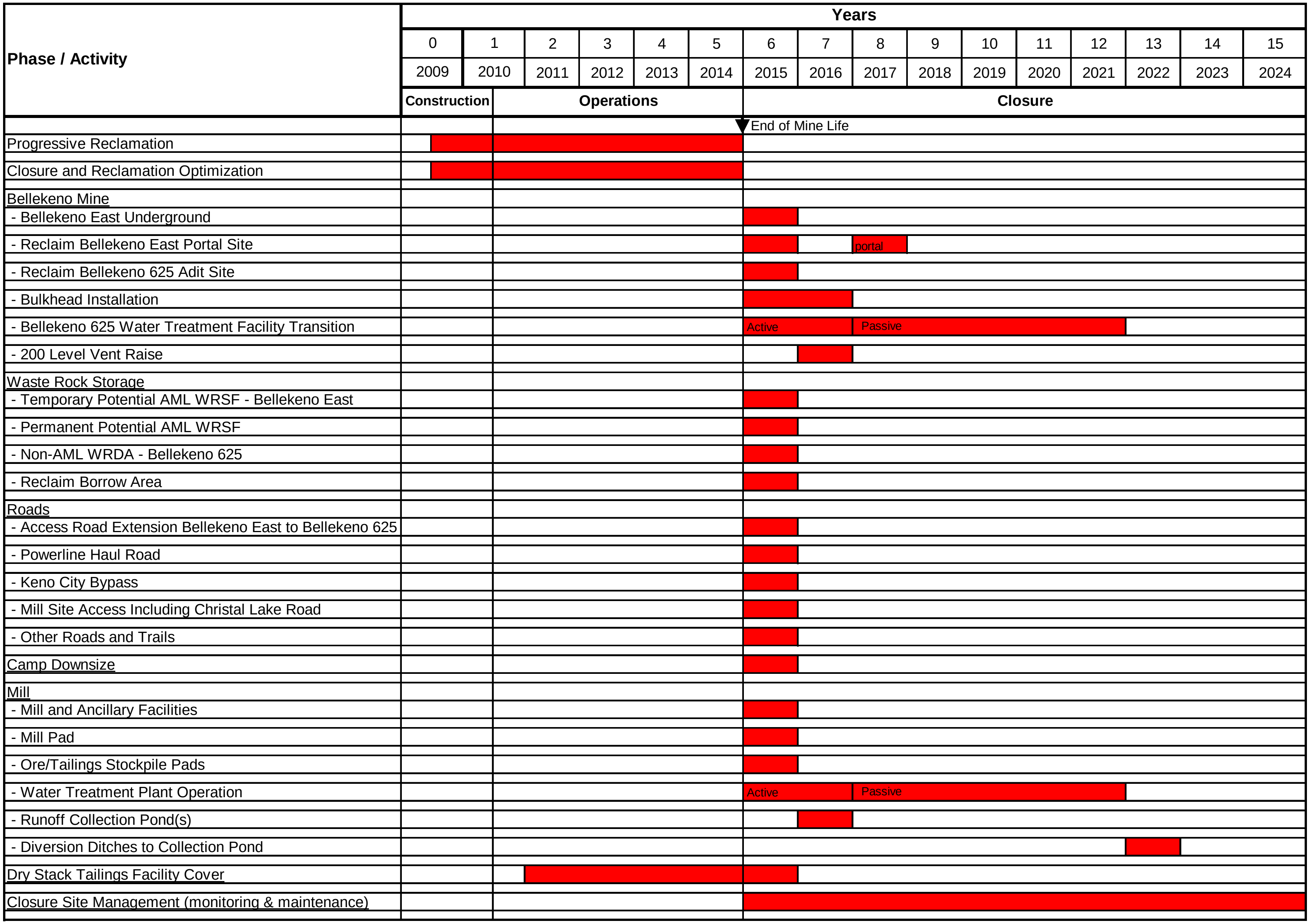
During site decommissioning, camp accommodations would be available to support site personnel. As other activities will continue to be undertaken in the Keno Hill Silver District a site caretaker or security personnel will not be required.

6.1 DECOMMISSIONING AND RECLAMATION IMPLEMENTATION SCHEDULE

Progressive reclamation will begin during operations to promote slope stabilization and reduce erosion during the life of the mine. Disturbed slopes will be stabilized and revegetated. Progressive reclamation of the DSTF cover will occur for the most part during operations.

Mine decommissioning and reclamation including removal of equipment and infrastructure will mainly take place during the first year of mine closure. The Bellekeno 625 and mill water treatment facilities will be transitioned from active to passive treatment which will take place over the course of a few years. Please see Figure 6-1 which shows the project decommissioning and reclamation schedule.

Figure 6-1 Bellekeno Mine Decommissioning and Reclamation Schedule



6.2 CLOSURE MONITORING AND MAINTENANCE

It is assumed that monitoring activity will be required to determine the ongoing and continued success of closure measures in meeting the closure objectives, for a period of 10 years. The adaptive management approach (Section 6.3 below) will be used to determine if criteria triggers for remedial action have been triggered, and then the success of the remedial measures will need to be incorporated into the monitoring and surveillance regimen.

At the time of closure, monitoring would continue to be undertaken by an Environmental Monitor:

- Continued water quality sampling at monitoring stations identified in the Type A Water Licence ;
- Monitoring of road bank and drainage along access road;
- Physical inspection of tailings area;
- Physical inspection of the passive water treatment;
- Physical stability of all waste rock storage areas;
- Success of revegetation measures where employed (principally portal area and mill pad area);
- Integrity of covers (potentially-AML WRSF and DSTF); and
- Physical inspection of impacted earthen surfaces for evidence of erosion, gullying, or sediment transport to watercourses.

The condition of permafrost beneath the WRDA will be monitored throughout operation and at least 10 years past closure. The requirement for ground temperature monitoring will be reviewed 10 years after closure. An annual geotechnical inspection should be conducted on the WRDA for at least 5 years after closure. The requirement for an annual geotechnical inspection will be reviewed 5 years after closure.

6.3 ADAPTIVE MANAGEMENT STRATEGY

To address risks or hazards over the short term, an adaptive management strategy is required in the event conditions reach a point where management actions are required. Adaptive management planning (AMP) is a recognized and effective tool to ensure that changing site conditions are not subject to static reclamation initiatives, and that closure measures can be adapted to these conditions to achieve desired performance. The adaptive management approach will be used to determine if indicators for remedial action have been triggered. The success of remedial actions would then be incorporated into the monitoring and surveillance regimen.

An Adaptive Management Plan has been developed for the entire Keno Hill Silver District which provides adaptive management implementation protocol for the Company and includes provisions for monitoring at Bellekeno. During the decommissioning phase, environmental and physical compliance monitoring and inspections will continue according to the site-wide Environmental Monitoring Program and Adaptive Management Plan.

6.4 TEMPORARY CLOSURE

In the event of a premature closure, the following monitoring and "care and maintenance" activities (focussed on a temporary closure scenario occurring after mine start-up) will be instigated. In the unlikely event that a temporary closure scenario occurs prior to mine start-up, these proposed temporary closure measures will be applied where applicable to maintain the existing site infrastructure.

Alexco's priority during any temporary closure scenario will be to ensure that the site remains geochemically and physically stable, secure and safe, monitored and in compliance with applicable licences and legislation. This will include initial stabilization and ongoing routine monitoring and maintenance of the site infrastructure and facilities until mining recommences or full closure is initiated.

Table 6-1 provides a summary of the various project components and associated inspection and maintenance activities during any temporary cessation of mining activities.

6.4.1 Physical Stability and Geochemical Stability

Stabilization of site works during any temporary closure will be addressed initially well in advance of any closure scenario through the Company's commitment to progressive reclamation and stabilization measures. Progressive reclamation will be implemented on an ongoing basis (Section 4) to fulfil the Company's commitment to maintaining site stability and reclaiming areas as soon as operationally possible, therefore reducing both financial and operational liability.

Site infrastructure, including primarily buildings, equipment and machinery, will be emptied/drained of hazardous reagents and process fluids where appropriate and stabilized for temporary closure based on recommendations from mechanical and chemical suppliers, contractors and engineers. This includes the removal of all hazardous wastes, including waste hydrocarbons, coolants, lubricants, mill reagents and process chemicals. The bulk explosives inventory will be removed from site and explosives storage containers and facilities will be inspected regularly. In the event of suspended operations, the Bellekeno 625 and mill water treatment facilities will be maintained by the care and maintenance crew.

This temporary decommissioning will be conducted to a level whereby the infrastructure and mine components are ensured to be stable in the short term (3 years) and whereby mining and milling operations can be resumed in a timely manner should the decision be made to transition back into operations. This will include:

- the retention of essential equipment/assets onsite to maintain infrastructure; and
- the storage of hazardous materials (not waste) in competent primary and secondary containment ensuring compliance with applicable legislation.

Table 6-1 Summary of Care and Maintenance Activities and Surveillance During Temporary Cessation of Mining Activities

Project Component	Objectives	Care & Maintenance Activities	Monitoring	Monitoring Responsibility	Monitoring Timing/ Frequency
Bellekeno Mine	Water Management	Maintain Bellekeno 625 water treatment facility and related water management infrastructure.	WUL Water Quality Surveillance Program	Care & Maintenance Crew	As per WUL
Bellekeno Mine	Physical Stability	Restrict access to hazardous areas with physical barriers.	QML Physical Monitoring Program	Care & Maintenance Crew	As per QML
Waste Rock Storage	Physical stability	Runoff/Erosion/Sediment control. Progressive reclamation will occur during operations.	QML Physical Monitoring Program	Care & Maintenance Crew	As per QML
Waste Rock Storage	Physical stability	Runoff/Erosion/Sediment control. Progressive reclamation will occur during operations.	Geotechnical Inspection	Engineer	Annual
Waste Rock Storage	Geochemical Stability	Cover AML WRSF with HDPE? Monitor WRSF & WRDA for seepage.	WUL Water Quality Surveillance Program	Care & Maintenance Crew	As per WUL
Roads	Physical Stability	Surface grading and granular amendments, ditch and culvert maintenance.	Visual inspection periodically for signs of instability/erosion	Care & Maintenance Crew	Weekly and after heavy precipitation events
Mill	Buildings, Equipment and Infrastructure	Secure buildings and retain necessary equipment for site maintenance.	Visual inspection for signs of instability.	Care & Maintenance Crew	Monthly
Mill	Buildings, Equipment and Infrastructure	Concentrate removed from site.			
Mill	Physical Stability	Inspect for site stability.	Structural Inspection	Engineer	Twice Annually
Mill	Physical Stability	Reduce ore stockpile inventory.			
Mill	Water Management	Maintain water treatment system and related water management infrastructure.	WUL Water Quality Surveillance Program	Care & Maintenance Crew	As per WUL
Dry Stack Tailings Facility	Physical stability	Surface water diversion structure repair/ maintenance.	Monitoring Program from DSTF Operating Plan; & QML Physical Monitoring Program	Care & Maintenance Crew	As per Monitoring Programs & QML
Dry Stack Tailings Facility	Physical stability	Runoff/Erosion/Sediment control.	Monitoring Program from DSTF Operating Plan; & QML Physical Monitoring Program	Care & Maintenance Crew	As per Monitoring Programs & QML
Dry Stack Tailings Facility	Physical stability	Dust Control.	Monitoring Program from DSTF Operating Plan; & QML Physical Monitoring Program	Care & Maintenance Crew	As per Monitoring Programs & QML
Dry Stack Tailings Facility	Physical stability	Progressive reclamation will occur during operations.	Geotechnical Inspection from QML and DSTF Operating Plan	Engineer	Annual
Dry Stack Tailings Facility	Geochemical Stability	Monitor for seepage and water quality.	WUL Water Quality Surveillance Program; & Monitoring Program from DSTF Operating Plan	Care & Maintenance Crew	As per WUL
Entire Site	Physical stability	Runoff/Erosion/Sediment control.	QML Physical Monitoring Program	Care & Maintenance Crew	As per QML
Entire Site	Physical stability	Road/culvert maintenance.	QML Physical Monitoring Program	Care & Maintenance Crew	As per QML
Entire Site	Physical stability	Progressive reclamation will occur during operations.	QML Physical Monitoring Program	Care & Maintenance Crew	As per QML
Entire Site	Security	Full time site care & maintenace crew will check, repair and replace as required: • precautionary signage • security gates – installed to restrict access to the mill	Care & Maintenance Monitoring of all infrastructure and site elements	Care & Maintenance Crew	Daily: Inspection Sheets included in Annual Reporting
Entire Site	Miscellaneous Infrastructure	Minimize camp size.			
Entire Site	Miscellaneous Infrastructure	Inspect power line	Care & Maintenance monitoring of all infrastructure and site elements	Care & Maintenance Crew	Daily: Inspection Sheets included in Annual Reporting
Entire Site	Reporting	Prepare and submit annual report to Yukon Water Board pursuant to WUL, including details of temporary closure activities and monitoring.		Alexco	Annually
Entire Site	Reporting	Prepare and submit annual report to YG Mineral Resources Branch pursuant to the QML, including details of temporary closure activities and monitoring.		Alexco	Annually
Entire Site	Reporting	Prepare and submit quarterly monitoring reports to Environment Canada under MMER.		Alexco	Quarterly, Online RISS Registry

6.4.2 Security and Monitoring

Uncontrolled access to the mine components and facilities could pose a risk to the public and to the site assets. As such, the full-time care and maintenance crew will conduct daily monitoring of all infrastruction and site elements. Equipment and vehicles will be available onsite for the staff should more intensive earthworks be required during the temporary closure period.

During temporary closure gates may be required and locked with warning signs erected at the gates and key locations around the site indicating the risks of entry. Site buildings will be locked and secured. Roads will be maintained as required.

The care and maintenance crew will be responsible for:

- Regular inspections of the site to observe and document the condition of, and any changes to: site security and public safety measures, infrastructure, mine components, etc., as well as to document potential emerging environmental or public health and safety objectives;
- Conducting routine physical monitoring activities;
- Regular water quality and flow monitoring;
- Submitting inspection and monitoring reports to managers on a regular basis;
- Responding to any security/safety objectives as required; and
- Conducting routine site maintenance and basic repairs to infrastructure and works as required (snow removal, culvert and road maintenance, building maintenance).

Site inspections and monitoring will be conducted by vehicle when seasonally possible. Some sites may be difficult to access in winter as snow removal would not be reasonable at all locations. Inspection results will be documented on a form and submitted to management on a regular basis. Reports of changes to physical status of any part of the site may warrant a follow-up investigation by managers and/or professional personnel.

The Company's Environmental Monitoring Program and detailed design reports further commit to structural monitoring, which will continue in the event of temporary closure.

Some elements of the monitoring program (geotechnical and structural inspections and non-routine water quality and biological monitoring) will be conducted by appropriate professional personnel, and results of these inspections will be included in annual reports and other required submissions.

6.4.3 Reporting

Monitoring and inspection data collected will be compiled and submitted according to the required annual reporting timeframes for both the Quartz Mining and Water Licences.

6.5 SUPERVISION AND DOCUMENTATION OF WORK

All decommissioning and reclamation works will be supervised to ensure that works are constructed according to their design and that this work is properly carried out and documented. The project manager or construction supervisor would supervise all closure works. Regular inspection procedures would be completed to document work progress, deficiencies and completion.

Upon completion of the decommissioning and reclamation works, a final site plan report (summary text and drawings) will be prepared that will outline the facilities or works remaining on the site following closure including the locations of subsurface features. It is expected that this plan would accompany an Application for a Certificate of Closure under the Quartz Mining Act.

7. RECLAMATION SECURITY AND COSTING

Costing of the proposed decommissioning and reclamation measures is the basis for the provision of security. Yukon Government currently holds a security bond to cover the potential liabilities arising from the ultimate advance of the underground exploration project. Once final security has been assessed for the Bellekeno Mine, this bond will be augmented by such security as necessary to cover the cost of closure measures for additional mine related infrastructure.

Decommissioning and reclamation cost estimates have been prepared for the following phases in the life of the mine:

- Current Site Status (currently posted) = $297,000;
- End of Mine Construction = $1,661,000;
- End of Mine Life = $2,769,000.

Closure liability cost estimate summary tables are provided below. Where possible, cost estimates were made using unit cost per volume. Where the use of unit costs proved difficult, then an estimation of equipment and labour hours were used. The unit costs and job hours were derived from Access Consulting Group's professional experience with other closure program costing estimates prepared for Yukon Government as well as Alexco's operational experiences. In particular, the unit costs are the same as those used to calculate closure costs for Western Copper Corporation's recently approved Preliminary Detailed Closure and Reclamation Plan. The exception is camp costs, as Alexco's actual rate per person per day is used. Unit costs are presented in Table 7-1.

As the mine is constructed and operated, this Decommissioning and Reclamation Plan will be reviewed every two years and closure costs updated based on more detailed engineering plans. Assumptions for the current closure liability cost estimates are based on current site conditions, as well as Alexco retaining the contract to perform site care and maintenance. Alexco maintains a constant presence on site fulfilling the care and maintenance contract, and this is reflected in closure costs for site management, the incremental costs of water treatment, as well as camp costs.

Certain pre-existing terrestrial liabilities are the responsibility of the Federal Government and have not been included. Others remain in question and will require discussion with INAC and YG to determine terrestrial liability. The need to reclaim these areas is still noted in the tables below as well as where further discussion is needed.

Table 7-2 summarizes closure liability cost estimate for end of mine life while Table 7-3 summaries costs for end of mine construction. Cost estimates for the separate reclamation components including site management are provided in the remaining tables.

Cost estimates for waste rock storage and site management at end of mine construction will differ from those at end of mine life; therefore, two tables representing the two stages of closure for each of these components are provided. For end of mine construction much of the closure costs for mine infrastructure will be the same as at the end of mine life while the DSTF will not exist. Similarly, it will not be necessary to operate the mill water treatment facility and costs for this have been excluded.

Table 7-1 Unit Rate Cost Table

EQUIPMENT RATES		
Bulldozer-small (Cat D6)	$130	per hr
D8K Dozer	$190	per hr
D9H Dozer	$260	per hr
D250E Haul Truck	$220	per hr
Tandem Haul Truck	$110	per hr
A35 Haul Truck	$190	per hr
Cat 325 Hoe	$190	per hr
Cat 235 Excavator	$240	per hr
235 Excavator w Hammer	$275	per hr
Cat 16H grader	$220	per hr
988B Loader	$250	per hr
Tractor Trailer (lowbed)	$130	per hr
30 ton Crane	$160	per hr
Hiab Flatdeck truck	$125	per hr
Cat 950 Loader	$125	per hr
Underground LHD 4-6yd Placement	$219	per hr
Underground Truck 20t	$113	per hr
Misc Mine Infrastructure	$100	per hr
Vacuum Truck	$100	per hr
Gas Powered Pump	$100	per day
Pickup Truck	$2,500	per month
Support Equipment	??	lump sum

PERSONNEL RATES		
Blaster	$60	per hr
General Labourer	$45	per hr
Underground Labourer	$65	per hr
Trades Labourer	$80	per hr
Underground / Site Supervisor	$95	per hr
Medical Safety	$50	per hr
Technician	$75	per hr
Design Engineer	$130	per hr
Environmental Scientist	$95	per hr
Project Manager	$9,700	per month
Camp Labourer	$4,000	per month
Site Caretaker	$6,100	per month
Environmental Monitor	$90	per hr
Analytical Costs	$500	Unit cost
Misc.	??	lump sum

REVEGETATION RATES		
Revegetation Seed Mix	$13	per kg
Revegetation Seed Mix - 50kg/ha	$510	per ha
Fertilizer	$1	per kg
Fertilizer - 250kg/ha	$250	per ha
Tree Seedlings	$1,750	per ha (1,000 seedlings per ha)
Seed/Fertilizer Application	$1,500	per ha
Revegetation cost per ha. Including application cost	$2,260.00	per ha

CONTRACTOR UNIT RATES & CAMP COST		
Custom Rate A (Load, haul and place overburden cover on AML Waste Rock)	$4.50	cu.m
Custom Rate B (Load, haul and dump mineralized rock stockpile in BK East Decline)	$4.50	cu.m
Compact and Contour Cover	$2	cu.m
Excavation of Soil	$5	cu.m
Supply and place Geotextile	$7	sq m
Load, haul and place soil cover	$8	cu.m
Haul & Place rock cover	$8	cu.m
Drill, Blast and Screen Rip Rap	$22	cu.m
Load and Haul and Place Rip Rap	$13	cu.m
HDPE Liner Install	$10	sq m
Erosion barriers	$3	sq m
Freight run to Whitehorse	$1,000	per load
Camp Cost	$55	per day per person
Power and Heat	$5,500	per month
Sundry equipment maintenance	$5,000	yearly
General Administrative expenses	$2,000	per month
Employee Transport Costs	$3,000	per month

Note: Custom Unit Rates have been developed specifically for Bellekeno Mine, taking into account such factors as haul distance, grade, machinery required, time required, etc.

Table 7-2 Bellekeno Mine Closure Liability Cost Estimate Summary – End of Mine Life

Item No.	Mine Component	Cost
1	**BELLEKENO MINE**	**$589,000**
1.1	Bellekeno East Underground	$32,000
1.2	Reclaim Bellekeno East Portal Site	$89,000
1.3	Reclaim Bellekeno 625 Adit Site	$34,000
1.4	*Bulkhead Installation**	*$237,000*
1.5	Bellekeno 625 Water Treatment Facility Transition	$166,000
1.6	200 Level Vent Raise	$31,000
2	**WASTE ROCK STORAGE**	**$226,000**
2.1	Temporary AML WRSF - Bellekeno East	$38,000
2.2	Permanent AML WRSF	$87,000
2.3	Non-AML WRDA - Bellekeno 625	$94,000
2.4	Reclaim Borrow Area	$7,000
3	**ROADS**	**$83,000**
3.1	Access Road Extension Bellekeno East to Bellekeno 625 (~600 m)	$15,000
3.2	*Powerline Haul Road (~2.3 km)**	*$26,000*
3.3	Keno City Bypass (~650 m)	$13,000
3.4	*Mill Site Access Including Christal Lake Road (1.9 km)**	*$24,000*
3.5	Other Roads and Trails (~5 km)	$5,000
4	**CAMP DOWNSIZE**	**$27,000**
5	**MILL**	**$472,000**
5.1	Mill and Ancillary Facilities	$308,000
5.2	Mill Pad (~3 ha)	$25,000
5.3	Ore/Tailings Stockpile Pads	$11,000
5.4	Water Treatment Plant Operation (~2 yrs)	$81,000
5.5	Runoff Collection Pond (4,700 m3)	$38,000
5.6	Diversion Ditches to Collection Pond	$9,000
6	**DRY STACK TAILINGS FACILITY**	**$271,000**
6.1	Mine Year 2 DSTF Cover	$32,000
6.2	Mine Year 3 DSTF Cover	$36,000
6.3	Mine Year 4 DSTF Cover	$63,000
6.4	Mine Year 5 DSTF Cover	$65,000
6.5	Mine Year 6 DSTF Cover	$75,000
7	**SITE MANAGEMENT**	**$502,000**
7.1	Onsite Management	$213,000
7.2	Compliance Monitoring and Reporting	$252,000
7.3	Contaminated Site Assessment Plan	$12,000
7.4	Closure Maintenance	$25,000
	TOTAL CLOSURE COSTS	**$2,170,000**
	Contingency Costs (15%)	**$326,000**
	Contingency Water Treatment (Mine & Mill 2 yrs)	**$218,000**
	Contingency WRDA Toe Buttress	**$55,000**
	GRAND TOTAL CLOSURE COSTS - END OF MINE LIFE	**$2,769,000**

** for discussion with INAC & YG re terrestrial liability* (also components of item 1.3, see table for breakdown)

Table 7-3 Bellekeno Mine Closure Liability Cost Estimate Summary – End of Mine Construction

Item No.	Mine Component	Cost
1	**BELLEKENO MINE**	**$589,000**
1.1	Bellekeno East Underground	$32,000
1.2	Reclaim Bellekeno East Portal Site	$89,000
1.3	Reclaim Bellekeno 625 Adit Site	$34,000
1.4	*Bulkhead Installation**	*$237,000*
1.5	Bellekeno 625 Water Treatment Facility Transition	$166,000
1.6	200 Level Vent Raise	$31,000
2	**WASTE ROCK**	**$20,000**
2.1	Rehandle existing temporary AML waste rock (from exploration) underground	$13,000
2.2	Reclaim Borrow Area	$7,000
3	**ROADS**	**$83,000**
3.1	Access Road Extension Bellekeno East to Bellekeno 625 (~600 m)	$15,000
3.2	*Powerline Haul Road (~2.3 km)**	*$26,000*
3.3	Keno City Bypass (~650 m)	$13,000
3.4	*Mill Site Access Including Christal Lake Road (1.9 km)**	*$24,000*
3.5	Other Roads and Trails (~5 km)	$5,000
5	**MILL**	**$385,000**
5.1	Mill and Ancillary Facilities	$308,000
5.2	Mill Pad (~3 ha)	$25,000
5.3	Ore/Tailings Stockpile Pads	$11,000
5.5	Runoff Collection Pond (4,700 m3)	$32,000
5.6	Diversion Ditches to Collection Pond	$9,000
7	**SITE MANAGEMENT** (includes monitoring & maintenance during decommissioning & 2 year closure period)	**$204,000**
7.1	Project G & A	$19,000
7.2	Onsite Management	$136,000
7.3	Compliance Monitoring and Reporting	$32,000
7.4	Contaminated Site Assessment Plan	$6,000
7.5	Closure Maintenance	$11,000
	TOTAL CLOSURE COSTS	**$1,281,000**
	Contingency Costs 15%)	**$192,000**
	Contingency Water Treatment at Bellekeno 625 (2 yrs after mine flooding)	**$188,000**
	GRAND TOTAL CLOSURE COSTS - END OF CONSTRUCTION	**$1,661,000**

** for discussion with INAC & YG re terrestrial liability* (also components of item 1.3, see table for breakdown)

Table 7-4 Bellekeno Mine Estimated Closure Costs

Item No.	Reclamation Component	Equipment / Labour	Units	Quantity	Unit Cost	Cost	Total Cost
1.1	**Bellekeno East Underground**						
	Removal of underground equipment (e.g. paste plant; switch gear; electrical; hydraulic control structures)	Underground LHD 4-6yd Placement	per hr	60	$219	$13,140	
		A35 Haul Truck	per hr	60	$190	$11,400	
		General Labourer	per hr	120	$45	$5,400	$29,940
	Project Management	7% of Total Cost	%		7.00%	$2,096	$2,096
	Sub-Total						**$32,000**
1.2	**Reclaim Bellekeno East Portal Site**						
	Remove shop and other buildings (explosives and cap magazine)	Misc.	lump sum	1	$25,000	$25,000	
	Supply rockfill for portal barrier	Load and Haul and Place Rip Rap	cu.m	700	$13	$9,100	
	Labour for portal barrier	General Labourer	per hr	40	$45	$1,800	
	Characterize settling ponds sediments	Analytical Costs	Unit cost	1	$500	$500	
	Remove settling ponds liners to landfill	A35 Haul Truck	per hr	2	$190	$380	
		General Labourer	per hr	8	$45	$360	
	Clean out fuel tank residue	Misc.	lump sum	1	$1,000	$1,000	
	Haul fuel tank and liner for reuse or landfill	Cat 325 Hoe	per hr	6	$190	$1,140	
		A35 Haul Truck	per hr	6	$190	$1,140	
		General Labourer	per hr	16	$45	$720	
	Area cleanup and haul debris to landfill	Cat 325 Hoe	per hr	20	$190	$3,800	
		A35 Haul Truck	per hr	20	$190	$3,800	
		General Labourer	per hr	40	$45	$1,800	
	Test area soils for contamination	Environmental Monitor	per hr	8	$90	$720	
	Laboratory Analysis for soils testing	Analytical Costs	Unit cost	2	$500	$1,000	
	Haul any contaminated soils to nearest Land Treatment Facility	Cat 325 Hoe	per hr	16	$190	$3,040	
		A35 Haul Truck	per hr	16	$190	$3,040	
	Recontour and scarify area and slopes to establish drainage	D8K Dozer	per hr	24	$190	$4,560	
		Cat 16H grader	per hr	20	$220	$4,400	
	Install Signage	Misc.	lump sum	1	$1,000	$1,000	
	Mob/Demob (entire mine)	Misc.	lump sum	1	$15,000	$15,000	$83,300
	Project Management	7% of Total Cost	%		7.00%	$5,831	$5,831
	Sub-Total						**$89,000**
1.3	**Reclaim Bellekeno 625 Adit Site**						
	Remove lab	Misc.	lump sum	1	$5,000	$5,000	
	*Remove electrical substation**	*Misc.*	*lump sum*			*$0*	
	*Remove electrical transmission line (Keno City to BK 625)**	*Misc.*	*lump sum*			*$0*	
	*Remove shop/loadout facility, compressor shack**	*Misc.*	*lump sum*			*$0*	
	Area cleanup and haul debris to landfill	Cat 325 Hoe	per hr	20	$190	$3,800	
		A35 Haul Truck	per hr	20	$190	$3,800	
		General Labourer	per hr	40	$45	$1,800	
	Test area soils for contamination	Environmental Monitor	per hr	8	$90	$720	
	Laboratory Analysis for soils testing	Analytical Costs	Unit cost	2	$500	$1,000	
	Haul any contaminated soils to nearest Land Treatment Facility	Cat 325 Hoe	per hr	16	$190	$3,040	
		A35 Haul Truck	per hr	16	$190	$3,040	
	Recontour and scarify area and slopes to establish drainage	D8K Dozer	per hr	24	$190	$4,560	
		Cat 16H grader	per hr	20	$220	$4,400	
	Install Signage	Misc.	lump sum	1	$1,000	$1,000	$32,160
	Project Management	7% of Total Cost	%		7.00%	$2,251	$2,251
	Sub-Total						**$34,000**
1.4	***Bulkhead Installation****						
	Hydrogeologic study & engineering for concrete bulkhead	*Misc.*	*lump sum*	*1*	*$45,000*	*$45,000*	
	Underground Rehab for bulkhead	*Misc.*	*lump sum*	*1*	*$50,000*	*$50,000*	
	Construct concrete plug	*General Labourer*	*per hr*	*120*	*$45*	*$5,400*	
		Underground Labourer	*per hr*	*200*	*$65*	*$13,000*	
		Underground Truck 20t	*per hr*	*120*	*$113*	*$13,560*	
	Concrete Batch	*Misc.*	*lump sum*	*1*	*$75,000*	*$75,000*	
		Cat 950 Loader	*per hr*	*80*	*$125*	*$10,000*	
	Install Instrumentation (e.g pressure gauge)	*Misc.*	*lump sum*	*1*	*$10,000*	*$10,000*	*$221,960*
	Project Management	*7% of Total Cost*	*%*		*7.00%*	*$15,537*	*$15,537*
	Sub-Total						***$237,000***
1.5	**Bellekeno 625 Water Treatment Facility Transition**						
	*Contingency treatment operation (2 yrs after mine flooding)***	*Misc.*	*lump sum*	*24*	*$7,845*	*$188,280*	
	Remove salvageable equipment	General Labourer	per hr	16	$45	$720	
		Trades Labourer	per hr	16	$80	$1,280	
	Load & return extra reagents/chemicals	General Labourer	per hr	8	$45	$360	
		Misc.	lump sum	1	$2,000	$2,000	
	Dismantle building	Cat 235 Excavator	per hr	4	$240	$960	
		Cat 950 Loader	per hr	10	$125	$1,250	
		Tractor Trailer (lowbed)	per hr	30	$130	$3,900	
		General Labourer	per hr	40	$45	$1,800	
	In mine pool treatment	Misc.	lump sum	1	$40,000	$40,000	
	Characterize settling ponds sediments/sludge	Analytical Costs	Unit cost	2	$500	$1,000	
	Remove sludge from settling ponds	Vacuum Truck	per hr	40	$100	$4,000	
		General Labourer	per hr	40	$45	$1,800	
	Remove settling ponds liners to landfill	A35 Haul Truck	per hr	4	$190	$760	
		General Labourer	per hr	8	$45	$360	
	Construct infiltration gallery	A35 Haul Truck	per hr	80	$190	$15,200	
		Cat 950 Loader	per hr	60	$125	$7,500	
		General Labourer	per hr	60	$45	$2,700	
	Operate infiltration gallery (5 yrs)	Misc.	lump sum	5	$10,000	$50,000	
	Site levelling	D9H Dozer	per hr	20	$260	$5,200	
	Scrap hauled to solid waste facility	Cat 235 Excavator	per hr	8	$240	$1,920	
		D250E Haul Truck	per hr	12	$220	$2,640	
	Misc. Supplies & Tools	Misc.	lump sum	1	$10,000	$10,000	$155,350
	Project Management	7% of Total Cost	%		7.00%	$10,875	$10,875
	Sub-Total						**$166,000**
1.6	**200 Level Vent Raise**						
.	Engineering for concrete cap	Misc.	lump sum	1	$10,000	$10,000	
	Concrete Batch	Misc.	lump sum	1	$10,000	$10,000	
		Cat 950 Loader	per hr	12	$125	$1,500	
		Hiab Flatdeck truck	per hr	48	$125	$6,000	
	Labour for cap	General Labourer	per hr	40	$45	$1,800	$29,300
	Project Management	7% of Total Cost	%		7.00%	$2,051	$2,051
	Sub-Total						**$31,000**
	Total Estimated Cost in Reclaiming Bellekeno Mine						**$589,000**

** for discussion with INAC & YG re terrestrial liability*

***contingency cost incorporated into summary table*

Table 7-5 Waste Rock Storage Estimated Closure Costs – End of Mine Life

Item No.	Work Item Description	Equipment / Labour	Units	Quantity	Unit Cost	Cost	Total Cost
2.1	**Temporary AML WRSF - Bellekeno East**						
	Rehandle underground	Custom Rate B (Load, haul and dump mineralized rock stockpile in BK East Decline)	cu.m	6000	$5	$27,000	
	Remove liner and haul to solid waste facility	D250E Haul Truck	per hr	2	$220	$440	
		General Labourer	per hr	8	$45	$360	
	Site recontouring	D8K Dozer	per hr	20	$190	$3,800	
	Revegetation	Revegetation cost per ha. Including application cost	per ha	1.8	$2,260	$4,068	$35,668
	Project Management	7% of Total Cost	%		7.00%	$2,497	$2,497
	Sub-Total						**$38,000**
2.2	**Permanent AML WRSF**						
	Educt impounded water	General Labourer	per hr	8	$45	$360	
		Vacuum Truck	per hr	8	$100	$800	
	Recontour waste rock	Cat 235 Excavator	per hr	8	$240	$1,920	
	Cover (0.5 m cover for 5 WRSF at 50 m x 50 m)	Load, haul and place soil cover	cu.m	6,250	$8	$50,000	
	Revegetation	Revegetation cost per ha. Including application cost	per ha	12.5	$2,260	$28,250	$81,330
	Project Management	7% of Total Cost	%		7.00%	$5,693	$5,693
	Sub-Total						**$87,000**
2.3	**Non-AML WRDA - Bellekeno 625**						
	Recontour waste rock - pull back crests	Cat 235 Excavator	per hr	60	$240	$14,400	
	Scarification	Cat 16H grader	per hr	24	$220	$5,280	
	Revegetation	Revegetation cost per ha. Including application cost	per ha	30	$2,260	$67,800	
	*Toe buttress***	*Cat 235 Excavator*	*per hr*	*120*	*$240*	*$28,800*	
		D250E Haul Truck	*per hr*	*120*	*$220*	*$26,400*	$87,480
	Project Management	7% of Total Cost	%		7.00%	$6,124	$6,124
	Sub-Total						**$94,000**
2.4	**Reclaim Borrow Area**						
	Stabilize slopes	D8K Dozer	per hr	12	$190	$2,280	
	Revegetation	Revegetation cost per ha. Including application cost	per ha	2	$2,260	$4,520	$6,800
	Project Management	7% of Total Cost	%		7.00%	$476	$476
	Sub-Total						**$7,000**
	Total Estimated Cost in Reclaiming Waste Rock Storage Areas						**$226,000**

***contingency cost incorporated into summary table*

Table 7-6 Waste Rock Storage Estimated Closure Costs – End of Mine Construction

Item No.	Work Item Description	Equipment / Labour	Units	Quantity	Unit Cost	Cost	Total Cost
2.1	**Temporary AML WRSF - Bellekeno East**						
	Rehandle existing temporary AML waste rock (from exploration) underground	Custom Rate B (Load, haul and dump mineralized rock stockpile in BK East Decline)	cu.m	850	$5	$3,825	
	Remove liner and haul to solid waste facility	D250E Haul Truck	per hr	2	$220	$440	
		General Labourer	per hr	8	$45	$360	
	Site recontouring	D8K Dozer	per hr	20	$190	$3,800	
	Revegetation	Revegetation cost per ha. Including application cost	per ha	1.8	$2,260	$4,068	$12,493
	Project Management	7% of Total Cost	%		7.00%	$875	$875
	Sub-Total						**$13,000**
2.4	**Reclaim Borrow Area**						
	Stabilize slopes	D8K Dozer	per hr	12	$190	$2,280	
	Revegetation	Revegetation cost per ha. Including application cost	per ha	2	$2,260	$4,520	$6,800
	Project Management	7% of Total Cost	%		7.00%	$476	$476
	Sub-Total						**$7,000**
	Total Estimated Cost in Reclaiming Waste Rock Storage Areas						**$20,000**

Table 7-7 Access and Haul Roads Estimated Closure Costs

Item No.	Work Item Description	Equipment / Labour	Units	Quantity	Unit Cost	Cost	Total Cost
3.1	**Access Road Extension Bellekeno East to Bellekeno 625 (~600 m)**						
	Culvert excavation (2 culverts)	Cat 235 Excavator	per hr	10	$240	$2,400	
	Culvert removal and install swales	General Labourer	per hr	24	$45	$1,080	
	Reslope banks/remove safety berm	D8K Dozer	per hr	24	$190	$4,560	
	Scarify road surface	Cat 16H grader	per hr	16	$220	$3,520	
	Erosion barriers (50% of length)	Erosion barriers	sq m	750	$3	$2,250	$13,810
	Project Management	7% of Total Cost	%		7.00%	$967	$967
	Sub-Total						**$15,000**
3.2	***Powerline Haul Road (~2.3 km)****						
	Culvert excavation (20 culverts)	*Cat 235 Excavator*	*per hr*	*40*	*$240*	*$9,600*	
	Culvert removal and install swales	*General Labourer*	*per hr*	*40*	*$45*	*$1,800*	
	Reslope banks/remove safety berm	*D8K Dozer*	*per hr*	*32*	*$190*	*$6,080*	
	Scarify road surface	*Cat 16H grader*	*per hr*	*32*	*$220*	*$7,040*	*$24,520*
	Project Management	*7% of Total Cost*	*%*		*7.00%*	*$1,716*	*$1,716*
	Sub-Total						***$26,000***
3.3	**Keno City Bypass (~650 m)**						
	Culvert excavation (4 culverts)	Cat 235 Excavator	per hr	8	$240	$1,920	
	Culvert removal and install swales	General Labourer	per hr	8	$45	$360	
	Reslope banks/remove safety berm	D8K Dozer	per hr	16	$190	$3,040	
	Scarify road surface	Cat 16H grader	per hr	8	$220	$1,760	
	Lightning Creek culvert removal	Cat 235 Excavator	per hr	16	$240	$3,840	
		Tractor Trailer (lowbed)	per hr	8	$130	$1,040	$11,960
	Project Management	7% of Total Cost	%		7.00%	$837	$837
	Sub-Total						**$13,000**
3.4	***Mill Site Access Including Christal Lake Road (1.9 km)****						
	Culvert excavation (40 culverts)	*Cat 235 Excavator*	*per hr*	*40*	*$240*	*$9,600*	
	Culvert removal and install swales	*General Labourer*	*per hr*	*40*	*$45*	*$1,800*	
	Reslope banks/remove safety berm	*D8K Dozer*	*per hr*	*12*	*$190*	*$2,280*	
	Scarify road surface	*Cat 16H grader*	*per hr*	*40*	*$220*	*$8,800*	*$22,480*
	Project Management	*7% of Total Cost*	*%*		*7.00%*	*$1,574*	*$1,574*
	Sub-Total						***$24,000***
3.5	**Other Roads and Trails (~5 km)**						
	Scarify road surface	Cat 16H grader	per hr	20	$220	$4,400	$4,400
	Project Management	7% of Total Cost	%		7.00%	$308	$308
	Sub-Total						**$5,000**
	Total Estimated Cost in Reclaiming Roads						**$83,000**

** for discussion with INAC & YG re terrestrial liability*

Table 7-8 Camp Downsize Estimated Closure Costs

Item No.	Work Item Description	Equipment / Labour	Units	Quantity	Unit Cost	Cost	Total Cost
4	**Camp Downsize**						
	Dismantle 5 trailer units and tranport to Lot 960 private	Misc.	lump sum	1	$25,000	$25,000	$25,000
	Project Management	7% of Total Cost	%		7.00%	$1,750	$1,750
	Sub-Total						**$27,000**
	Total Estimated Camp Downsizing Costs						**$27,000**

Table 7-9 Mill Estimated Closure Costs

Item No.	Work Item Description	Equipment / Labour	Units	Quantity	Unit Cost	Cost	Total Cost
5.1	**Mill and Ancillary Facilities**						
	Remove equipment (crushers, conveyors, mill equipment, trailer units, other ancillary facilities - fine ore bin)	General Labourer	per hr	600	$45	$27,000	
		Trades Labourer	per hr	400	$80	$32,000	
		Cat 950 Loader	per hr	150	$125	$18,750	
		Cat 235 Excavator	per hr	50	$240	$12,000	
		Tractor Trailer (lowbed)	per hr	120	$130	$15,600	
	Load and return extra reagents/chemicals	General Labourer	per hr	75	$45	$3,375	
		Misc.	lump sum	1	$2,500	$2,500	
	Dismantle Mill Building	Cat 950 Loader	per hr	70	$125	$8,750	
		Tractor Trailer (lowbed)	per hr	70	$130	$9,100	
		Trades Labourer	per hr	300	$80	$24,000	
		General Labourer	per hr	1,000	$45	$45,000	
	Concrete Demolition	235 Excavator w Hammer	per hr	60	$275	$16,500	
		D9H Dozer	per hr	20	$260	$5,200	
	Crane Support	30 ton Crane	per hr	200	$160	$32,000	
	Haul scrap to solid waste facility	Cat 235 Excavator	per hr	50	$240	$12,000	
		D250E Haul Truck	per hr	100	$220	$22,000	
	Misc. Supplies & Tools	Misc.	lump sum	1	$2,000	$2,000	$287,775
	Project Management	7% of Total Cost	%		7.00%	$20,144	$20,144
	Sub-Total						**$308,000**
5.2	**Mill Pad (~3 ha)**						
	Test area soils for contamination	Environmental Monitor	per hr	16	$90	$1,440	
	Laboratory Analysis for soils testing	Analytical Costs	Unit cost	12	$500	$6,000	
	Haul any contaminated soils to nearest Land Treatment Facility	Cat 325 Hoe	per hr	16	$190	$3,040	
		A35 Haul Truck	per hr	16	$190	$3,040	
	Regrade embankment shoulders	D8K Dozer	per hr	8	$190	$1,520	
	Scarify pad area	Cat 16H grader	per hr	8	$220	$1,760	
	Revegetate	Revegetation cost per ha. Including application cost	per ha	3	$2,260	$6,780	$23,580
	Project Management	7% of Total Cost	%		7.00%	$1,651	$1,651
	Sub-Total						**$25,000**
5.3	**Ore/Tailings Stockpile Pads**						
	Concrete Demolition & Burial	Cat 235 Excavator	per hr	20	$240	$4,800	
		D9H Dozer	per hr	20	$260	$5,200	$10,000
	Project Management	7% of Total Cost	%		7.00%	$700	$700
	Sub-Total						**$11,000**
5.4	**Water Treatment Plant Operation (~2 yrs)**						
	Contingency treatment operation (2 yrs freshet)	*Misc.*	*lump sum*	*2*	*$15,000*	*$30,000*	
	Construct infiltration gallery	A35 Haul Truck	per hr	80	$190	$15,200	
		Cat 950 Loader	per hr	60	$125	$7,500	
		General Labourer	per hr	60	$45	$2,700	
	Operate infiltration gallery (5 yrs)	Misc.	lump sum	5	$10,000	$50,000	$75,400
	Project Management	7% of Total Cost	%		7.00%	$5,278	$5,278
	Sub-Total						**$81,000**
5.5	**Runoff Collection Pond (4,700 m^3)**						
	Pump down impounded water	General Labourer	per hr	36	$45	$1,620	
		Gas Powered Pump	per day	2	$100	$200	
	Misc. Supplies & Tools	Misc.	lump sum	1	$500	$500	
	Characterize pond sediments/sludge	Analytical Costs	Unit cost	1	$500	$500	
	Remove sediment/sludge from settling pond	Vacuum Truck	per hr	16	$100	$1,600	
		General Labourer	per hr	16	$45	$720	
	Breach dyke, relocate and contour materials	Excavation of Soil	cu.m	3,000	$5	$15,000	
	Stabilize slopes with erosion barriers	Erosion barriers	sq m	3,000	$3	$9,000	
	Remove discharge pipeline	Misc.	lump sum	1	$5,000	$5,000	
	Revegetate	Revegetation cost per ha. Including application cost	per ha	0.5	$2,260	$1,130	$35,270
	Project Management	7% of Total Cost	%		7.00%	$2,469	$2,469
	Sub-Total						**$38,000**
5.6	**Diversion Ditches to Collection Pond**						
	Recontour	D9H Dozer	per hr	24	$260	$6,240	
	Revegetate	Revegetation cost per ha. Including application cost	per ha	1	$2,260	$2,260	$8,500
	Project Management	7% of Total Cost	%		7.00%	$595	$595
	Sub-Total						**$9,000**
	Total Estimated Mill Closure Cost						**$472,000**

Table 7-10 Dry Stack Tailings Facility Estimated Closure Costs

Item No.	Work Item Description	Equipment / Labour	Units	Quantity	Unit Cost	Cost	Total Cost
6.1	**Mine Year 2 DSTF Cover**						
	Top with overburden and soil (0.5m)	Load, haul and place soil cover	cu.m	3,500	$8	$28,000	
	Revegetate	Revegetation cost per ha. Including application cost	per ha	0.7	$2,260	$1,582	$29,582
	Project Management	7% of Total Cost	%		7.00%	$2,071	$2,071
	Sub-Total						**$32,000**
6.2	**Mine Year 3 DSTF Cover**						
	Top with overburden and soil (0.5m)	Load, haul and place soil cover	cu.m	4,000	$8	$32,000	
	Revegetate	Revegetation cost per ha. Including application cost	per ha	0.8	$2,260	$1,808	$33,808
	Project Management	7% of Total Cost	%		7.00%	$2,367	$2,367
	Sub-Total						**$36,000**
6.3	**Mine Year 4 DSTF Cover**						
	Top with overburden and soil (0.5m)	Load, haul and place soil cover	cu.m	7,000	$8	$56,000	
	Revegetate	Revegetation cost per ha. Including application cost	per ha	1.4	$2,260	$3,164	$59,164
	Project Management	7% of Total Cost	%		7.00%	$4,141	$4,141
	Sub-Total						**$63,000**
6.4	**Mine Year 5 DSTF Cover**						
	Top with overburden and soil (0.5m)	Load, haul and place soil cover	cu.m	7,000	$8	$56,000	
	Remediate sludge storage area	D8K Dozer	per hr	8	$190	$1,520	
	Revegetate	Revegetation cost per ha. Including application cost	per ha	1.4	$2,260	$3,164	$60,684
	Project Management	7% of Total Cost	%		7.00%	$4,248	$4,248
	Sub-Total						**$65,000**
6.5	**Mine Year 6 DSTF Cover**						
	Top with overburden and soil (0.5m)	Load, haul and place soil cover	cu.m	8,000	$8	$64,000	
	Revegetate	Revegetation cost per ha. Including application cost	per ha	2.5	$2,260	$5,650	$69,650
	Project Management	7% of Total Cost	%		7.00%	$4,876	$4,876
	Sub-Total						**$75,000**
	Total Estimated DSTF Closure Cost						**$271,000**

Table 7-11 Site Management Estimated Closure Costs – End of Mine Life

Item No.	Work Item Description	Equipment / Labour	Units	Quantity	Unit Cost	Cost	Total Cost
7.1	**Onsite Management**						
	Project Management and Engineering - Included in costs for each closure component						
	Pickup truck	Pickup Truck	per month	15	$2,500	$37,500	
	Sundry equipment maintenance	Sundry equipment maintenance	yearly	3	$5,000	$15,000	
	Power and heat (incremental additional costs)	Misc.	lump sum	15	$1,000	$15,000	
	General Admininstrative expenses	General Administrative expenses	per month	15	$2,000	$30,000	
	Camp Costs	Camp Cost	per day per person	2100	$55	$115,500	
	Sub-Total						**$213,000**
7.2	**Compliance Monitoring and Reporting**						
	Water Quality Monitoring						
	Years 1-5 (monthly)	Misc.	monthly	60	$2,000	$120,000	
	Years 6-10 (quarterly - spring/summer/fall)	Misc.	quarterly	20	$2,000	$40,000	
	Disbursements (non-labour/non-analytical)	Misc.	lump sum	10	$1,000	$10,000	
	Biological Monitoring - Closure implementation						
	Years 1-5 (Every 2 Years)	Misc.	yearly	2	$3,000	$6,000	
	Years 6-10 (Every 2 Years)	Misc.	yearly	2	$3,000	$6,000	
	Bellekeno waste rock & DSTF permafrost monitoring (10 yrs)	Misc.	yearly	10	$4,000	$40,000	
	WRDA & DSTF Annual Geotechnical Inspection - 5 yrs after closure	Misc.	yearly	5	$6,000	$30,000	
	Sub-Total						**$252,000**
7.3	**Contaminated Site Assessment Plan**						
	Develop Plan	Misc.	lump sum	1	$6,000	$6,000	
	Assessment Reporting	Misc.	lump sum	1	$6,000	$6,000	
	Sub-Total						**$12,000**
7.4	**Closure Maintenance**						
	Manage Land Treatment Facility and Testing	Misc.	per year	5	$2,000	$10,000	
	Misc. Maintenance work related to the site after closure (roads, covers, revegetation)	Misc.	per year	5	$3,000	$15,000	
	Sub-Total						**$25,000**
	Total Estimated Cost for Site Management at Closure						**$502,000**

Table 7-12 Site Management Estimated Closure Costs – End of Mine Construction

Item No.	Work Item Description	Equipment / Labour	Units	Quantity	Unit Cost	Cost	Total Cost
7.1	**Project G & A**						
	Pre-closure planning and organization	Project Manager	per month	2	$9,700	$19,400	
	Sub-Total						**$19,000**
7.2	**Onsite Management**						
	Project Management and Engineering - Included in costs for each closure component						
	Site vehicle	Pickup Truck	per month	8	$2,500	$20,000	
	Camp Costs	Camp Cost	per day per person	2,100	$55	$115,500	
	Sub-Total						**$136,000**
7.3	**Compliance Monitoring and Reporting**						
	Water Quality Monitoring						
	Years 1-2 (quarterly)	Misc.	per qrtr	8	$2,000	$16,000	
	Disbursements (non-labour/non-analytical)	Misc.	per qrtr	8	$500	$4,000	
	Geotechnical Inspection (yrs 2 & 3)	Misc.	yearly	2	$6,000	$12,000	
	Sub-Total						**$32,000**
7.4	**Contaminated Site Assessment Plan**						
	Develop Plan	Misc.	lump sum	1	$3,000	$3,000	
	Assessment Reporting	Misc.	lump sum	1	$3,000	$3,000	
	Sub-Total						**$6,000**
7.5	**Closure Maintenance**						
	Misc. site maintenance	Misc.	per year	2	$3,000	$6,000	
	Revegetation maintenance (25% of area revegetated)	Revegetation cost per ha. Including application cost	per ha	2	$2,260	$4,690	
	Sub-Total						**$11,000**
	Total Estimated Cost for Site Management						**$204,000**

Appendix F

Emergency Response Plan

Managing Risk – Unlocking Value

This controlled document will be regularly updated to reflect revisions.

- Updated Emergency Management Response Plan (EMRP) documents will be bound and distributed to all authorized personnel.
- All Keno Hill Project personnel must have EMRP training and know where to gain access to the document in the event of an emergency.

Authorized Distribution / Location List:

Alexco Resource Corp. - Keno Hill Property:
Administration Office
Bellekeno East Shifters Office
Care & Maintenance Shop
First Aid Room
General Managers Workspace
Kitchen Medical Station
Mine Rescue Shed – Bellekeno East
Safety Coordinators Office

Alexco Resource Corp.:
Access Consulting Group Whitehorse Office
Alexco Resource Corp. Vancouver Office
Alexco Resource Corp. Whitehorse Office

Community:
Mayo Nursing Station
Mayo RCMP Detachment
Mayo Fire Department

Government:
Occupational Health & Safety - YWCHSB

Primary Partners On-site Contractors:
First Nation Na-Cho Nyak Dun – Mayo
Procon Mining and Tunneling Corporate Office

CONTENTS:

1.0 PURPOSE

This guide sets out the response protocol in the event of a "Serious Incident" as defined in the following section.

It is intended for use as a quick reference handbook for managers and supervisors. Incident reporting and investigating is also outlined.

In an emergency situation it is imperative that due diligence is exercised as well as discretion. The priorities are the protection of **LIFE, LIMB and PROPERTY** – in that order.

2.0 DEFINITIONS

2.1 "SERIOUS INCIDENT"

A "**Serious Incident**" is defined as any occurrence meeting one or more of the following criteria:

1. Any "serious injury" or "serious accident" as defined in OH&S 33(1) (see Section 2.2),
2. Any incident requiring first aid or rescue response to the scene,
3. Any fire requiring discharge of a fire extinguisher,
4. Any release of mill process solution outside of containment,
5. Any release of a hazardous product where there is potential for that product to enter a waterway,
6. Any hazardous product spill of reportable volume, as defined in Section 11.0.

2.2 "SERIOUS INJURY" AND "SERIOUS ACCIDENT" UNDER OH&S ACT

(Excerpt from Occupational Health & Safety Act)

33. (1) In this section,

"**Serious Injury**" means:

a) an injury that results in death,
b) fracture of a major bone, including the skull, the spine, the pelvis, or the thighbone,
c) amputation other than of a finger or toe,
d) loss of sight of an eye,
e) internal bleeding,
f) full thickness (third degree) burns,
g) dysfunction that results from concussion, electrical contact, lack of oxygen, or poisoning, or
h) an injury that results in paralysis (permanent loss of function);

"**Serious Accident**" means:

(a) an uncontrolled explosion,
(b) failure of a safety device on a hoist, hoist mechanism, or hoist rope,
(c) collapse or upset of a crane
(d) collapse or failure of a load-bearing component of a building or structure regardless of whether the building or structure is complete or under construction,
(e) collapse or failure of a temporary support structure,

(f) an inrush of water in an underground working,

(g) fire or explosion in an underground working,

(h) collapse or cave-in, of a trench, excavation wall, underground working, or stockpile,

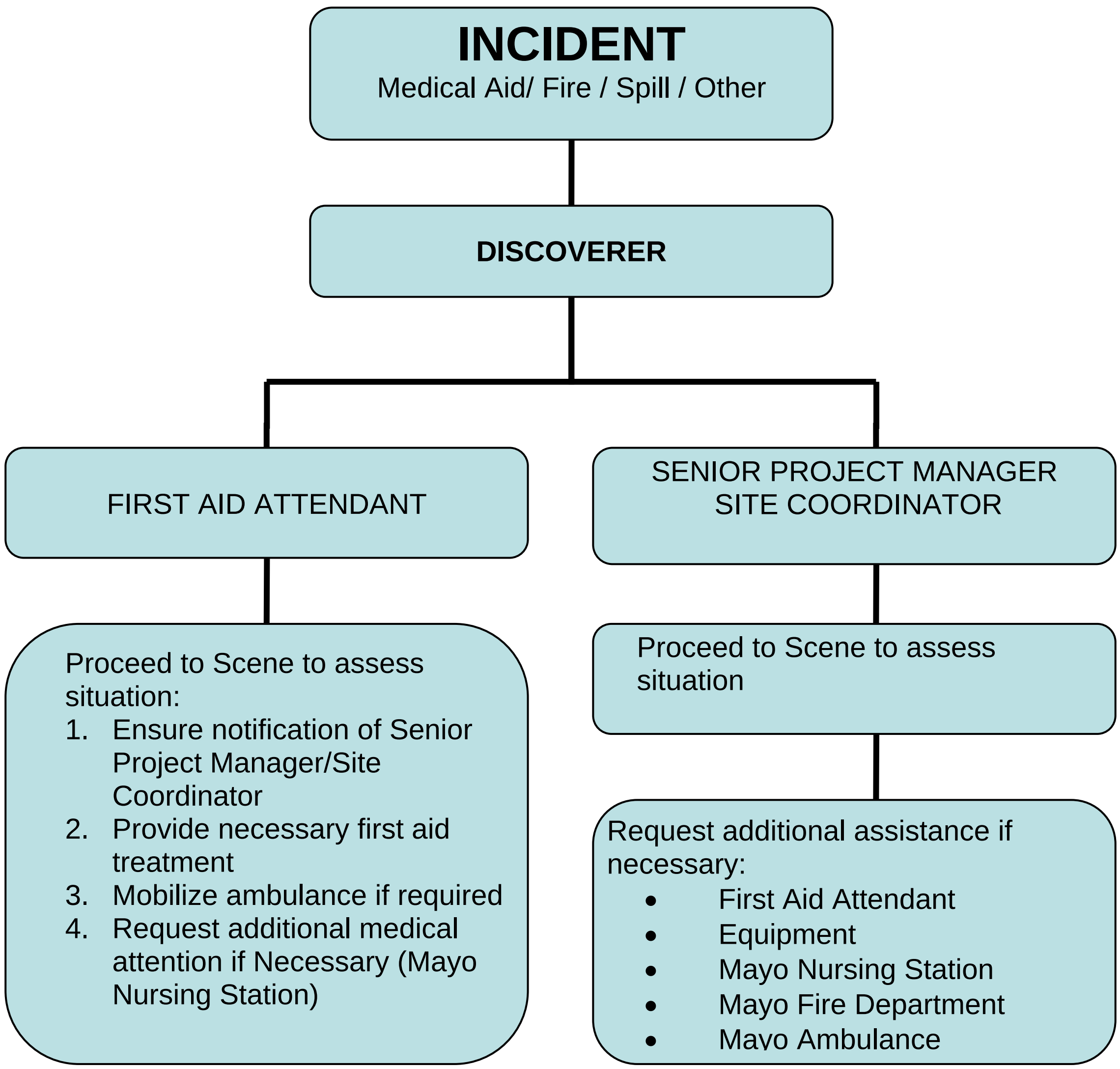
(i) accidental release of a controlled product,

(j) brake failure on mobile equipment that causes a runaway,

(k) any accident that likely would have caused serious injury but for safety precautions, rescue measures, or chance. (As amended by SY 1988, c.22, s. 5; SY 1989, c. 19, s.6)

Reprinted from "Occupational Health and Safety with Mine Safety Regulations."
Yukon Workers' Compensation Health and Safety Board. Department of Justice, Government of the Yukon. 1992

3.0 INITIAL RESPONSE TO SERIOUS INCIDENT - KENO HILL PROJECT



4.0 FOLLOW UP TO SERIOUS INCIDENT - KENO HILL PROJECT

INCIDENT
Medical Aid/ Fire / Spill / Other

SAFETY COORDINATOR

- Notify Appropriate Authorities
- Arrange/Coordinate first aid/transportation of injured at surface.
- Ensure legislation compliance
- Assist with site investigation/interviews
- Determining Root Cause Analysis
- Implement Remedial Action Plan
- Training overall site safety responsibilities

SENIOR PROJECT MANAGER
SITE COORDINATOR

Ensure Incident investigation has been initiated

Request necessary notifications are made:

- Alexco corporate office
- Yukon OH&S
- Yukon Spill Response Line
- TYPE II office

5.0 SERIOUS INCIDENT RESPONSIBILITY MATRIX

POSITION	RESPONSIBILITIES
Area Supervisor Site Coordinator	• Coordinate initial response • E.R.T. and specialized resources mobilization & consultation • Attend and coordinate response for all incidents involving “serious injury” and “serious accident”, as defined in Sec. 33, OHS Act • Initial scene control • Responsible for investigation – determine contributing causes and take immediate proactive action • Request additional external resources as necessary • Coordinate recovery and investigative activity • Notify Senior Project Manager • Ensure all government reporting has been completed • Organize and conduct post-incident debriefings • Prepare Incident Report and make recommendations
First Aid Attendant	• Ensure area supervisor has been notified of incident • Provide first aid treatment if necessary • Mobilize ambulance to scene, if required • Stand by to assist as required by scene coordinator
Senior Project Manager	• Designate on-call senior personnel during weekends • Receive briefings on incident details • Provide direction as required • Notify regulatory agencies, government and Alexco corporate office of incident • Review Incident Reports • Attend at all incidents involving “serious injury” and “serious accident”, as defined in Sec. 33, OHS Act • Verify compliance with standards and government regulatory requirements • Forward necessary reports to regulatory agencies • Fire Chief – assume responsibility for fire investigation
Safety Coordinator	

6.0 SERIOUS INCIDENT CONTACTS FOR SITE PERSONNEL

Position	Contact Personnel	Office Contact Number	Radio	Home Contact Number
Operations General Manager	Tim Hall	867-995-3113	CH 3	907-790-2245
Safety Coordinator	Colleen Geddes	867-995-3113	CH 3	867-667-6155
Mine Manager	Tom Fudge	867-995-3113	CH 3	
Project / Construction Manager	Peter Johnson	867-995-3113	CH 3	867-993-5911
Remediation Manager	Kael Hanak	867-995-3113	CH 3	867-393-2741
Operations General Manager	Tim Hall	867-995-3113	CH 3	907-790-2245
Chief Operating Officer	Brad Thrall	604-633-4888		604-250-6501
Chief Executive Officer	Clynt Nauman	604-633-4888		604-250-3293
Access Consulting Group	Dan Cornett	867-668-6463		867-668-7964
Procon Mining (Elsa)	Anson Smith	867-995-3113 604-637-5997 (Bellekeno)	CH 3	
Procon Mining (Vancouver)	Brad Skeeles	604-296-3365		778-837-4407
Boart Longyear	William Krasnozon	705-672-3311		705-499-3444
Kluane Drilling		705-672-3311		

7.0 EXTERNAL RESOURCE CONTACTS

With the exception of medical aid incidents, external resources will be authorized only by the Senior Project Manager on site or his designate, or those with higher level of responsibility.

Assistance Required For:	Agency Contact	Contact Number
Ambulance / Air Medivac	Mayo Nursing Station	867-996-4444
Poisonous Substance Ingestion	Poison Control Centre	867-633-8477
Fire (building) / Rescue Assistance	Mayo Fire Department	867-996-2222
Forest Fire		888-798-FIRE
Spill	Yukon Spill Report Line	867-667-7244
Spill Fax		867-393-6266
Wildlife Management	YTG Ren. Res. - Mayo	867-996-2162
Crime – Related Incidents	RCMP – Mayo	867-996-5555
Fatality	Coroner or RCMP	867-996-5555
Mine Rescue YT OH&S	Mine Inspector	867-334-2002
Procon Mining and Tunneling Ltd	Brad Skeeles	604-291-8292
Boart Longyear	William Krasnozon	705-499-3444
Kluane Drilling		705-672-3311

8.0 UNDERGROUND EMERGENCY ACTION PLAN

In an emergency situation it is imperative that due diligence is exercised as well as discretion. The priorities are the protection of **LIFE, LIMB and PROPERTY** – in that order

Please see **Section 2. of this E.M.R.P document** for further definition of a SERIOUS reportable incident / accident. All SERIOUS reportable incidents / accidents require notification of the YT OH&S Mine Inspector as defined in the Occupation Health and Safety Act – Mine Safety Regulations

"Underground Emergency" means:

a) "Serious" Incident
b) Serious Injury
c) Uncontrolled fire
d) Unexpected fall
e) Unexpected explosion
f) Any condition that can negatively affect:
   - life,
   - health
   - the environment.

"Mass Casualty Incident Emergency" – Underground means:

Any underground emergency which could affect 5 or more people.

8.1 REPORTING THE EMERGENCY:

Where an EMERGENCY exists that may affect mine personnel, evacuation procedures must be initiated.

Underground Emergency -

Any person discovering an emergency shall:

1. Request or initiate mine evacuation.
2. Notify personnel of the emergency using a mine phone or radio in your area (leaky feeder).
3. When mine radio or phone is not readily available for use as emergency notification:
    a) Proceed to the mine portal.
    b) Open the stench warning control box located on the compressed airline
    c) Turn the cylinder "on".
    d) Remain at the box until the cylinder is empty.
    e) Proceed to Bellekeno Mine Office Dry and report the nature of the emergency to response personnel.
    f) Report in, brass out and standby for further instruction.
    g) In addition to the compressed airline stench a stench bottle will be located at the main fan intake at both Bellekeno East Portal and Bellekeno 625 level. The fan must be on and response personnel must open the stench bottle and release the gas into the main fan air intake.

8.2 IN CASE OF FIRE:

Where a FIRE exists that may affect other personnel working in the area, evacuation procedures must be initiated:

Evacuation Procedures

1. Warn all personnel in the immediate area (voice, radio, phone) to evacuate to a safe location.
2. Initiate the Stench Warning System.
3. Where the fire is small, use nearby fire extinguishers to extinguish it, provided it is safe to do so.
4. If down wind of the fire, don your self rescuer (either the W65 or the SCSR's) and proceed to either a refuge station of fresh air base.
5. Do not expose yourself to unnecessary risk and keep a clear area of retreat behind you.
6. If the fire is too big, do not hesitate, leave the area immediately and evacuate to the designated assembly area or seek refuge.

Mass Casualty Incident Emergency - Underground

In the event of an emergency which could harm more than 5 employees, request that the underground stench warning system be initiated immediately:

This includes:

- All fires
- Fall of ground
- Inundation of water
- Unplanned explosion
- Gas
- Electrical

8.3 EMERGENCY WARNING RESPONSE:

Upon being notified of a mine emergency evacuation either by radio, phone or stench warning:

1. Stop work immediately,
2. Note the time you received the warning
3. Calmly proceed out of the mine using the safest route possible.
4. DO NOT RUSH UNNECESSARILY – EXCESSIVE SPEEDS USED TO LEAVE THE MINE CAN RESULT IN INCIDENT OR INJURY.

Once out of the mine,

1. Proceed immediately to the Bellekeno Mine Office Dry,
2. Report in to the Check out Coordinator and “Brass Out”.
3. Remain in the Mine Office Dry for further instructions.

8.4 MEDICAL PERSONNEL:

Underground Emergency – System of response

1. Initiate emergency response notification procedures as directed by Area Supervisor or Site Coordinator.
2. Upon completion of the emergency response notification procedure:
   a) Complete the EMERGENCY DATA SHEET.
   b) Establish MEDICAL ROOM as the COMMUNICATION CENTER.
   c) Keep all Communication Equipment on Standby.
   d) Direct operations personnel to COMMUNICATION CENTER.
   e) Confirm Incident Coordinator (IC) response has been initiated.
   f) Complete the EMERGENCY DATA SHEET by obtaining the following information:
      - Name of person reporting the emergency
      - Nature and severity of injuries and/or incident
      - Assistance required
      - Location of emergency
      - Number of people involved

8.5 REFUGE CHAMBER BARRICADING

For use when the nature of an emergency (such as fire, smoke, fall of ground) prevents your safe exit from the mine.

Nature of the refuge chamber

An air lock is provided to keep smoke and gases out of the inner chamber. There is a charged air line between the doors that can be used to blow smoke and gases out of the air lock before opening the inner door and possibly admitting bad air into the chamber.

When the refuge chamber is required:

1. DO NOT HESITATE. DON YOUR SELF-RESCUER IF SMOKE OR FIRE IS ENCOUNTERED.
2. RETREAT DIRECTLY TO THE NEAREST REFUGE CHAMBER AND BARRICADE YOURSELF IN.
3. Review the barricading procedures posted inside the refuge chamber.
4. Once inside, if smoke and gases leak in around the door frame, use the foam sealant provided to seal the door frame.
5. There is a compressed air line in the inner chamber. Open the air valve a ¼ turn to ensure a supply of breathing air and create a slight positive pressure to keep smoke and gases out.
6. Each chamber has a CO_2 exhaust valve located on an outer wall 2 feet above the floor. Find it and open it when using compressed or bottled air. This will prevent the chamber from over-pressurizing and allows carbon dioxide from your exhaled breath to escape. Carbon dioxide is much heavier than air; that is why the valve is low on the wall.

7. If the compressed air line loses pressure, the compressed air bottles can be used to provide a source of breathing air. Turn the compressed air line off. If fire caused the failure, air could be withdrawn out of the chamber through the air line.
8. Turn on all 4 compressed air bottles. Turn the regulator knob and adjust the outlet pressure to 25 – 30 psi. Adequate breathing air and slight positive pressure will be provided.
9. Check the mine phone for operation and call outside the mine. Report the following information:
10. Your name and name of others in refuge.
11. Refuge Chamber location.
12. Outside conditions.
13. That you are safe in refuge.
14. Remain in the refuge as long as you are safe, even if communication is cut off.
15. Do not be tempted to wander about the mine seeking safe passage out.
16. Remain in the refuge until you are rescued by mine rescue personnel.

8.6 MAIN VENTILATION CONTROLS IN CASE OF FIRE

In the event of an underground fire, efforts will be undertaken to ensure ventilation to the mine is maintained.

Operation of the main ventilation fans in Bellekeno East Decline and/or Bellekeno 625 level will be guarded and monitored to ensure continuous operation of the fans at all times.

The effects of the alteration to the main ventilation fans shall be clearly understood before the changes are made.

During a mine fire:

- There will be no alteration to the operation of the main fans without the authorization of the Area Supervisor or Site Coordinator.

8.7 MINE VENTILATION OUTAGE ACTION PLAN

In the event of fan failure due to a malfunction, accident, power failure, or other such unplanned or unscheduled event, this action plan applies to all underground employees and contractors whose work areas are affected by the temporary interruption of the operation of the main, booster, or auxiliary fans in the mine.

Main Ventilation Interruption Procedure:

Less Than 2 Hours:

1. Diesel mobile equipment, mucking operations, will cease in all active production and development headings supplied by mechanical ventilation until the main ventilation system is restored. ... OR ... The active heading is continually monitored for air quality and is maintained in compliance with the applicable standards.
2. All other work relevant (scaling, cleanup, maintenance, etc) to the active heading may continue per normal operations provided the air quality remains in compliance with the applicable standards.
3. Diesel mobile equipment for access to, or egress from, the mine will continue per normal mine operations provided air quality remains within compliance of the standards. **If the ventilation is forced the diesel equipment must be shut down until ventilation is re-established.**

Two Hours or More:

1. Air quality testing will be performed by Supervision in all active headings affected by the ventilation interruption. Where air quality is not within compliance of the standards for mine ventilation, all personnel shall be withdrawn from the active heading affected.
2. Ventilation to the affected active headings shall be restored to normal and the air quality in the affected active workings shall be tested by Supervision to ensure the air quality meets the requirements of the standards prior to the return to work in the area.
3. Prolonged ventilation interruption will require air quality testing in the affected active workings at least every four hours until ventilation has been restored.
4. In areas where air quality prevents continued testing, normal ventilation shall be restored for a minimum of two hours before persons enter the area to test air quality ... OR ...Suitable self contained breathing apparatus and procedures consistent with YT WCBOHS Regulations will be followed by competent persons to perform air quality testing the effected area.
5. Diesel mobile equipment for access to, or egress from, the mine on the main haulage ways will continue per normal mine operations provided air quality remains within compliance of the standards.
    a. **This is contingent on the mine having flow through exhaust. If the ventilation is forced the diesel equipment must be shut down and the mine evacuated until ventilation is re-established.**

Mine Quality Air Standards		
OXYGEN	Minimum 19%	Normal air is 21%
CARBON MONOXIDE	Permissible limit 35 PPM	
NITROGEN DIOXIDE	Permissible limit 3 PPM	
SULFUR DIOXIDE	Permissible limit 2 PPM	

9.0 MINE RESCUE

The contractor (Procon Mining and Tunneling) and Alexco Resource Corp. will have a trained mine rescue team available for mine emergencies.

If the mine rescue team is required, a back-up team has to be readily available. Due to Alexco's size of operation, sufficient responders may not be available onsite. Alexco has in place cooperative agreements with the Cantung Mine in the Yukon, BHP Ekati Mine in the NWT and other divisions of Procon Mining and Tunneling.

If the incident requires Mine Rescue response the YT OH&S Mine Inspector, Cantung and Ekati must be notified immediately, advised of the situation and to respond immediately pending available resources.

Agency	Contact Personnel	Office Contact Number	Home Contact Number
YT OH&S Mine Inspector	Ossie Venasse	867-334-2002	1-800-661-0443 (toll free)
Procon Mining and Tunneling	Brad Skeeles	604-291-8292	778-837-4407
Cantung Mine	Mark Goebel or Mike Daley	604-759-0913 X225	safety@skymessage.com.
BHP Ekati Mine (NWT)	Rob MacLean or Richard Weishaupt	867-880-2201	867-880-2154

10.0 REPORTABLE SPILL QUANTITIES

Should a spill of reportable quantity occur, under federal and territorial regulations, we are required to *immediately* notify the 24-hour Yukon Spill Report line: telephone number 867-667-7244.

For the purposes of the water use license:

1. Any quantity of spill is reportable.
2. The Senior Project Manager, Site Coordinator or Manager On-Call are responsible for reporting spills.
3. Reportable spills require an Incident Investigation Report to be completed.

This guide will assist in determining what volume of product requires reporting to regulatory agencies.

If a spill is deemed to be of reportable quantity, the area supervisor will immediately notify the Site Coordinator or Senior Project Manager who will in turn ensure that spill reporting is completed by designated personnel.

Reportable spill quantities

HAZARD Class	TYPICAL PRODUCTS ON SITE	REPORTABLE QUANTITY
Explosives (1)	• ANFO	Any amount spilled outside of blast pattern
Flammable Gases (2.1)	• Propane • Acetylene	>100 Liters
Non-Flammable Gases (2.2)	• Halon	>100 Liters
Poisonous Gases (2.3)		Any Amount
Non-poisonous Gases (2.3)		>100 Liters
Corrosive Gases (2.4)		Any Amount
Non-corrosive Gases (2.2)		>100 Liters
Flammable Liquids (3.)	• Diesel • Gasoline • Glycol • Hydraulic &/or Engine Oil	>200 Liters
Flammable Solids (4.)		>25 kg
Spontaneous Combustibles (4.)		>25 kg
Dangerous When Wet (4.)		>25 kg
Oxidizers (5.1)	• Sodium Hydroxide / Caustic Soda • Lime Solution • Sodium Nitrate • Calcium Hypochlorite • Ammonium Nitrate	>50 kg or 50 Liters
Corrosive Materials (8.)	• Hydrochloric / Muriatic /	>5 kg or 5 Liters
Miscellaneous Dangerous Goods (9.1)		>50 kg
Dangerous Waste (9.3)	• Waste Oil	>5 kg or 5 Liters

The Bellekeno MLU operating permit dictates that all spills will be reported.

11.0 SPILL RESPONSE EQUIPMENT RESOURCE LIST

	Location	Contact
Spill Response Kit	• Bellekeno East Fuel Tank • Bellekeno East Shop • Bellekeno 625 adit	Site Coordinator
Oil- Absorbent Pads	• In Spill Kits	Site Coordinator
Oil- Absorbent Booms	• In Spill Kits	Site Coordinator

Any contaminated soils will be removed to the land treatment facility in Mayo or a suitable permitted facility within the Keno Project area.

12.0 MISSING PERSONS ACTION PLAN

Potential exists where persons may become lost on the property. Such incidents can occur under the following circumstance:

- Alexco or Contractor personnel engaged in surface exploration or any other activities (i.e. care and maintenance) are overdue and can not be located or contacted.

Upon notification that Alexco personnel, or Contractors are unaccounted for on the property you should:

1. Immediately advise the Area Supervisor and Senior Project Manger or Site Coordinator who will:

    - Assess and determine the level of response required.
    - Gather all available information about the missing persons including last known location.
    - Advise the RCMP of the circumstances and request further assistance
    - Designate Keno Hill Project employees to stand-by and assist the RCMP in search efforts as directed

2. Stand-by to provide further information and assistance as required.

13.0 EMERGENCY EQUIPMENT AND EQUIPMENT LOCATIONS

EMERGENCY EQUIPMENT	LOCATION	USE IS AUTHORIZED BY:
Ambulance 4x4 Suburban with Stretchers	Elsa Town site Fire hall	Sr .Project Manager / Site Coord. First Aid Attendant
(MMTU) **Mobile Medical Treatment Unit** 4 x 4 Truck with Stretchers	Bellekeno Mine Site	Sr .Project Manager / Site Coord. First Aid Attendant
AED Automatic External Defibrillator Use when CPR is required	Admin 1st Aid Room Black and Neon ZOLL – AED Bellekeno East 1st Aid Room	Sr .Project Manager / Site Coord. First Aid Attendant
Oxygen **Airway Adjuncts (OPA)**	MMTV 1st Aid Jump Kit Admin 1st Aid Room Bellekeno East 1st Aid Room	Sr .Project Manager / Site Coord. First Aid Attendant
Spinal Precautions Spine Boards & Head Blocks Stiff Collars Spyder Straps KED – Vehicle extrication device	Ambulance MMTV Admin 1st Aid Room Bellekeno East 1st Aid Room	Sr .Project Manager / Site Coord. First Aid Attendant
Splints Vacuum Splints – Extremity breaks	Admin 1st Aid Room Bellekeno E. 1st Aid Room	Sr .Project Manager / Site Coord. First Aid Attendant
Wound Management **Burn Dressings** Sterile Water Bandages & Dressings	Ambulance MMTV Admin 1st Aid Room 1st Aid Jump Kit Bellekeno East 1st Aid Room	Sr .Project Manager / Site Coord. First Aid Attendant
EPI Pens Anaphylactic Shock / Allergies	Ambulance MMTV Admin 1st Aid Room 1st Aid Jump Kit Bellekeno E. 1st Aid Room	Sr .Project Manager / Site Coord. First Aid Attendant

14.0 EMERGENCY FIRST AID PATIENT ASSESSMENT MODEL

THE ROLE OF THE FIRST PERSON AT THE SCENE

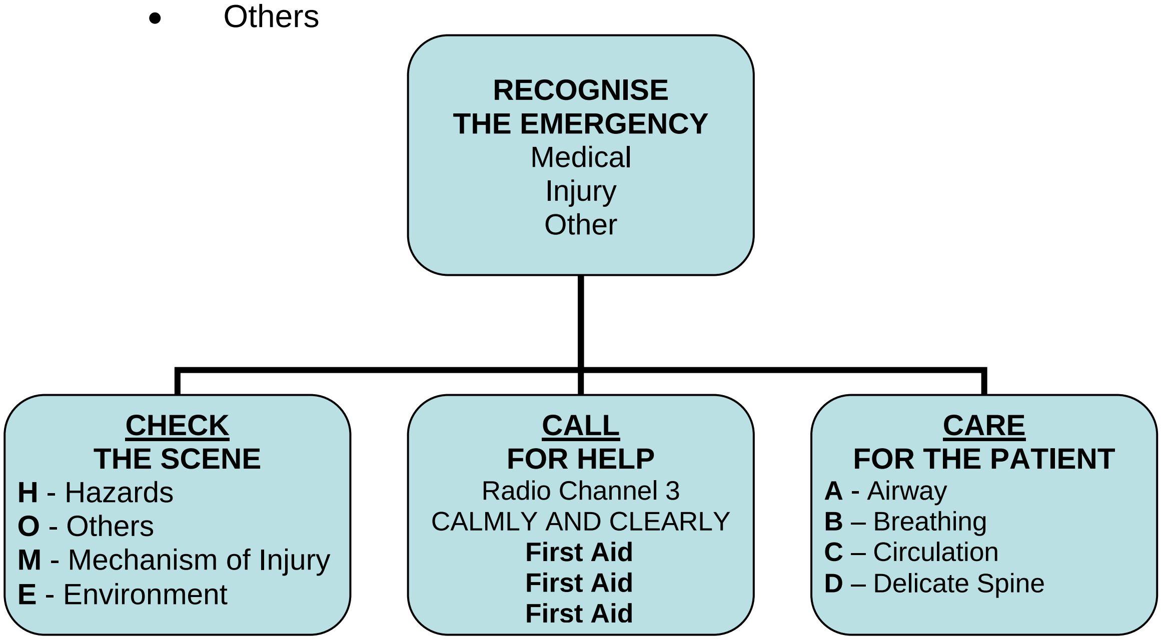
1. **CHECK** - Recognize the emergency
2. **CALL** – Activate medical services / first aid to attend the scene
3. **CARE** - Act according to your skills, knowledge and comfort level

A "**medical emergency"** is an illness or condition that needs immediate medical attention. For example:

- Anaphylactic shock
- Diabetic emergency
- Heart attack
- Others

An "**injury"** is damage to the body caused by external force. For example this damage can cause

- Broken bones
- Burns
- Wounds
- Others



15.0 EMERGENCY CONTACT INFORMATION

*As this **ERP document** is updated, only revised pages will be replaced.*

15. 1 Keno Hill Project

Name	Office	Home (other)	Cell
Tim Hall Operations General Manager	867-995-3113	907-790-2245	907-723-8974
Colleen Geddes Safety Coordinator	867-995-3113	867-667-6155	867-332-8384
Peter Johnson Project/Construction Manager	867-995-3113	867-993-5911	N/A
Kael Hanak Remediation Manager	867-995-3113	867-393-2741	N/A
Andrea Mansell Administration	867-995-3113	867-993-5911	N/A
Stan Dodd VP Exploration	867-995-3113	360-647-1375	360-319-1882
Bellekeno **Shifters Office**	1-604-637-5669		
Anson Smith Procon Mining	867-995-3113		306-382-9748
William Kraznosen Boart Longyear	705-672-3311		705-499-3444
Kluane Drilling			

In the event of a "SERIOUS" Incident, injury or accident you must notify:

1. Keno Hill Project Department Manager or Alternate
2. Member of the First Aid, Health and Safety Department

15.2 Keno Hill Project Department/Area Mangers

Name	Office	Home (other)	Cell
Tim Hall Operations General Manager	867-995-3113	907-790-2245	907-723-8974
Colleen Geddes Safety Coordinator	867-995-3113	867-667-6155	867-332-8384
Stan Dodd VP Exploration	867-995-3113	360-647-1375	360-319-1882
Peter Johnson Project/Construction Manager	867-995-3113	867-993-5911	
Kael Hanak Remediation Manager	867-995-3113	867-393-2741	N/A
Andrea Mansell Administration	867-995-3113	867-993-5911	
Anson Smith Procon Mining	867-995-3113		
William Kraznosen Boart Longyear	705-672-3311		705-499-3444
Kluane Drilling			

15.3 First Aid, Health & Safety Department

Name	Office	Home (other)	Qualification
Jennifer Dobbie First Aid & Safety	867-995-3113	867-332-5363	EMR, Mine Rescue U/G
Andrea Mansell First Aid / Administration	867-995-3113	867-993-5911	EMR, Surface Rescue
Tiffany Jewell First Aid & Safety	867-995-3113		EMR
Lisa Perry First Aid & Safety	867-995-3113		EMR

15.4 Alternate Keno Hill Department Managers

Name	Office	Home (other)	Cell
Grant Ewing / Les Keim Care and Maintenance	867-995-3113	867-332-1329 GE 867-993-5878 LK	
Rob McIntyre Access Consulting	867-668-6463	867-633-5844	867-334-6002
Dan Cornett Access Consulting	867-668-6463	867-668-7964	867-334-5104
Brad Thrall, COO Alexco Resource Corp	604-633-4888		604-250-6501
Clynt Nauman, CEO Alexco Resource Corp	604-633-4888		604-250-3293
David Whittle, CFO Alexco Resource Corp	604-633-4888		

ALEXCO RESOURCE CORP.
Keno Hill Project
PO Box #7
Elsa, Yukon Territory
Y0B 1J0

Tel: 867-995-3113
Fax: 604-995-2600

ALEXCO RESOURCE CORP.
Corporate Administrative Office
Suite 1150 - 200 Granville Street
Vancouver, BC
V6C 1S4

Tel: 604-633-4888
Fax: 604-633-4887

ALEXCO RESOURCE CORP.
#3 Calcite Business Centre
151 Industrial Road
Whitehorse, YT
Y1A 2V3

Tel: 867-633-4881
Fax: 867-633-4882

15.5 Reporting for "Serious" incidents, injuries, or accidents

Agency	Name	Home (other)	Other
YT OH&S Mine Inspector	Ossie Venasse	867-334-2002	1-800-661-0443 (toll free)
Chief Operating Officer Alexco Resource Corp	Brad Thrall	604-633-4888	604-250-6501
Chief Executive Officer Alexco Resource Corp	Clynt Nauman	604-633-4888	604-250-3293
Chief Financial Officer Alexco Resource Corp	David Whittle	604-633-4888	

15.6 Radio Communications

Channel	Area
Channel 3	**Keno Hill Project – First Aid**
Channel 4	**LAD 1**

Summon First Aid by:

Ensuring the radio turned on and on Channel 3

Keying the mic. to capture the channel

Clearly and calmly say: First Aid …First Aid …First Aid

Wait for a response from the attendant

State your name

State your location

State the nature of the assistance required

15.7 Emergency MEDIVAC Transportation

Name	Office	
ALCAN Air Fixed Wing	867-668-2107	Whitehorse Dispatch
Trans North Helicopters Helicopter	867-996-2355 867-335-2355	Mayo Dispatch Kel Huston - Pilot
Trans North Helicopters Helicopter	867-668-2177	Whitehorse Dispatch
Mayo Nursing Station Ground Ambulance	867-996-4444	Mayo Nursing Station Dispatch
Mayo RCMP **Alternate Emergency**	867-996-5555	Mayo / Whitehorse Station Dispatch

Important information to convey to MEDIVAC dispatch

1. Number of patients
2. Location of patients
3. Patient assessment provided by First Aid Attendant including:
    - Level of consciousness
    - Vitals – ABC's
    - Treatments provided (if any)
    - Spinal precautions (if any)
4. Weather or driving conditions
5. Coordinates for helicopter

HELICOPTER LANDING PADS -
Sites have windsocks for directional reference
Safety personnel will ensure the landing site is clear, lighted and free of traffic

Elsa town site:	**Latitude**	**63. 54 North**
	Longitude	**135.29 West**
Landing is at the shop / transport area		
Bellekeno East Mine:	**Latitude**	**63. 54 North**
	Longitude	**135.15 West**
Landing is at the helicopter pad located up hill of the portal at the waste rock site.		

15.8 Keno Hill Mine Rescue

Name	Agency	Name
Anson Smith	PROCON	**U/G Rescue**
Leland Smith	PROCON	**U/G Rescue**
Steve Cooper	PROCON	**U/G Rescue**
Andrew McArdle	PROCON	**U/G Rescue**
Randy Molinga	PROCON	**U/G Rescue**
Herman Melancon	PROCON	**U/G Rescue**
Roger Herbert	Boart Longyear	**U/G Rescue**
Jean-Guy Therrioult	Boart Longyear	**U/G Rescue**
Tim Hall	ALEXCO – U/G	**U/G Rescue, SFA – CPR**
Jennifer Dobbie	ALEXCO – U/G	**U/G Rescue, EMR**
Grant Ewing	ALEXCO – U/G	**U/G Rescue, SFA – CPR, Fire 1, Auto Ex**
Travis Murphy	ALEXCO – U/G	**U/G Rescue, SFA – CPR**
Florian Zech	ALEXCO – U/G	**U/G Rescue, SFA – CPR**
Vince Scartozzie	ALEXCO – U/G	**U/G Rescue, SFA – CPR**
Kael Hanak	ALEXCO – U/G	**U/G Rescue, SFA – CPR**
Peter Johnson	ALEXCO – Surface	**EMR, Auto Ex**
Tiffany Jewell	ALEXCO – Surface	**EMR, Auto Ex**
Andrea Mansell	ALEXCO – Surface	**EMR, Auto Ex**
Kyle Morrison	ALEXCO – Surface	**SFA, Class 2**
Rob Schneider	ALEXCO – Surface	**EMR, Auto Ex**
Stan Dodd	ALEXCO – Surface	**SFA – CPR**
Jared Chipman	ALEXCO – Surface	**SFA – CPR**
Kathleen Gould	ALEXCO – Surface	**SFA – CPR**
Colleen Geddes	ALEXCO – Surface	**EMR**

15.9 Co-operative Mine Rescue (CMR) Assistance

Agency	Name	Home (other)	Other
YT OH&S Mine Inspector	Ossie Venasse	867-334-2002	1-800-661-0443
Procon Mining & Tunneling	Brad Skeeles	604-291-8292	778-837-4407
Cantung Mine	Mark Goebel or Mike Daley	604-759-0913 X225	safety@skymessage.com
BHP Ekati Mine (NWT)	Rob MacLean or Richard Weishaupt	867-880-2201	867-880-2154

15.10 Territorial and Federal contact numbers

Name	Office	
Mayo Ambulance	867-996-4444	Mayo (Volunteer Responders)
Mayo Fire & Rescue	867-996-2222	Mayo (Volunteer Responders)
RCMP	867-996-5555	Mayo
Whitehorse Regional Hospital	867-393-8700	Emergency
Whitehorse Regional Hospital	867-393-8700	Admissions
Yukon Corner	867-667-5317	Whitehorse
Yukon Dept. of Conservation	867-667-5317	Whitehorse
Yukon Dept. of Fish & Game	867-393-6722	Whitehorse
Yukon Energy	867-996-2387	Mayo
Yukon Energy	1-800-676-2843	After hours Whitehorse
Yukon Occupational Health & Safety	867-334-2002 tel. 867-393-6279 fax	YOH&S Ossie Venasse (Mine Inspector)

APPENDIX G

HERITAGE RESOURCES PROTECTION PLAN

ALEXCO

HERITAGE RESOURCES PROTECTION PLAN

Construction Version – July 2009

BELLEKENO PROJECT

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1.0 Introduction

The Keno Hill Mining District is located in the vicinity of Keno City (63˚ 55'N, 135˚ 29'W), in central Yukon Territory, 354 km (by air) due north of Whitehorse. Access to the property is via a paved, two-lane highway from Whitehorse to Mayo (407 km) and an all-weather gravel road northeast from Mayo to Elsa (45 km); a total distance of 452 km. The Bellekeno mine is located about 3 km east of Keno City, while the Flame and Moth mill site is about 1.2 km to the west

The following Heritage Resources Protection Plan has been assembled to address the potential discovery of previously unknown heritage resources during the course of the project and provide a protocol for reporting and protecting these resources. For reference, the following definitions of heritage resources are provided:

- Heritage (or Historic) Resource – abandoned sites and objects greater than 45 years in antiquity. Cabins, caches, graves, brush camps, and other man-made structures, features or objects are the most readily recognized. Mining artifacts in the Keno Hill District are particularly abundant, as the area has hosted nearly 100 of years of very active mining.
- Archaeological Resource – tend to date before European contact and found on or under the ground surface, generally consisting of the remains of ancient camps, hearths, stone tools and debris.
- Palaeontological Resource – fossil and other remains of extinct or prehistoric plants and animals including bones of mammoth, horse, bison and other ice age fauna as well as fossil remains and traces plants, vertebrate and invertebrate fauna.

2.0 Heritage Resources Protection Plan

Over the decades since the mid-19ths century, pioneer gold seekers, frontiersmen, miners, surveyors, trappers, merchants, geologists, engineers and individualists have come to explore, live and work in the Keno area. Since the major discovery of silver around the turn of the 20th century, the district made the Yukon one of the world's leading silver producers and backstopped the territorial economy for decades.

Alexco recognizes the importance of the historic and heritage values that characterize this historic mining district. In fact, the historic and heritage aspects of the Keno Hill Silver District certainly enhances our pride and enjoyment of the area while we pursue the economic revitalization of the District. As miners, we naturally hold historic mining evidence and artifacts in high regard.

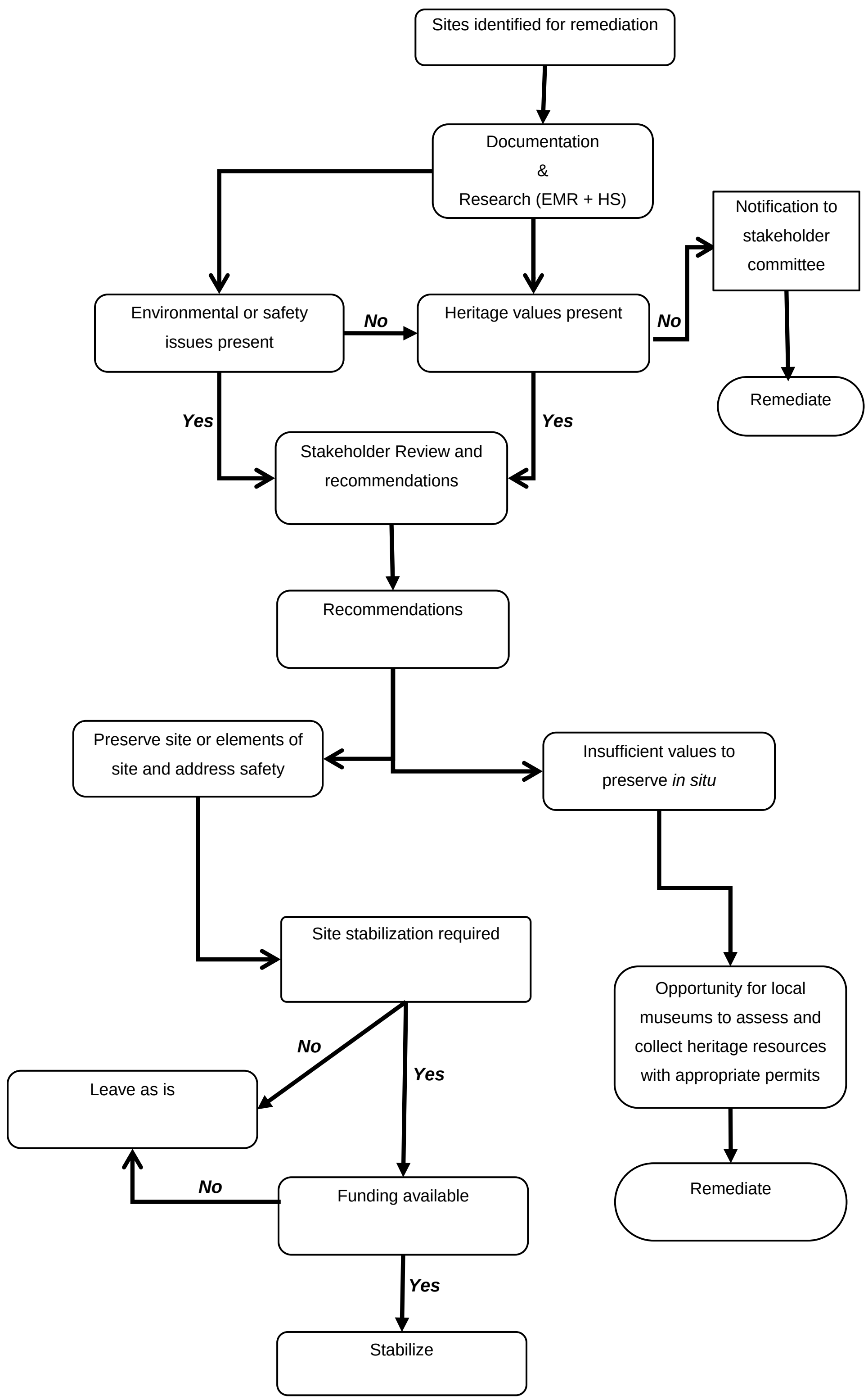
Consideration of heritage resources is an important component of the District wide Closure Plan being developed by Alexco and the governments of Canada and Yukon and the NNDFN. Multi-stakeholder heritage assessment of Keno Hill last year, as a component of our Physical Hazards reduction program, identifying specific element of the Keno 700 mine site, as well as Comstock-Keno, the Keno 200, and the Porcupine Mine. Although much of these sites will be remediated, there were several items of interest to various the stakeholder groups who participated in the preliminary assessment.

In general, the process developed in conjunction with Type II Abandoned Mine Sites and YG Heritage and NNDFN follows the protocol as presented as Figure 1 "*Protocol for Site Remediation of Keno Hill Mine Sites".*

Documentation of sites includes: locating with GPS, photographs, cataloguing, initial condition, environmental and public safety assessment, historical research.

The stakeholder Committee struck to oversees this work includes ERDC, First Nation of the Nacho Nyak Dun, the Silver Trail Association, YG – Yukon Type II Abandoned Mines staff, and Yukon Historic Sites staff.

Figure 1 Protocol for Site Remediation of Keno Hill Mine Sites



Local Museums in the area are the Keno Mining Museum in Keno or the Binet House in Mayo.

Prior to any removal of any heritage resource form the Keno Hill will require a Permit to remove heritage resources from sites – Scientists and Explorers Permit.

Through community and stakeholder consultation, the Duncan Creek Road to the west of Keno City was identified as having been used in the past as an informal solid waste disposal area. This area may correspond with Phase II of the Keno City Bypass, and construction of this road may disturb heritage resources. A formal heritage inspection of the Keno City Bypass the Flame and Moth mill site/DSTF area has been schedule with Yukon Government Heritage Branch on July 28th, 2009 in order to identify and preserve any heritage resources which may exist before construction commences.

With the possible aforementioned exception, no activities will occur in the vicinity of known heritage resources unless approved in writing by the appropriate authorities. Before commencing any project activities that may disturb known heritage resources, the area would be appropriately marked in the field. Development is prohibited within 30 m of a known or suspected heritage site.

3.0 Response to Discovery of Heritage Resources

The following response will be implemented to provide protection for any heritage resources discovered during:

- Land clearing;
- Road and trail construction/use; and
- Excavation and placement of soils/rock in are as proposed for development.

Notification & Preliminary Response	• In the event previously unknown heritage resources are discovered, operations will be suspended and the site will immediately be marked and protected from further disturbances and no objects will be removed. • Notification will be provided to Yukon Government Heritage Resources Branch at (867)667-5363 and the NNDFN at (867) 996-2265 and they will be consulted for advice on mitigation. • No further activities may be carried out within 30 m of the site until Yukon Government indicates in writing that the activities may be resumed.
Archaeological Resources	• Any site containing archaeological objects discovered in the course of carrying out operations will, as soon as practicable, be reported to the Yukon Archaeology Program, Government of Yukon in Whitehorse at (867)667-3771 or (867)667-5386.
Palaeontological Resources	• Any site containing palaeontological resources discovered will, as soon as practicable, be reported to the Yukon Palaeontology Program, Government of Yukon in Whitehorse at (867)667-8089 or 1-800-661-0408.
Human Remains	• If human remains or burial sites are discovered, work will cease immediately and the RCMP notified. The Guidelines Respecting the Discovery of Human Remains and First Nation Burial Sites in the Yukon will be followed.

APPENDIX H

WILDLIFE PROTECTION PLAN

ALEXCO

WILDLIFE PROTECTION PLAN

Construction Version – July 2009

BELLEKENO PROJECT

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1.0 INTRODUCTION

The Keno Hill Silver District supports a variety of wildlife including ungulates, fur-bearers, small mammals, upland game birds and waterfowl. Results of moose surveys conducted between 1993 and 2006 as well as an annual ground based monitoring program (2001 – 2006) generally indicate that the density of moose in the Mayo-Elsa-Keno area is higher than the Yukon average. Small mammals common to the area include muskrat, beaver, ground squirrel, red squirrel, varying hare, fox, mink, weasel, vole and shrew. Less common are porcupine, river otter and chipmunk. Alpine areas have local populations of hoary marmot and pika as well as a unique population of butterflies. Large carnivores include black bear, grizzly bear, lynx and timber wolf. This area is included in the range of the Mayo woodland caribou herd, although only anecdotal information on the herd is available. Caribou and sheep are also observed on rare occasion.

A summary of the key terrestrial resources and resources utilization within the regional area is provided:

- the area is characterized by widespread discontinuous permafrost with a variety of habitat types including low wetland areas to scree dominated mountainous areas;
- a wide variety of wildlife is supported (above);
- the area has a long history of resources utilization by local communities and first nations with exploitation of local wildlife populations; and
- local observations indicate that wildlife habitat is regenerating and wildlife populations are being maintained.

1.1 Site History

There is no question that past anthropogenic activities in the Keno Hill Silver District have altered the local landscape and affected local wildlife populations. However, observations of these effects over time have indicated the environment's natural capacity to regenerate habitat and sustain wildlife and waterfowl populations in the face of past development and occupation pressures. With the Bellekeno mine/mill development and operation activities, it is expected that there will be minimal loss of wildlife habitat or displacement of local wildlife due to the Bellekeno mine/mill development operation. Some areas within the mill site and tailing areas have been previously disturbed with many facilities already in existence on the sites (Flame and Moth pit is a previously disturbed area).

2.0 TOPICS OF CONCERN AND PROTECTION MEASURES

The objective of the procedures described below is to mitigate adverse impacts on wildlife by minimizing disturbance to the animals and their habitat, and minimizing disruption of their free movement.

Topic of Concern	Protection Measures
General	• All incidents and interactions with wildlife shall be reported to the District Conservation Officer in Mayo at (867) 996-2202, as well as any other communication regarding wildlife. • Every effort shall be made to avoid disturbing wildlife. • The provisions of the *Quartz Mining Land Use Regulations* Schedule 1 Operating Conditions (MLUA Class 3 LQ00186) will be adhered to.
Access Management	• Public access to the mill site will be controlled by means of signage at the mine site, mill site and all site haul and access roads. • Public access to the mine site, ponds and adits will be controlled by signage or gates and/or fencing • Access to the Flat Creek Camp will be controlled by means of fencing and a gate. • Speed limits will be enforced for mine traffic and posted along the access and site roads (maximum 40 km/hr, reduced to 20 km/hr at blind corners and bridge crossings). Mine traffic between the mill and the mine site will be radio controlled for safety and speed control. • To the maximum extent possible employees will be encouraged to take advantage of project bussing and transportation from Mayo/Elsa to the mine and mill site, thereby minimizing hunting opportunities and direct road mortalities; • Private employee all-terrain vehicles will be prohibited on the access road and at the mine site. • Existing trails and disturbed areas will be used where possible to minimize the addition of new linear corridors and there will be no unnecessary disturbance to the organic mat and soils. • Subject to safety considerations, new trails, roads, or cut-lines will be

Topic of Concern	Protection Measures
	doglegged to prevent predator line of sight into new habitat. • Snow plows on the access road will create breaks in the snow berm every 0.5 km to allow for wildlife to escape from the access road.
Harassment	• As provided for in sections 92 and 93 of the *Wildlife Act*, the proponent shall not harass wildlife or encourage wildlife to become a public nuisance. • Employees will undergo wildlife education, which will encompass no wildlife feeding, wildlife avoidance, and bear awareness among other topics. • Project personnel will not be allowed to have pets on the project site.
Ecologically Sensitive Areas	• Every precaution will be taken to avoid disturbance of wildlife sensitive areas, including but not limited to calving, denning or nesting sites. • Vegetative buffer zones will be maintained around stream riparian areas and facilities to minimize wildlife disturbance and protect wildlife corridors.
Wildlife Movement	• Measures will be implemented to reduce any impediment of wildlife movements, including ploughing back snow banks and ensuring sufficient breaks in the bank to provide adequate sightlines for drivers and wildlife escape. • All project activities will be maintained to the project area. Personnel movement will be restricted to the project area and access routes. Wildlife movements will not be restricted. • Windrows will not be created so that wildlife movements are not restricted, and fire hazards are minimized.
Wildlife Mortality	• Speed limits and signage at possible wildlife crossings will be posted to minimize vehicle/wildlife collisions. • Collisions between wildlife and project vehicles along the mine haul route will result in changes to the Traffic Management Plan to minimize these effects.
Wildlife Monitoring	• Wildlife monitoring is outlined within the Environmental Monitoring Program and includes maintaining a wildlife observation log onsite; reporting wildlife encounters; monitoring measures to ensure birds do not settle in ponds; and scheduled post-rut moose surveys. Environmental personnel on site will monitor project activities and modify operations to address wildlife concerns. • Wildlife monitoring responsibilities will include waterfowl and shorebirds within the sedimentation pond during migration periods.
Hunting and Fishing	• Project personnel will not be permitted to have firearms on the project site, unless authorized as a safety precaution.

Topic of Concern	Protection Measures
	• Employees are prohibited from hunting and fishing while on the mine site or in the vicinity of the project area, including during travel to and from the site. Infringement of this policy will be reported and may result in disciplinary measures.
Migratory Birds	• Monitoring of measures to ensure waterfowl and shorebirds do not settle in ponds. Environmental personnel on site will monitor project activities and modify operations to address wildlife concerns. • Further measures to protect against impact on migratory birds will be discussed with the Canadian Wildlife Service. These discussions may include bird scaring devices and measures to ensure birds do not settle in the sedimentation pond.
Bears	• The Company will have an employee bear awareness program. • The camp shall be equipped with bear deterrent devices and the devices shall be maintained in good working order throughout the duration of camp occupancy. • A Waste Management Plan is provided (section 6.0). Routine garbage patrols will be undertaken to remove materials, (e.g., metals, plastics, grease) which may be potentially harmful to wildlife. Garbage and debris destined for disposal will be collected routinely and prior to incineration stored in wildlife proof containers / fenced short term storage areas in a manner which does not attract wildlife to the mine site. Solid waste will be frequently and completely incinerated at the Elsa Solid Waste Management Facility in a manner which minimizes odours and eliminates the attraction of bears and other wildlife to the mine site. Nuisance bears shall be reported to Yukon Government authorities. • In the event that bears or other wildlife become a nuisance or problem at the camp, the Company will take appropriate measures such as the installation of a portable electrified fence around the perimeter of the camp.
Caribou	• All caribou observations will be reported to the Regional Biologist in Mayo • If caribou are observed on the project site between 15 May and 30 June[1], construction activities will be minimized to reduce disturbance of caribou calving.
Moose	• If moose are observed on the project site between 20 May and 10 June[2], construction activities will be minimized to reduce disturbance of moose calving.

3.0 REFERENCES

Gamberg Consulting, 1999. Contaminants in Yukon Moose and Caribou. Whitehorse, YT. March 1999

APPENDIX I

LQ00240 PRE-SEASON REPORT ADDENDUM (PHASE I, CONSTRUCTION SITE PLAN)

Alexco Keno Hill Mining Corp
#2 Calcite Business Center
Whitehorse, Yukon Y1A 2V3

June 26, 2009

Government of Yukon
Department of Energy, Mines & Resources
P.O. Box 2703 Whitehorse, Yukon Y1A 2C6

Attention
Judy St. Amand, Regional Mining Lands Officer

Subject: Addendum to 2009 Pre-Season Report, Quartz Mining Land Use Class IV Operating Permit LQ00240 for Keno Hill Exploration and Development -- Keno City Bypass Road Rehabilitation/Pioneering and Flame and Moth Site Preparatory Earthworks Construction

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Please see attached plans for additional work we are submitting as an addendum to our 2009 pre-season report. Please do not hesitate to call me at 668-6463 if you have any further questions or to discuss any aspect of this submission.

Sincerely,
ALEXCO KENO HILL MINING CORP.

____
Robert L. McIntyre R.E.T., CCEP
Vice President

Cc external: Joanne Oberg, Manager, Mining Lands; D. Buyck, First Nation of Nacho Nyak Dun
Cc internal: B.Thrall, D.Cornett, P. Johnson, T. Hall, S. Dodd

Attachment 1: Overview Figure
Attachment 2: Christal Lake Road Reconstruction Drawings (A00-20-051-A00-20-057)
Attachment 3: Mill Site Preparatory Earthworks Drawing

PRE-SEASON SUMMARY REPORT ADDENDUM
Operating Plan Update
Yukon Quartz Mining Land Use Regulations

Operating Plan Number: LQ00240
Date: June 26, 2009
Field Season: 2009
Property Name: Keno Hill
Operator: Alexco Keno Hill Mining Corp.
c/o Alexco Resource Corp.
1150 – 200 Granville Street
Vancouver, BC V6C 1S4
Telephone: 604-633-4888

1.0 Summary of Work to be Performed

As an addendum to the Alexco Resource (Operator Alexco Keno Hill Mining Corp.) Pre-Season Report (submitted February 16, 2009) we are submitting plans for additional work in support of the current exploration programs and will eventually be utilized for the Bellekeno Mine development program.

In this addendum, we are submitting plans for the construction and upgrading of roads for the purpose of bypassing Keno City with traffic to and from the Bellekeno Mine.

Second, we are submitting plans for preparatory earthworks in support of construction of a mill and ancillary facilities at the Flame and Moth pit. This work will include earth moving for construction of a mill pad.

Pelly Construction and Ewing Transport, both working in a joint venture with Nacho Nyak Dun Development Corporation of Mayo, YT, have been selected as the contractors responsible to carry out this work on behalf of Alexco.

2.0 Keno City Bypass

The Keno City bypass construction will consist of two components: (1), the upgrading of the existing Christal Lake Road (Phase I) and (2), the pioneering of a new segment of road connecting Sourdough Trail with Duncan Creek Road (Phase II). An overview of this work is attached (Attachment 1).

2.1 Phase I -- Christal Lake Road Reconstruction/Upgrade

Phase I of the Keno City bypass will involve rehabilitating the historic haul road that was used to supply ore to the Mackeno Mill during the 1950s between the Silver Trail Highway and Duncan Creek Road. This rehabilitated former haul road will be used to route exploration and mine through traffic around Keno City on route to and from Bellekeno. As activity related to the Bellekeno mine development program escalates, Alexco will use this road to reroute mine and haul traffic around the community Keno City in order to help mitigate community concerns over dust, noise and public safety.

As a previous haul road, this road was constructed to support heavy haul traffic and has not deteriorated significantly in most places. Primarily, reconstruction will consist of clearing brush. However, there may be requirements to add additional road base which may consist of glacio-fluvial gravel, placer tailings or of benign waste rock from the Bellekeno Mine. In some places, widening may also be required in order to produce a 4-5m wide driving surface. A large washout exists near Christal Lake, which will be built up and culverted. Attached are stamped engineering designs of this section of road reconstruction drawn by Wardrop Engineering Inc (Attachment 2).

A joint site inspection between Alexco and Government of Yukon Department of Highways occurred on June 24, 2009. Department of Highways has committed to facilitating our construction activities by undertaking upgrading work on Duncan Creek road during the summer of 2009. Specifically, this work may consist of brushing, clearing, and realignment of portions of the Duncan Creek road in the vicinity of the intersections of the Flame and Moth access road and the intersection of the Keno City Bypass Phase II. These measures will improve the sight distances and suitability of the intersections for mine haul traffic.

2.1.1 Erosion Control Measures for Christal Lake Road Reconstruction/Upgrading

As previous haul road, erosion control structures may still be in place including proper sloping, ditching and culverts. These will be reassessed and upgraded in accordance with Wardrop's engineering designs as construction proceeds.

2.1.2 Closure Measures for Christal Lake Road

Due to the fact that this road has been open to public access since the 1950s, it is unknown whether this road can be closed (i.e. gated) upon cessation of Alexco's use. It is anticipated that Alexco (and possibly other operators in the district) will continue to use this portion of the road in order to bypass Keno City long into the future after closure of the Bellekeno Mine. Therefore, for the purpose of this land use approval, closure measures will focus on returning the Christal Lake road to its previous (current) state. Specifically this will include removal of culverts, scarifying and decompacting the road surface and allowing natural revegetation to take place.

2.2 Phase II – Pioneering New Road Construction

Phase II of the Keno City Bypass route will involve construction of a new road and bridge across Lightning Creek, connecting the Sourdough Trail with the Duncan Creek Road to the southwest of Keno City. This bypass was presented to YESAB as a part of our Keno City mitigation plan in our Bellekeno Mine Development Project Proposal.

In the 2009 season, we are seeking approval to lay out this road and "pioneer" it with equipment in anticipation of final route selection. Final design and routing of this bypass and crossing are currently being optimized according to site conditions and community concerns and will be submitted for approval at a later date. The approximate location of this proposed road is shown in the attached figure. The actual crossing of Lightning Creek will require receipt of a Type A Water Licence, which is anticipated in the spring of 2010. Construction of this crossing and completion of Phase II of the Keno City Bypass for haul traffic is anticipated by spring/summer 2010.

2.2.1 Heritage Issues

Keno City community members have identified the segment of Duncan Creek road to the west of Keno City as having been used in the past as an informal solid waste disposal area. This area may correspond with Phase II of the Keno City Bypass, construction of this road may disturb heritage resources. As part of this proposed pioneering, we will propose traversing the route with a member of Yukon Government Heritage Branch in order to identify and preserve any heritage resources.

2.2.2 Erosion Control Measures for New Road Construction

The vegetative cover will be removed (stockpiled where feasible), and a cut into soil and bedrock made to produce a 4-5m wide driving surface. Additional erosional control features will be installed during final road construction. These measures will include ditching on the upslope and berming on the downslope as well as insertion of water bars placed where necessary.

2.2.3 Keno City Bypass New Road Closure

This new section of road will be subject to standard road decommissioning and reclamation measures at closure, including culvert excavation/removal, drainage recontouring, and surface scarification. Regrading/contouring the roads will ensure that runoff sheds off the road surface.

Upon cessation of use of the road, Alexco will use its own heavy equipment on site to roll back the crests of the downhill slope to remove the crest that would otherwise potentially be subject to erosion. Culverts will be removed and will be available for re-use on other parts of the property as necessary. Sections of the road where culverts were located will be graded back at shallow slopes to prevent erosion. Revegetation will be allowed to occur naturally, which, owing to the linear nature of the disturbance & therefore close proximity of natural seed sources, will be well underway within one or two seasons.

2.2.4 Other Mineral Rights Holders in the Vicinity of Keno City Bypass

Most new road construction will occur on quartz claims controlled by Alexco Keno Hill Mining Corp (registered by Alexco Keno Hill Mining Corp. or Elsa Reclamation and Development Company). The Keno City Bypass however, will cross a number of placer claims owned by Frank Taylor and several quartz claims registered to by Matthias Bindig (see Figure attached). Details of our proposed Keno City bypass route were part of the YESAB assessment (file number 2009-0030). This assessment is currently nearing completion, with the YESAB recommendations currently under review by Government of Yukon in preparation of their Decision Document. In addition to the opportunity for review and comment provided by the YESAB assessment, additional consultation with these mineral rights holders will be held prior to construction.

Although Alexco will be operating this road with an agreement with Frank Taylor of Duncan Creek Golddusters Ltd., Duncan Creek Golddusters Ltd. will retain the rights to reprocess these gravels for gold, under rights conferred by their placer claims. Therefore, any reclamation commitments made herein by Alexco are subject to Duncan Creek Golddusters Ltd.'s right to re-mine this material at some point in the future.

2.2.5 Lightning Creek Crossing

As previously noted, the Lightning Creek Crossing will be constructed in subject to and in accordance with the Type A water licence expected in early 2010.

2.3 Total Length of New Access Roads

In addition to the estimated new road construction in 2009 of less than 500 metres presented in the Pre-season Report, this addendum adds an additional 780 metres of new road to be pioneered connecting the Duncan Creek road to the Sourdough Trail Road across Lightning Creek to complete the Keno City Bypass.

2.4 Total Length of Road Upgrades on Claims

The Christal Lake Road between the Silver Trail Highway and the Duncan Creek Road to be upgraded according to these plans is approximately 1620 meters

3.0 Preparatory Earthworks, Flame and Moth

Preparatory earthworks proposed at the Flame and Moth pit area consist of a pad that will be suitable from a size and geotechnical suitability perspective in order to support eventual construction of a concentrating mill and ancillary facilities for the proposed Bellekeno Mine. This will consist of dozer work on previously cleared land (on the site of the former Flame and Moth open pit mine). Preparation will include excavation to competent bedrock wherever possible with compacted fill where required to achieve level. The approximate area of this pad is 150 x 80m. See Attachment 3 for location and details of this pad.

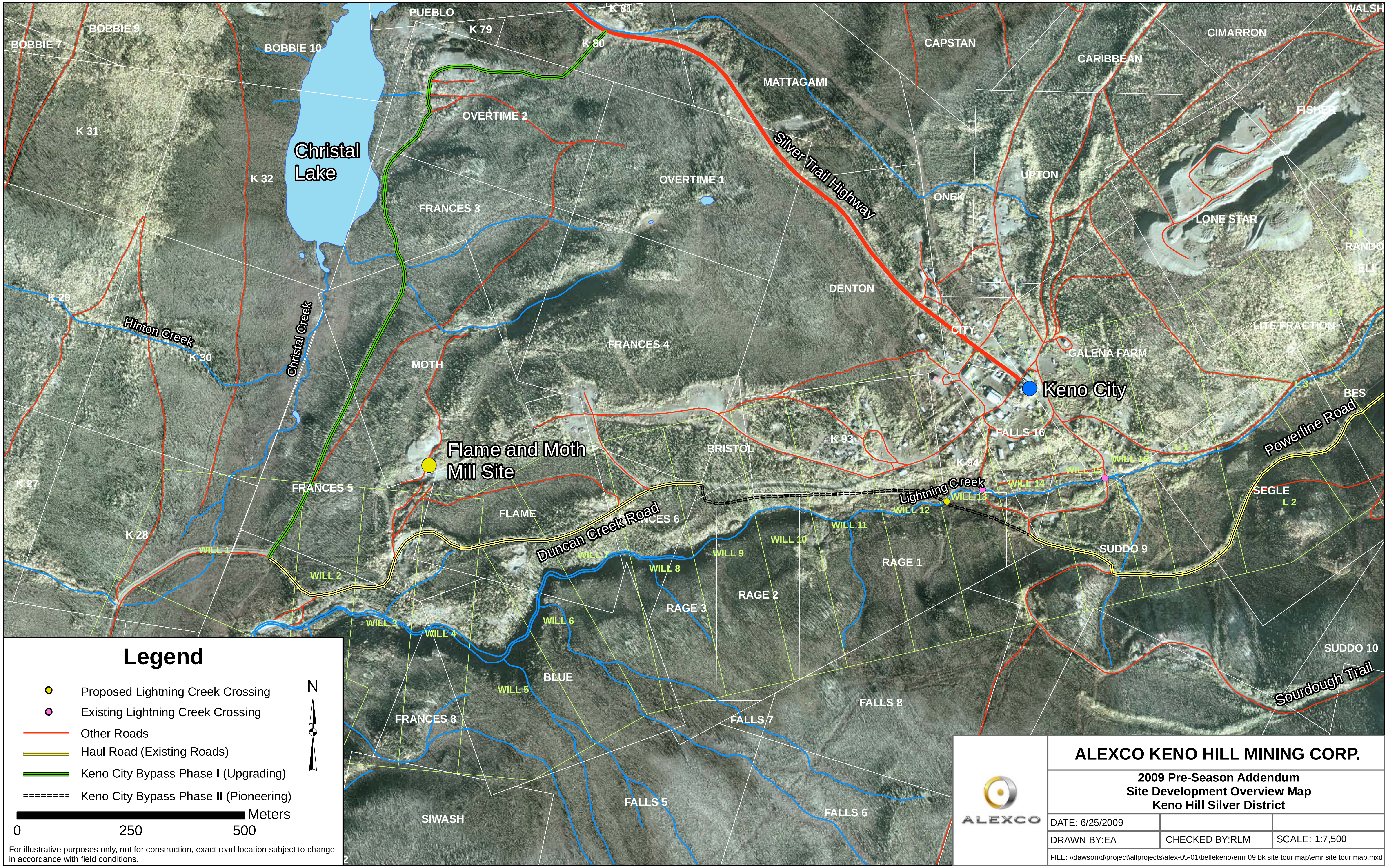
3.1 Erosion Protection

As a previously disturbed site first exposed in approximately 1950, with additional surface mining during the 1970s and 1990s and extensive exploration drilling in the vicinity during the 1970s and 1980s, the vegetative mat has been removed over most of the site. As a result, of these disturbances, bedrock, waste rock and clean gravels are prevalent over most of the surface of the site, and permafrost has long since melted. The majority of the fine soils have been washed away. Limited regrowth of pioneer species (primarily willow and birch) has occurred in some places. Due to this history, we do not anticipate significant erosion. This pad will be sloped in order to prevent ponding. Water diversion and collection structures at the mill site will be eventually be put in place as part of the Construction Site Plan, which will be authorized under the pending Quartz Mining Licence.

3.2 Flame and Moth Site Mill Pad Closure

Conceptual closure measures for all aspects of the project including the mill site associated earthworks and water diversion and retaining structures was addressed in the Bellekeno Mine Development Project Proposal submitted to YESAB under project number 2009-0030 (currently in final review.). Closure and reclamation measures specific to the mill pad area will be as follows:

- The pad area will have its embankment shoulders re-graded to prevent water ponding;
- The surface will be scarified and reseeded to promote vegetative cover.
- Organic mat (uniformly fairly thin, however in certain places, can be salvaged) will be stockpiled & later use during pit reclamation;
- Organic materials (including but not limited to damaged woody stem vegetation) will be mulched into the soils;
- The site will be re-contoured to fit with existing contour profile in the vicinity;
- Complete preexisting road profile as well as roadside ditch will be re-established;
- Site will be walked & ‘groomed’ to remove any garbage or debris;
- Any hydrocarbon contaminated sand that may have resulted from minor hydraulic hose leaks, fuel leaks, etc., will be removed & deposited in an approved site;
- Site will be prepared so that natural revegetation can occur uniformly in a timely manner (decompacting travelled portions of the pad);
- Areas where natural revegetation is unlikely to occur in a timely manner (i.e. before significant erosion) will be assisted with native grass species.


ALEXCO KENO HILL MINING CORP.
2009 Pre-Season Addendum
Site Development Overview Map
Keno Hill Silver District
DATE: 6/25/2009
DRAWN BY:EA
CHECKED BY:RLM
SCALE: 1:7,500
FILE: \\dawson\d\project\allprojects\alex-05-01\bellekeno\emr 09 bk site tour map\emr site tour map.mxd
ALEXCO
Legend
Proposed Lightning Creek Crossing
Existing Lightning Creek Crossing
Other Roads
Haul Road (Existing Roads)
Keno City Bypass Phase I (Upgrading)
Keno City Bypass Phase II (Pioneering)
N
Meters
0
250
500
For illustrative purposes only, not for construction, exact road location subject to change in accordance with field conditions.
Christal Lake
Keno City
Flame and Moth Mill Site
Silver Trail Highway
Duncan Creek Road
Powerline Road
Sourdough Trail
Lightning Creek
Hinton Creek
Christal Creek
PUEBLO
BOBBIE 9
BOBBIE 7
BOBBIE 10
K 79
K 80
K 31
K 32
K 30
K 28
K 27
OVERTIME 2
OVERTIME 1
FRANCES 3
FRANCES 4
FRANCES 5
FRANCES 8
MOTH
FLAME
BRISTOL
MATTAGAMI
CAPSTAN
CIMARRON
CARIBBEAN
UPTON
ONEK
LONE STAR
DENTON
CITY
GALENA FARM
LITE FRACTION
FALLS 16
FALLS 8
FALLS 7
FALLS 5
FALLS 6
K 93
K 94
SEGLE
SUDDO 9
SUDDO 10
RAGE 1
RAGE 2
RAGE 3
BLUE
SIWASH
BES
WALSH
WILL 1
WILL 2
WILL 3
WILL 4
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WILL 13
WILL 14
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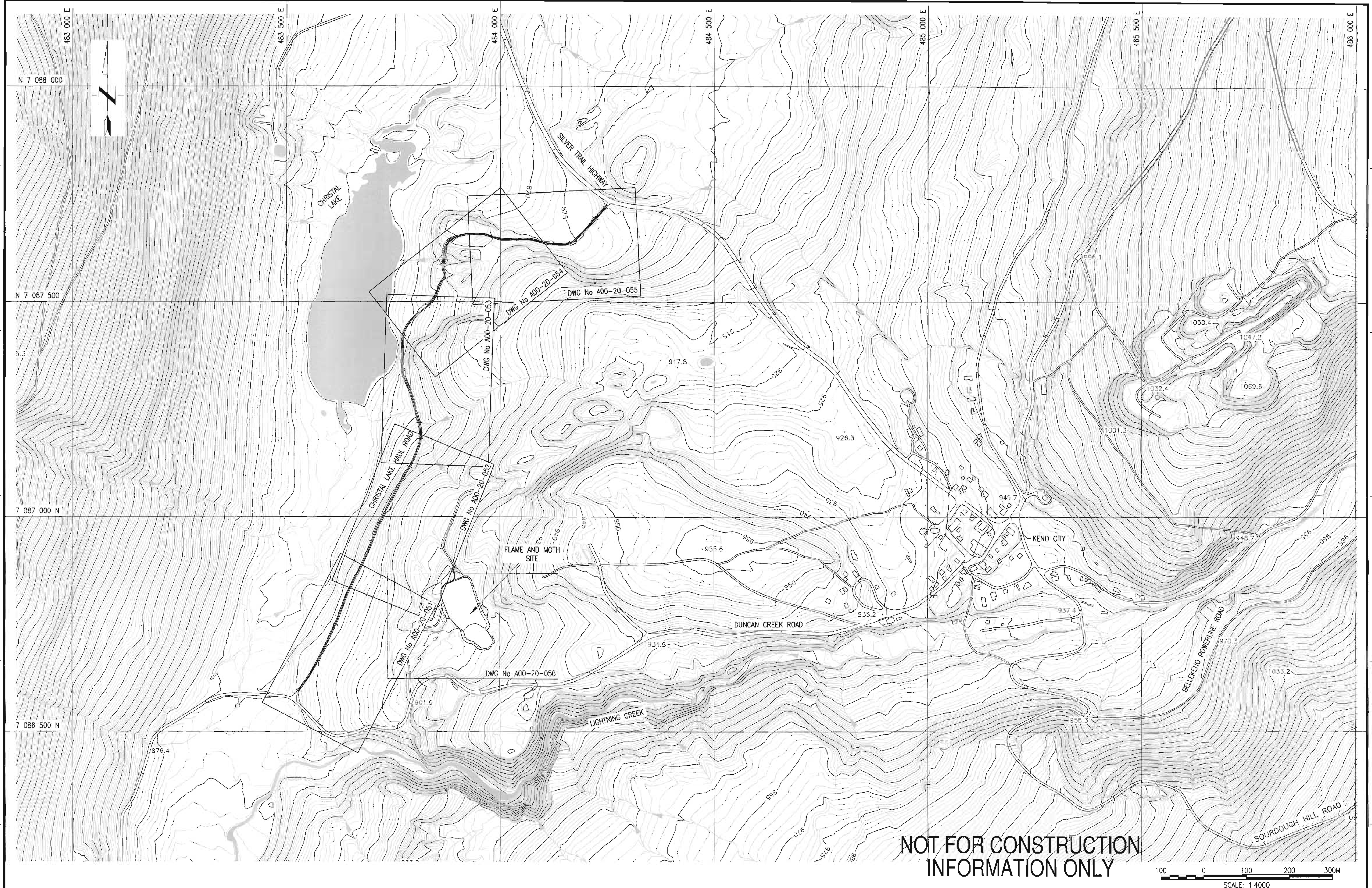

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PROFESSIONAL ENGINEER YUKON TERRITORY DWAYNE HARVIE 2009-6-23

REV. No.	ISSUE No.	DESCRIPTION	DATE	BY
A	1	ISSUED FOR PRELIMINARY DESIGN PURPOSES	23JUN09	MW

SECTION:	CIVIL-EARTH	
SCALE:	1:4000	DATE
DESIGN. BY:	MW	MAY09
DRAWN BY:	AO	MAY09
CHECK. BY:	JM	
APP. BY:		

YUKON TERRITORY

ALEXCO

WARDROP Engineering Inc.

BELLEKENO PROJECT

PLANT SITE FOOTPRINT AND CHRISTAL LAKE HAUL ROAD SHEET INDEX

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV
A0020057.DWG	09539601.00	A00-20-057	A

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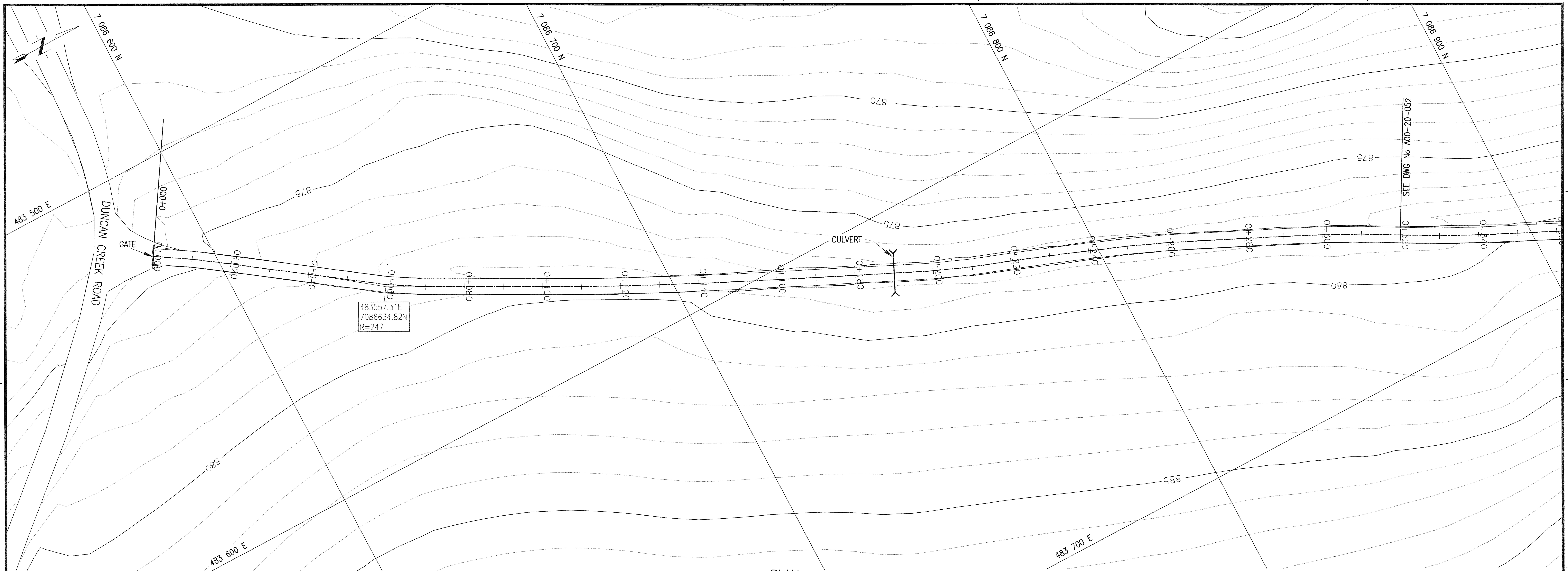

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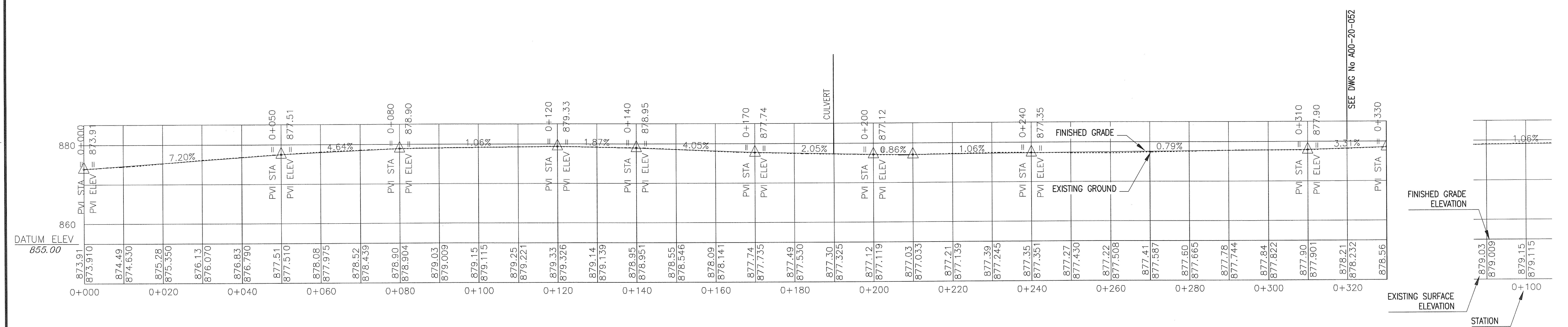

PROFILE
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INFORMATION ONLY

SCALE: 1:500

DWG. NO.	REFERENCE DRAWINGS
A00-20-057	PLANTSITE FOOTPRINT AND CHRISTAL LAKE HAUL ROAD SHEET INDEX

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DWAYNE HARVIE

REV. No.	ISSUE No.	DESCRIPTION	DATE	BY
B	1	ISSUED FOR PRELIMINARY DESIGN PURPOSES	23JUN09	MW
A	1	ISSUED FOR PEA UPDATE	05JUN09	MW

SECTION:	CIVIL-EARTH	
SCALE:	AS NOTED	DATE
DESIGN. BY:	MW	MAY09
DRAWN BY:	AO	MAY09
CHECK. BY:	JM	
APP. BY:		

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ALEXCO
WARDROP Engineering Inc.

TITLE
BELLEKENO PROJECT
PLANTSITE PREPARATION AND SITE ROADS
CHRISTAL LAKE HAUL ROAD
PLAN AND PROFILE
STA 0+000 TO 0+320

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
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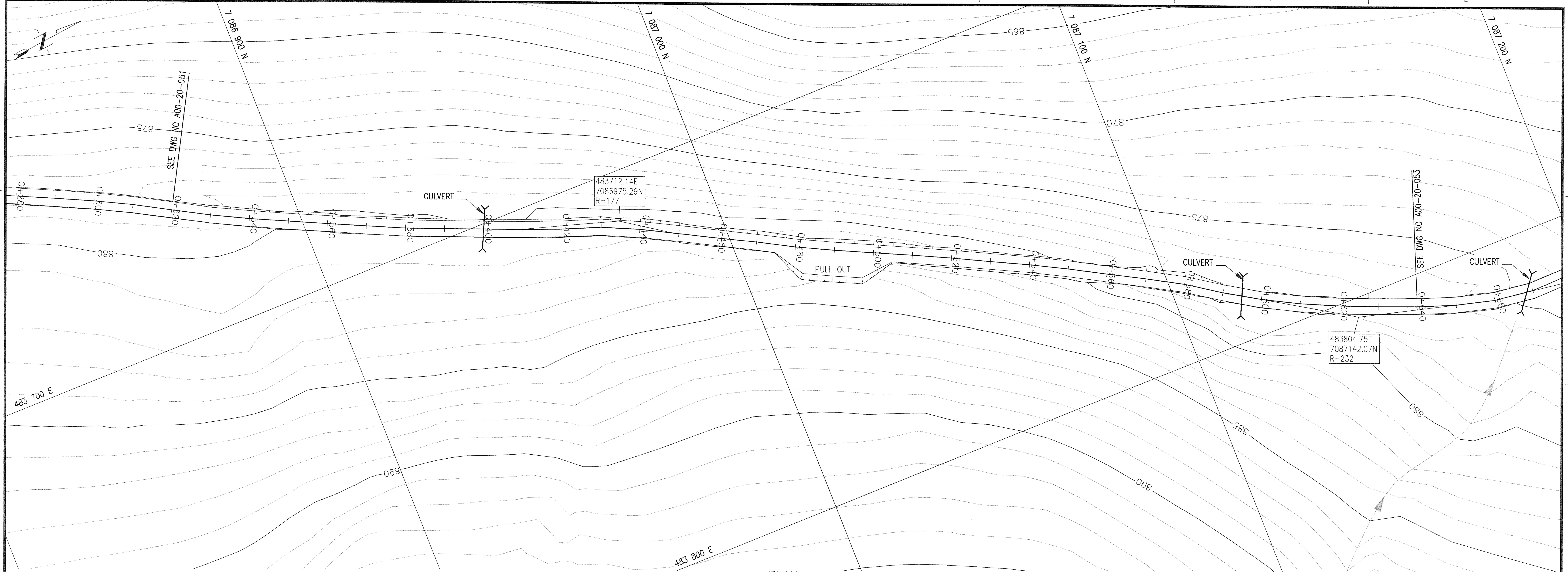

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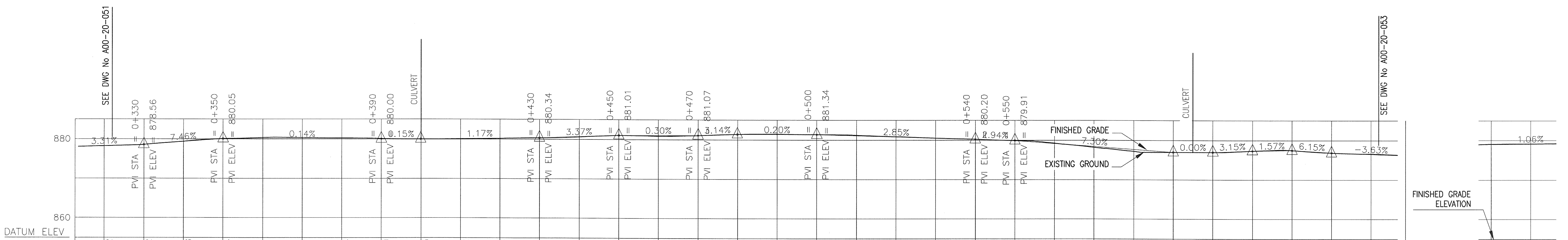

Station																																	
Finished grade elevation	878.21	878.56	879.38	880.05	880.33	880.33	880.22	880.09	879.98	880.00	880.16	880.34	880.62	881.01	880.88	881.07	881.38	881.43	881.34	881.22	880.87	880.52	880.20	879.91	879.24	878.23	877.20	876.99	876.99	877.32	877.46	876.85	876.61
Existing surface elevation	878.232	878.562	879.308	880.054	880.041	880.027	880.014	880.000	879.985	880.102	880.219	880.337	880.673	881.010	881.040	881.070	881.381	881.362	881.342	881.058	880.773	880.489	880.204	879.910	879.179	878.449	877.718	876.988	876.988	877.303	877.460	876.846	876.482

Finished grade elevation (legend)	879.03 / 879.15
Existing surface elevation (legend)	879.009 / 879.115

PROFILE
SCALE 1:500 V
1:500 H

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INFORMATION ONLY

10 0 10 20 30 40M
SCALE: 1:500

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DWG. NO.	REFERENCE DRAWINGS
A00-20-057	PLANTSITE FOOTPRINT AND CHRISTAL LAKE HAUL ROAD SHEET INDEX

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		DATE
SECTION:	CIVIL-EARTH	
SCALE:	AS NOTED	DATE
DESIGN. BY:	MW	MAY09
DRAWN BY:	AO	MAY09
CHECK. BY:	JM	
APP. BY:		

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ALEXCO
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TITLE
BELLEKENO PROJECT
PLANTSITE PREPARATION AND SITE ROADS
CHRISTAL LAKE HAUL ROAD
PLAN AND PROFILE
STA 0+320 TO 0+640

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
A0020052.DWG	09539601.00	A00-20-052	B

09/06/03 16:29

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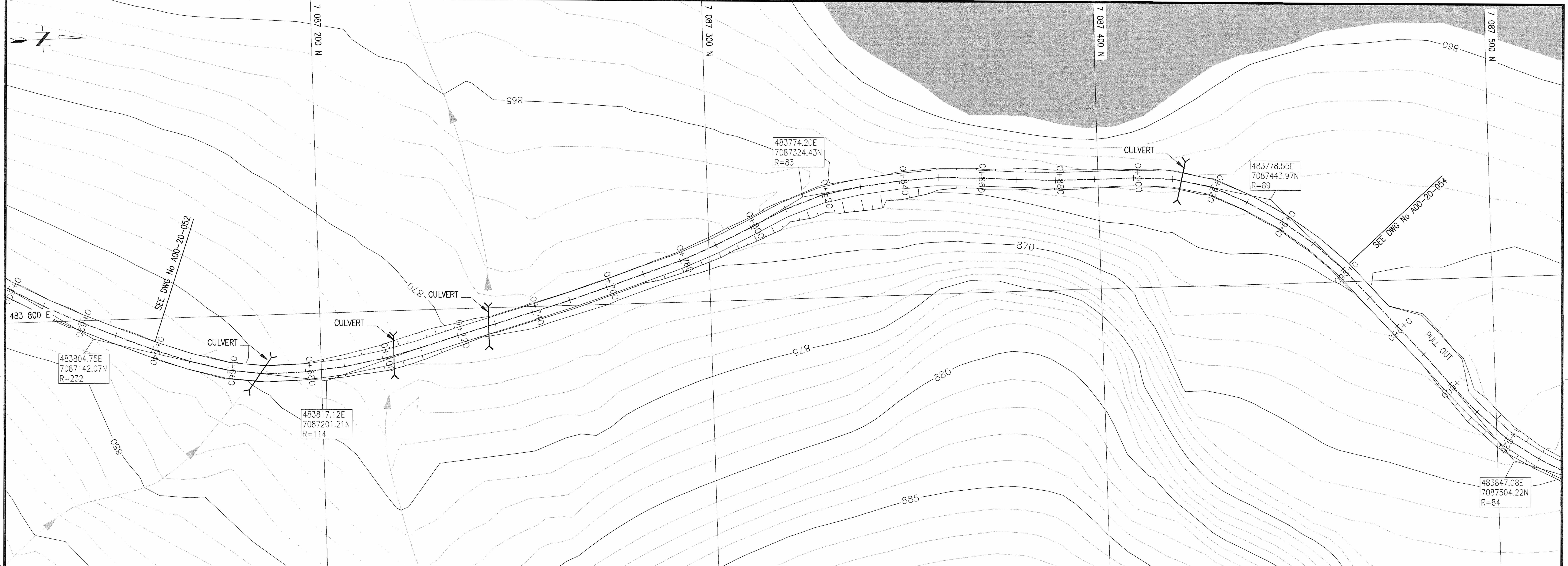

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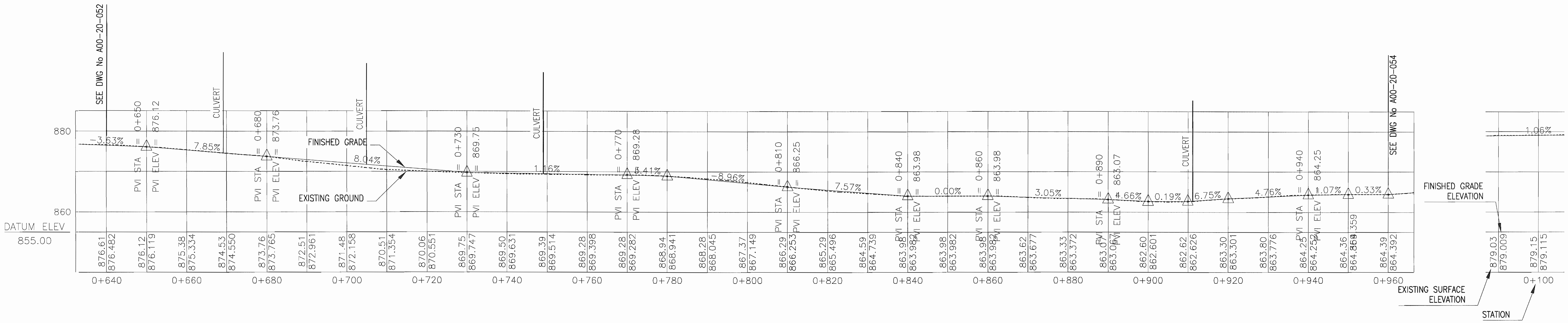
SCALE 1:500



PROFILE

SCALE 1:500 V
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INFORMATION ONLY

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DWG. NO.	REFERENCE DRAWINGS

PROFESSIONAL ENGINEER YUKON TERRITORY DWAYNE HARVIE 2009-6-23

REV. No.	ISSUE No.	DESCRIPTION	DATE	BY
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CLIENT, PROJ.MGR., PROCESS, ELECTR., INSTR., PIPING, MECH., STRUCT., ARCH., LAYOUT

SECTION:	CIVIL-EARTH	
SCALE:	AS NOTED	DATE
DESIGN. BY:	MW	MAY09
DRAWN BY:	AO	MAY09
CHECK. BY:	JM	
APP. BY:		

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TITLE
BELLEKENO PROJECT
PLANTSITE PREPARATION AND SITE ROADS
CHRISTAL LAKE HAUL ROAD
PLAN AND PROFILE
STA 0+640 TO 0+960

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
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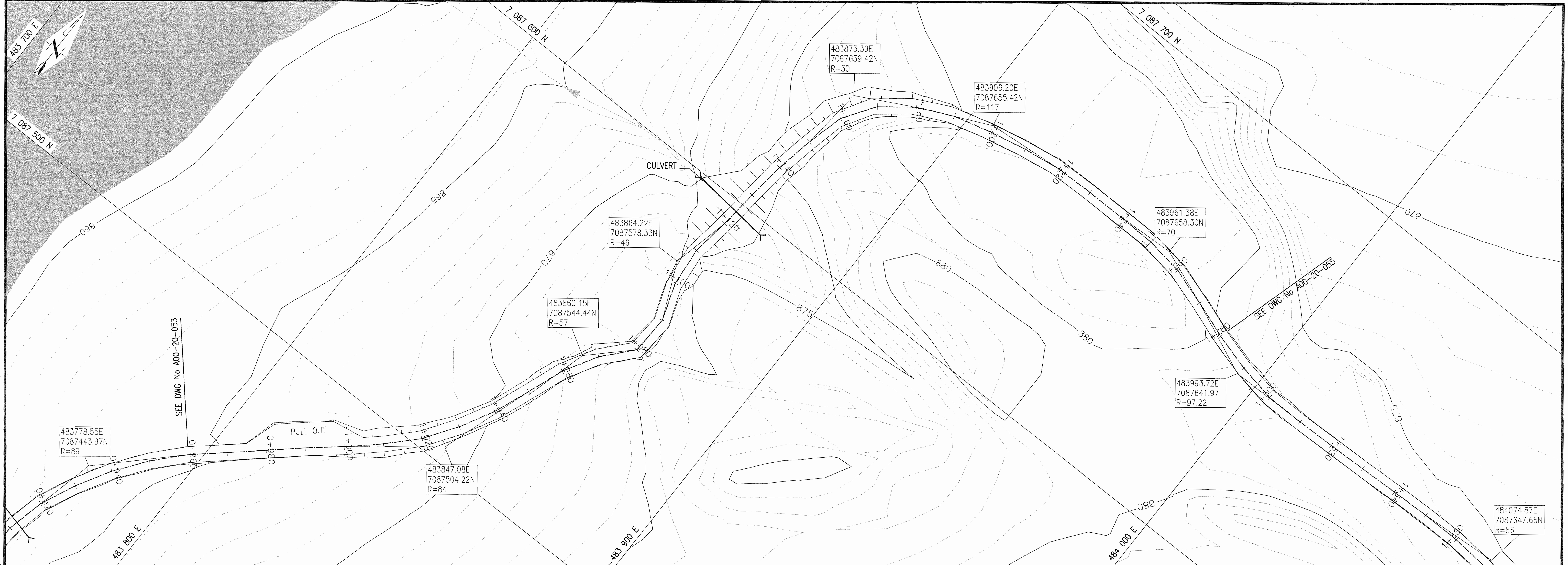

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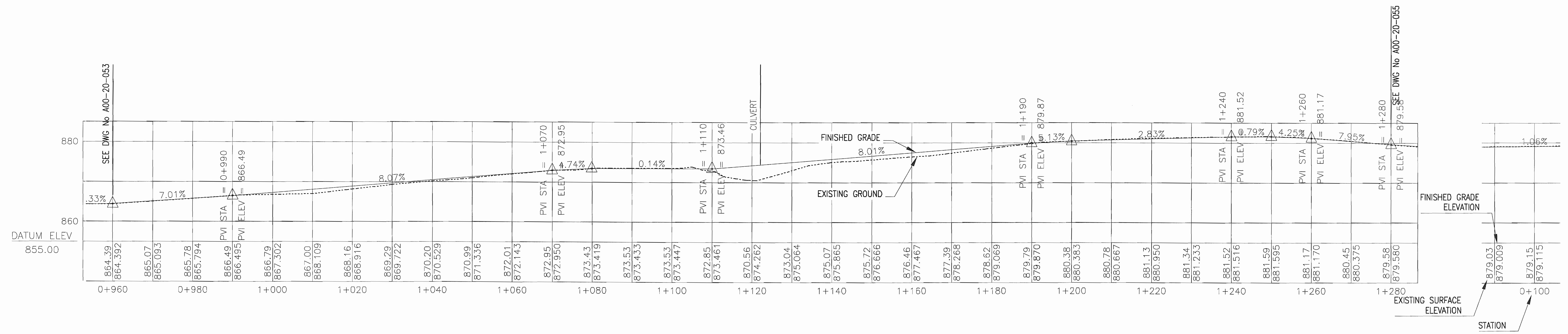

PROFILE

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SCALE: 1:500

DWG. NO. | REFERENCE DRAWINGS

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REV. No.	ISSUE No.	DESCRIPTION	DATE	BY
B	1	ISSUED FOR PRELIMINARY DESIGN PURPOSES	23JUN09	MW
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SECTION: CIVIL-EARTH
SCALE: AS NOTED | DATE
DESIGN. BY: MW | MAY09
DRAWN BY: AO | MAY09
CHECK. BY: JM
APP. BY:

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WARDROP Engineering Inc.

TITLE
BELLEKENO PROJECT
PLANTSITE PREPARATION AND SITE ROADS
CHRISTAL LAKE HAUL ROAD
PLAN AND PROFILE
STA 0+960 TO 1+280

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
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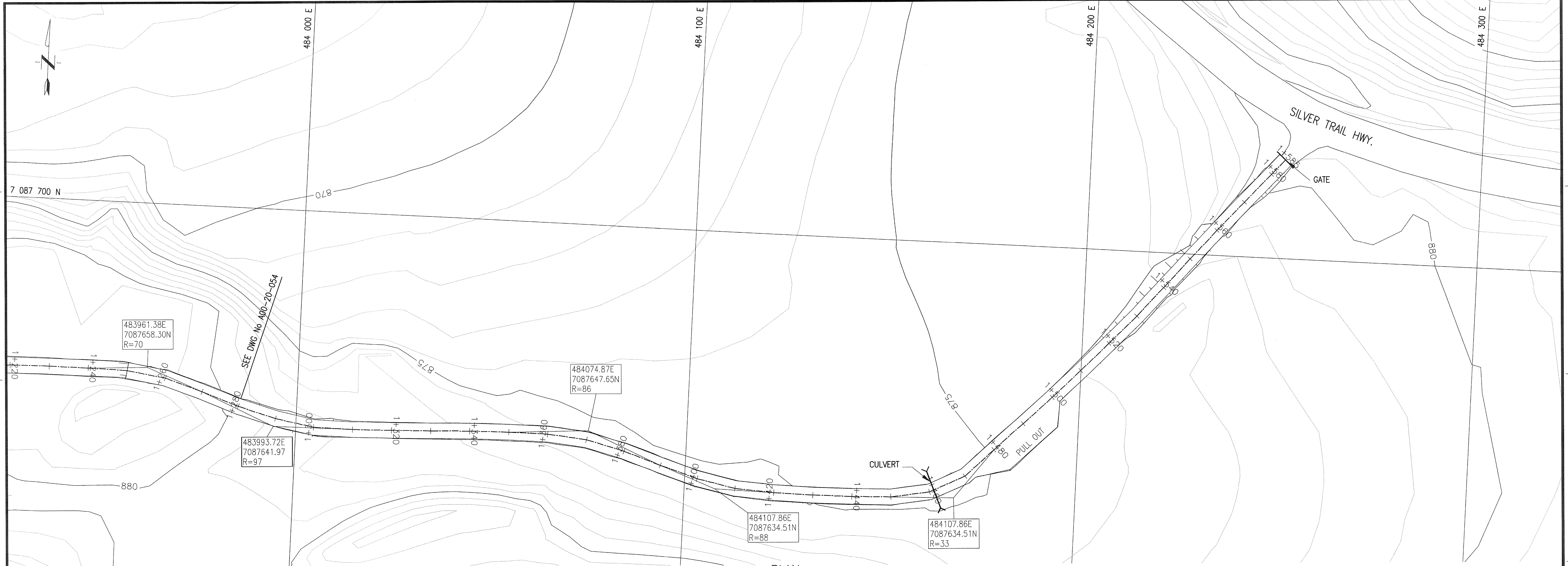

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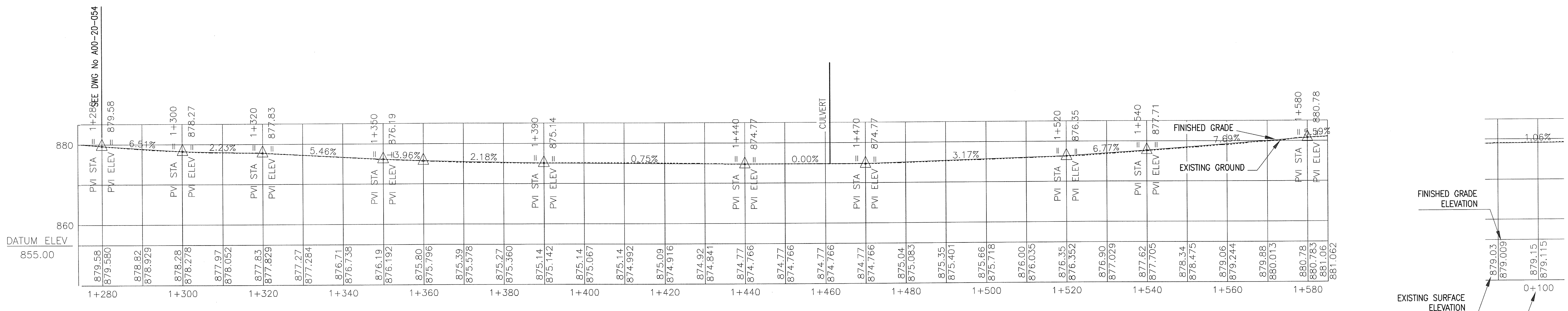

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NOT FOR CONSTRUCTION
INFORMATION ONLY

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DWG. NO.	REFERENCE DRAWINGS
A00-20-057	PLANTSITE FOOTPRINT AND CHRISTAL LAKE HAUL ROAD SHEET INDEX

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2009-6-2?

REV. No.	ISSUE No.	DESCRIPTION	DATE	BY
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SECTION:	CIVIL-EARTH	
SCALE:	AS NOTED	DATE
DESIGN. BY:	MW	MAY09
DRAWN BY:	AO	MAY09
CHECK. BY:	JM	
APP. BY:		

YUKON TERRITORY

ALEXCO

WARDROP Engineering Inc.

TITLE
BELLEKENO PROJECT
PLANTSITE PREPARATION AND SITE ROADS
CHRISTAL LAKE HAUL ROAD
PLAN AND PROFILE
STA 1+280 TO 1+610

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
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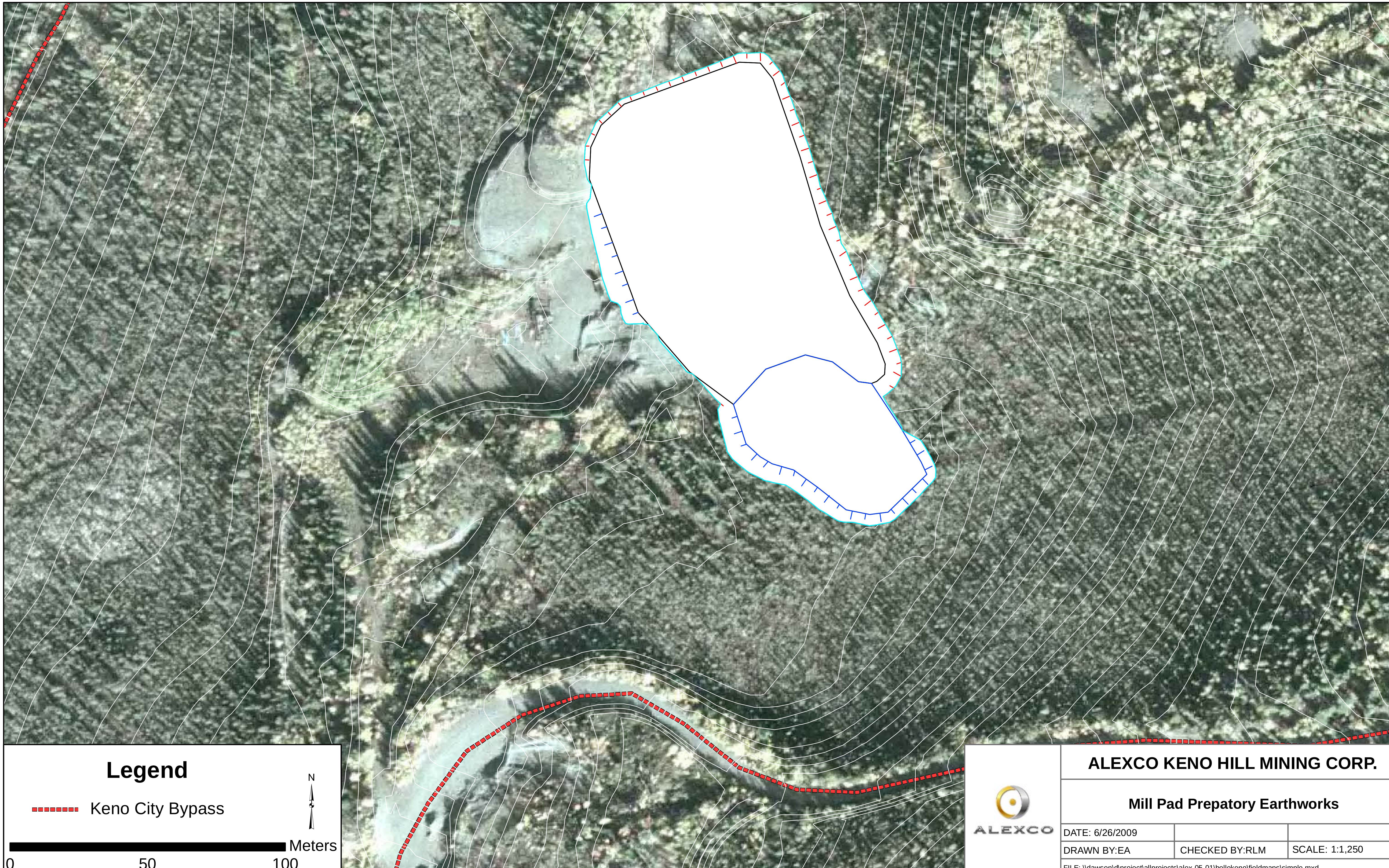

ALEXCO KENO HILL MINING CORP.

Mill Pad Prepatory Earthworks

ALEXCO

DATE: 6/26/2009		
DRAWN BY:EA	CHECKED BY:RLM	SCALE: 1:1,250
FILE: \\dawson\d\project\allprojects\alex-05-01\bellekeno\fieldmaps\simple.mxd		

APPENDIX J

TECHNICAL MEMO REGARDING TEMPORARY P-AML WASTE ROCK STORAGE FACILITY GEOTECHNICAL STABILITY

July 30, 2009 EBA File: W14101142.001

Alexco Resource Canada Corp.
#3-161 Industrial Road
Whitehorse, YT Y1A 2V3

Attention: Mr. Rob McIntyre
Vice President

Subject: Review of Potential Site for Typical Waste Rock Containment Facility Bellekeno East Adit, Keno Hill Silver District, YT

1.0 INTRODUCTION

In July 2008 EBA provided a typical design, including issued for construction drawings and specifications, for a containment facility to store waste rock from the Bellekeno advanced underground exploration and development program. This typical design was subject to an engineer reviewing and accepting each proposed site prior to construction of the facility.

Alexco has requested that EBA review the proposed site shown in Figure 1, which is approximately 850 m south of the Bellekeno East Adit. Alexco plans to temporarily store approximately 10,000 tonnes of waste rock at this location. EBA understands that this waste rock will be moved to an approved long-term storage location prior to 2015. This project was authorized by Rob McIntyre.

2.0 SITE CONDITIONS

Mr. Christopher Dixon, P. Eng. visited the site on May 6, 2009. The proposed site has an undetermined thickness of placer gravel overlying natural soil of the area. The natural soils in the area are expected to be frozen glacial silt till, based on review of surficial geology maps and experience with constructing the Bellekeno East Adit. The placer tailings are well graded gravel with some cobbles. The site is bounded on the west side by the natural treed slope (approximately 2H:1V) and on the east side by the placer spoil slope (approximately 2H:1V), which has no vegetation. The elevation difference from the toe to the crest of the placer spoil slope is approximately 30 m. The proposed site is approximately 35 m wide and 200 m long. There is an ephemeral creek which runs at the south end of the proposed site. The site naturally slopes from south to north at approximately 4%.

EBA Engineering Consultants Ltd.
p. 867.668.3068 • f. 867.668.4349
Calcite Business Centre • Unit 6, 151 Industrial Road • Whitehorse, Yukon Y1A 2V3 • CANADA

3.0 EVALUATION

EBA has examined the slopes and reviewed anticipated foundation soils expected at the site proposed for the waste rock containment facility. EBA considers the site acceptable for the construction of the facility as shown in Figures 1 and 2 subject to all conditions in the design specifications and issued for construction drawings (EBA File: W14101142), which are attached to this letter.

To construct the facility on the slope in question a setback distance equal to the slope height must be maintained from an imaginary line drawn at a 45º angle from the slope toe to the slope crest height. An example is shown in Section A on Figure 2.

EBA also reviewed the placer spoil gravel as a bearing surface. The gravel was placed in an unconsolidated condition and may be subjected to initial settlement when loaded with the waste rock. If the facility is constructed by cutting a portion of the gravel then a mass of waste rock equal to the mass of gravel removed can be placed without incurring any additional settlement. If a mass of waste rock greater than the mass of gravel is placed it should be limited to a height of 3 m if placed over a stratum of gravel greater than 3 m thick. The closer the facility is to the natural slope (west side of site), the thinner the strata of placer spoil should be. Review of the onsite topography indicates that it is not likely to have a stratum of gravel thicker than 3 m below the area where 3 m (or greater) of waste rock will be placed.

EBA collected a sample of the gravel during the site visit on May 6, 2009. The result of a particle size distribution test conducted on that sample of placer spoil is attached; the specification band shown is for Type B material from the specifications (EBA File W14101142). Currently, Alexco has not determined a source of Zone A Material.

4.0 RECOMMENDATIONS

EBA considers this site acceptable for the construction of the facility as detailed in the design drawings and specifications dated July 2008. All recommendations in the specifications and design drawings must be adhered to. If the facility is to remain in place past the year 2015, a long-term slope stability analysis should be conducted. The placer spoil gravel meets the gradation specifications for Zone B Material. Once a source of Zone A Material has been identified a sample should be collected and the particle size distribution determined. If the Zone A Materials meets the specification then liner Detail 1 can be used. If the Zone A Material is too fine then Liner Details 3 and 4 must be used. If the material is too coarse then Liner Details 5 and 6 must be used, as described in the original design drawings. If the facility is constructed to the dimensions shown in Figures 1 and 2 then it will have a storage capacity of 10,000 tonnes (5,900 m^3). The placement of waste rock must be as shown in Figure 2 to achieve this capacity (i.e. heaped at a 3H:1V slope).

5.0 LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of Alexco and their agents. EBA does not accept any responsibility for the accuracy of any of the data, the analysis or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than Alexco, or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this report is subject to the terms and conditions stated in EBA's Services Agreement and in the General Conditions included in this report.

6.0 CLOSURE

We trust this report meets your present requirements. Should you have any questions or comments, please contact the undersigned.

Yours truly,

EBA Engineering Consultants Ltd.

PROFESSIONAL
YUKON
CHRISTOPHER J. DIXON
TERRITORY
ENGINEER
July 30/ 2009

PROFESSIONAL
YUKON
RICHARD TRIMBLE
TERRITORY
ENGINEER
July 30/09

Christopher J. Dixon, P.Eng.
Project Engineer, Yukon Region
Direct Line: 867.668.2071 x241
cdixon@eba.ca

J. Richard Trimble, FEC, P.Eng.
Project Director, Yukon Region
Direct Line: 867.668.2071 x222
rtrimble@eba.ca

PERMIT TO PRACTICE
EBA ENGINEERING CONSULTANTS LTD.
SIGNATURE
Date July 30/09
PERMIT NUMBER PP003
Association of Professional Engineers of Yukon

DESIGN REPORT – GENERAL CONDITIONS

This Design Report incorporates and is subject to these "General Conditions".

1.0 USE OF REPORT AND OWNERSHIP

This Design Report pertains to a specific site, a specific development, and a specific scope of work. The Design Report may include plans, drawings, profiles and other support documents that collectively constitute the Design Report. The Report and all supporting documents are intended for the sole use of EBA's Client. EBA does not accept any responsibility for the accuracy of any of the data, analyses or other contents of the Design Report when it is used or relied upon by any party other than EBA's Client, unless authorized in writing by EBA. Any unauthorized use of the Design Report is at the sole risk of the user.

All reports, plans, and data generated by EBA during the performance of the work and other documents prepared by EBA are considered its professional work product and shall remain the copyright property of EBA.

2.0 ALTERNATIVE REPORT FORMAT

Where EBA submits both electronic file and hard copy versions of reports, drawings and other project-related documents and deliverables (collectively termed EBA's instruments of professional service), only the signed and/or sealed versions shall be considered final and legally binding. The original signed and/or sealed version archived by EBA shall be deemed to be the original for the Project.

Both electronic file and hard copy versions of EBA's instruments of professional service shall not, under any circumstances, no matter who owns or uses them, be altered by any party except EBA. EBA's instruments of professional service will be used only and exactly as submitted by EBA.

Electronic files submitted by EBA have been prepared and submitted using specific software and hardware systems. EBA makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

3.0 ENVIRONMENTAL AND REGULATORY ISSUES

Unless so stipulated in the Design Report, EBA was not retained to investigate, address or consider, and has not investigated, addressed or considered any environmental or regulatory issues associated with the project specific design.

4.0 CALCULATIONS AND DESIGNS

EBA has undertaken design calculations and has prepared project specific designs in accordance with terms of reference that were previously set out in consultation with, and agreement of, EBA's client. These designs have been prepared to a standard that is consistent with industry practice. Notwithstanding, if any error or omission is detected by EBA's Client or any party that is authorized to use the Design Report, the error or omission should be immediately drawn to the attention of EBA.

5.0 GEOTECHNICAL CONDITIONS

A Geotechnical Report is commonly the basis upon which the specific project design has been completed. It is incumbent upon EBA's Client, and any other authorized party, to be knowledgeable of the level of risk that has been incorporated into the project design, in consideration of the level of the geotechnical information that was reasonably acquired to facilitate completion of the design.

If a Geotechnical Report was prepared for the project by EBA, it will be included in the Design Report. The Geotechnical Report contains General Conditions that should be read in conjunction with these General Conditions for the Design Report.

GEOTECHNICAL REPORT – GENERAL CONDITIONS

This report incorporates and is subject to these "General Conditions".

1.0 USE OF REPORT AND OWNERSHIP

This geotechnical report pertains to a specific site, a specific development and a specific scope of work. It is not applicable to any other sites nor should it be relied upon for types of development other than that to which it refers. Any variation from the site or development would necessitate a supplementary geotechnical assessment.

This report and the recommendations contained in it are intended for the sole use of EBA's Client. EBA does not accept any responsibility for the accuracy of any of the data, the analyses or the recommendations contained or referenced in the report when the report is used or relied upon by any party other than EBA's Client unless otherwise authorized in writing by EBA. Any unauthorized use of the report is at the sole risk of the user.

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Where EBA submits both electronic file and hard copy versions of reports, drawings and other project-related documents and deliverables (collectively termed EBA's instruments of professional service), only the signed and/or sealed versions shall be considered final and legally binding. The original signed and/or sealed version archived by EBA shall be deemed to be the original for the Project.

Both electronic file and hard copy versions of EBA's instruments of professional service shall not, under any circumstances, no matter who owns or uses them, be altered by any party except EBA. EBA's instruments of professional service will be used only and exactly as submitted by EBA.

Electronic files submitted by EBA have been prepared and submitted using specific software and hardware systems. EBA makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

3.0 ENVIRONMENTAL AND REGULATORY ISSUES

Unless stipulated in the report, EBA has not been retained to investigate, address or consider and has not investigated, addressed or considered any environmental or regulatory issues associated with development on the subject site.

4.0 NATURE AND EXACTNESS OF SOIL AND ROCK DESCRIPTIONS

Classification and identification of soils and rocks are based upon commonly accepted systems and methods employed in professional geotechnical practice. This report contains descriptions of the systems and methods used. Where deviations from the system or method prevail, they are specifically mentioned.

Classification and identification of geological units are judgmental in nature as to both type and condition. EBA does not warrant conditions represented herein as exact, but infers accuracy only to the extent that is common in practice.

Where subsurface conditions encountered during development are different from those described in this report, qualified geotechnical personnel should revisit the site and review recommendations in light of the actual conditions encountered.

5.0 LOGS OF TESTHOLES

The testhole logs are a compilation of conditions and classification of soils and rocks as obtained from field observations and laboratory testing of selected samples. Soil and rock zones have been interpreted. Change from one geological zone to the other, indicated on the logs as a distinct line, can be, in fact, transitional. The extent of transition is interpretive. Any circumstance which requires precise definition of soil or rock zone transition elevations may require further investigation and review.

6.0 STRATIGRAPHIC AND GEOLOGICAL INFORMATION

The stratigraphic and geological information indicated on drawings contained in this report are inferred from logs of test holes and/or soil/rock exposures. Stratigraphy is known only at the locations of the test hole or exposure. Actual geology and stratigraphy between test holes and/or exposures may vary from that shown on these drawings. Natural variations in geological conditions are inherent and are a function of the historic environment. EBA does not represent the conditions illustrated as exact but recognizes that variations will exist. Where knowledge of more precise locations of geological units is necessary, additional investigation and review may be necessary.

7.0 SURFACE WATER AND GROUNDWATER CONDITIONS

Surface and groundwater conditions mentioned in this report are those observed at the times recorded in the report. These conditions vary with geological detail between observation sites; annual, seasonal and special meteorologic conditions; and with development activity. Interpretation of water conditions from observations and records is judgemental and constitutes an evaluation of circumstances as influenced by geology, meteorology and development activity. Deviations from these observations may occur during the course of development activities.

8.0 PROTECTION OF EXPOSED GROUND

Excavation and construction operations expose geological materials to climatic elements (freeze/thaw, wet/dry) and/or mechanical disturbance which can cause severe deterioration. Unless otherwise specifically indicated in this report, the walls and floors of excavations must be protected from the elements, particularly moisture, desiccation, frost action and construction traffic.

9.0 SUPPORT OF ADJACENT GROUND AND STRUCTURES

Unless otherwise specifically advised, support of ground and structures adjacent to the anticipated construction and preservation of adjacent ground and structures from the adverse impact of construction activity is required.

10.0 INFLUENCE OF CONSTRUCTION ACTIVITY

There is a direct correlation between construction activity and structural performance of adjacent buildings and other installations. The influence of all anticipated construction activities should be considered by the contractor, owner, architect and prime engineer in consultation with a geotechnical engineer when the final design and construction techniques are known.

11.0 OBSERVATIONS DURING CONSTRUCTION

Because of the nature of geological deposits, the judgmental nature of geotechnical engineering, as well as the potential of adverse circumstances arising from construction activity, observations during site preparation, excavation and construction should be carried out by a geotechnical engineer. These observations may then serve as the basis for confirmation and/or alteration of geotechnical recommendations or design guidelines presented herein.

12.0 DRAINAGE SYSTEMS

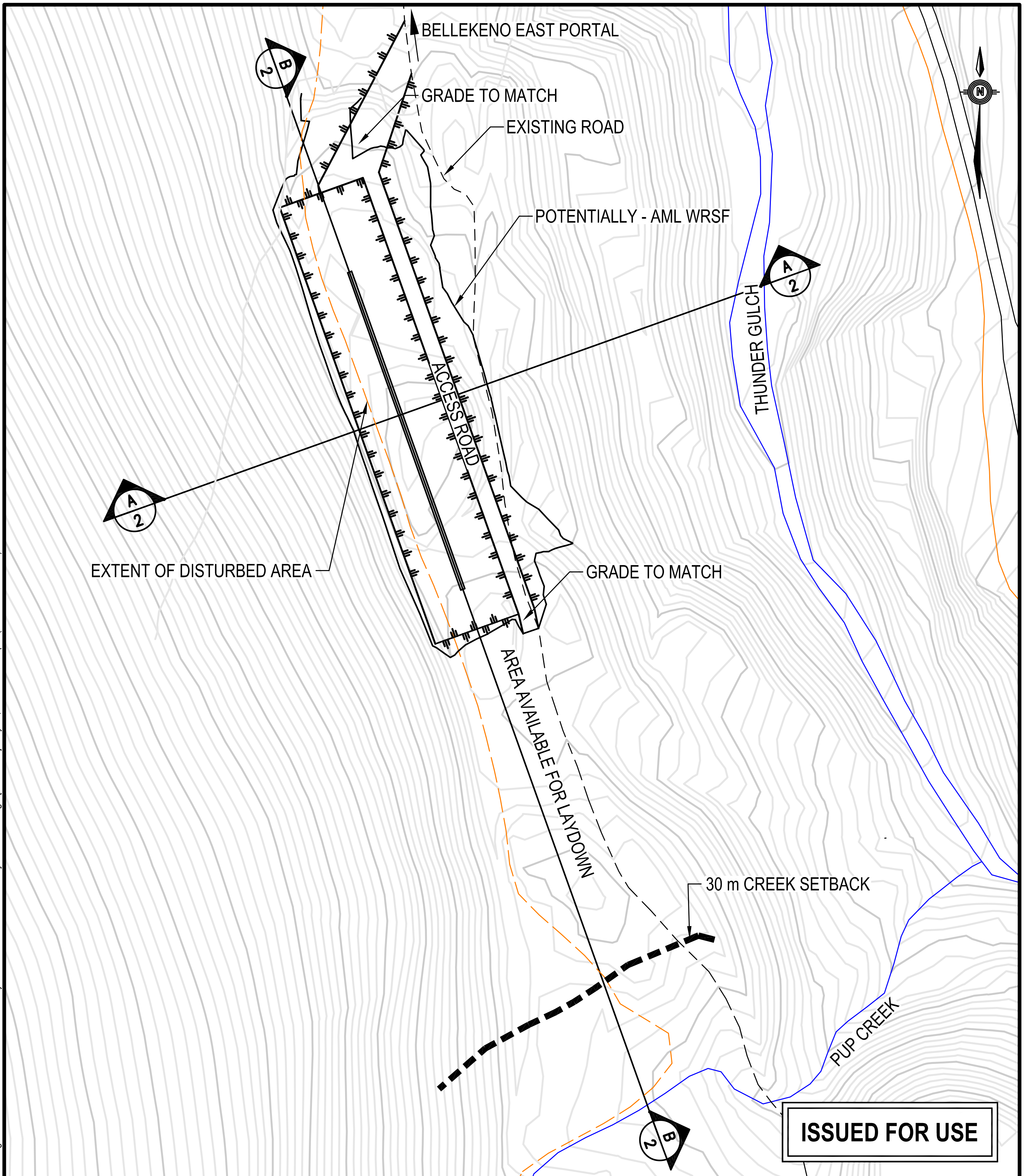
Where temporary or permanent drainage systems are installed within or around a structure, the systems which will be installed must protect the structure from loss of ground due to internal erosion and must be designed so as to assure continued performance of the drains. Specific design detail of such systems should be developed or reviewed by the geotechnical engineer. Unless otherwise specified, it is a condition of this report that effective temporary and permanent drainage systems are required and that they must be considered in relation to project purpose and function.

13.0 BEARING CAPACITY

Design bearing capacities, loads and allowable stresses quoted in this report relate to a specific soil or rock type and condition. Construction activity and environmental circumstances can materially change the condition of soil or rock. The elevation at which a soil or rock type occurs is variable. It is a requirement of this report that structural elements be founded in and/or upon geological materials of the type and in the condition assumed. Sufficient observations should be made by qualified geotechnical personnel during construction to assure that the soil and/or rock conditions assumed in this report in fact exist at the site.

14.0 SAMPLES

EBA will retain all soil and rock samples for 30 days after this report is issued. Further storage or transfer of samples can be made at the Client's expense upon written request, otherwise samples will be discarded.



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0 50
Scale: 1: 1 250 (metres)

CLIENT
ALEXCO

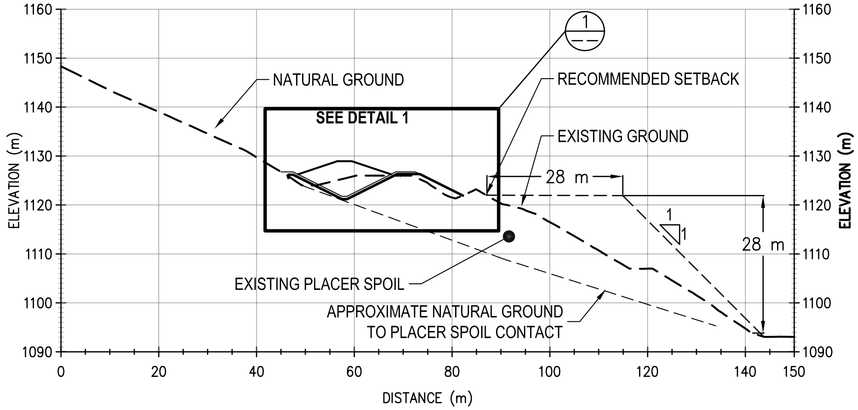
EBA Engineering Consultants Ltd.

TEMPORARY WASTE CONTAINMENT FACILITY
BELLEKENO EAST SITE

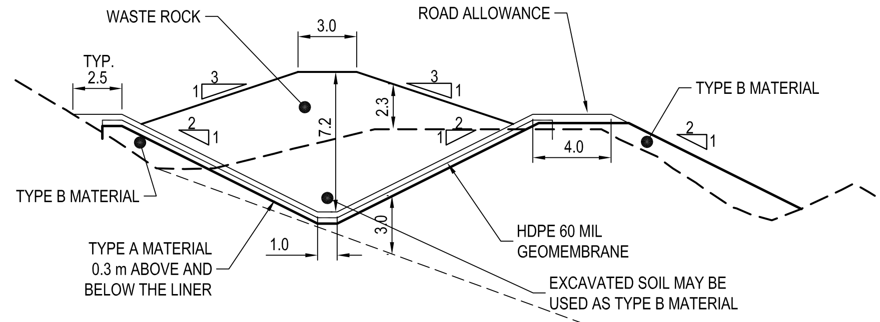
BELLEKENO EAST P-AML SITE
SITE PLAN

PROJECT NO.	DWN	CKD	REV
W14101142.001	KJT	CJD	0
OFFICE	DATE		
EBA-WHSE	July 30, 2009		

FIGURE 1



CROSS–SECTION A/1
SCALE: 1 : 1000



DETAIL 1
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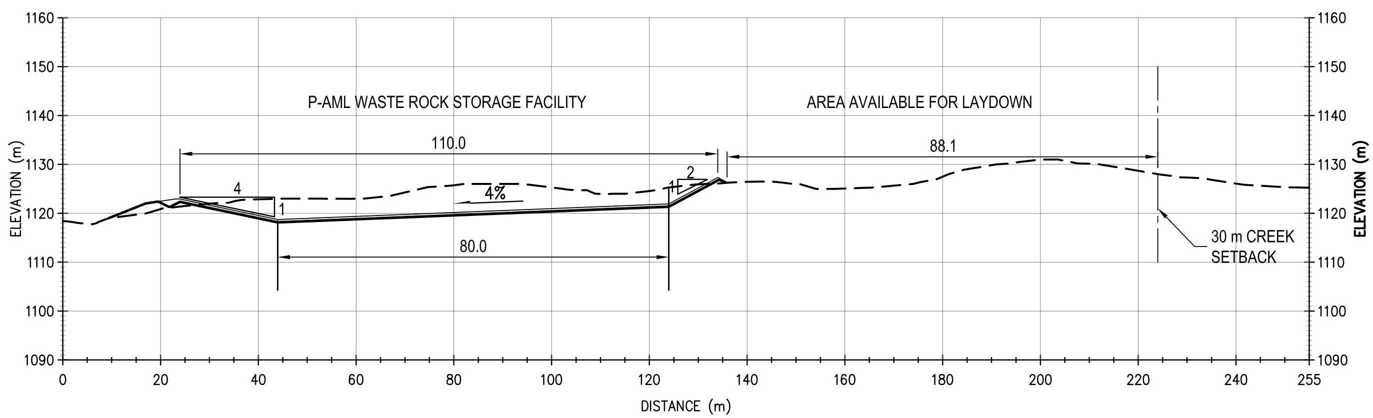

PROFILE B/1
SCALE: 1 : 1000

ISSUED FOR USE

LEGEND

0 50
Scale: 1: 1000 (metres)

CLIENT
ALEXCO

EBA Engineering Consultants Ltd.

BELLEKENO EAST P-AML WASTE ROCK STORAGE
KENO CITY, YUKON

PROFILE, SECTION AND DETAIL

PROJECT NO.	DWN	CKD	REV
W14101142.001	KJT	CJD	0
OFFICE: WHSE	DATE: July 27, 2009		

FIGURE 2

Alexco Resource Canada Corp.

TYPICAL WASTE CONTAINMENT FACILITY DESIGN
KENO HILL SILVER DISTRICT, YT
CONSTRUCTION SPECIFICATIONS
ISSUED FOR USE

W14101142

July 2008

EBA Engineering Consultants Ltd.
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Calcite Business Centre • Unit 6, 151 Industrial Road • Whitehorse, Yukon Y1A 2V3 • CANADA

TABLE OF CONTENTS

APPENDICES

Section 1001

DEFINITIONS

DEFINITIONS

1.0 General

.1 Definitions of terms used throughout the Construction Specifications are presented in this Section.

2.0 Definitions

Construction Drawings:	the drawings, as issued for construction, of the Typical Waste Containment Facility Design.
Construction Specifications:	this document.
Contract:	the legal and binding agreement between the Contractor and Alexco Resource Corp. regarding construction of the Waste Containment Facility.
Contractor:	the general contractor responsible for constructing the Waste Containment Facility.
Engineer:	the Professional Geotechnical Engineer registered in the Yukon who is associated with the construction process.
Owner:	Alexco Resource Corp.
Site:	the area in which construction of the Waste Containment Facility or related activity is occurring.
Unsuitable:	not meeting the requirements stated herein or not receiving the Engineer's approval.
Facility:	all components of the Waste Containment Facility.

END OF SECTION

Section 1002

GENERAL

GENERAL

1.0 General

.1 Alexco Resource Canada Corp. intends to construct a containment facility to store waste rock from the Bellekeno advanced underground exploration and development program. As the company advances through the Keno Hill Silver District, it is anticipated further underground exploration and development programs will require similar containment facilities. Therefore, a typical design has been developed to account for the various potential site and construction material conditions.

.2 The Facility is to be located within previously disturbed areas, all of which will be incorporated within a district wide closure plan. This district wide closure plan is required under the water license QZ06-074.

.3 Site specific conditions and Facility location have not been provided or considered. Once Facility location and site specific conditions are known, they must be reviewed by the Engineer. Furthermore, the base of the Facility must be approved by the Engineer prior to fill placement.

.4 The Facility will be lined with a suitable geomembrane. Water in the Facility will flow towards the vertical culvert and pond within the voids of the waste material.

.5 Water in the Facility will be monitored and tested on a regular basis. Based on water quality analysis, the waste water will be extracted via pump truck and discharged to the environment or treated in a designated treatment facility.

.6 Once the Facility reaches its ultimate capacity, the Facility will be capped and reclaimed.

2.0 Scope of Work

.1 The scope of work for the construction of the Facility is as follows:

a. Construct the liner subgrade and berms with Zone B material at the specified grade. This could include cut/fill operations should the foundation material be satisfactory;

b. If required, install a geotextile layer to act as separator for Zone A and Zone B materials;

c. Construct the liner bedding with Zone A material;

d. Install the liner system consisting of a suitable liner material and if required, protective geotextile layers above and below the liner, and a geocomposite reinforcing layer;

e. Place and compact cover material, Zone A material, over the liner system;

f. Install vertical culvert as specified on the Construction Drawings;

g. Place and compact the waste material;

h. Regrade the waste material and place and compact capping material;

i. Install vegetative cover.

END OF SECTION

Section 1003

FILL MATERIALS

FILL MATERIALS

1.0 General

.1 This section describes the construction material specifications for the Waste Containment Facility.

2.0 Reference Standards

.1 The most recent copy of American Society for Testing Materials, ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregate.

3.0 Material Sources

.1 No material of any type shall be borrowed or excavated without the Owner's prior approval.

.2 Pits and quarries shall be maintained and managed in accordance with the requirements set out in the Owner's Land Use and Quarry Permits.

.3 Zone A material shall be obtained from sources approved by the Owner, provided the final product meets the requirements specified herein. Processing may be required to achieve the specified gradation.

.4 Zone B material shall be obtained from sources approved by the Owner, provided the final product meets the requirements specified herein. Processing may be required to achieve the specified gradation.

.5 The parent rock from which all fill materials are derived shall consist of sound, hard, durable material free from soft, thin, elongated or laminated particles and shall contain no unsuitable substances. The potential quarry source shall be approved by the Engineer.

.6 The quarry source for the Facility fill materials shall be inspected by the Engineer throughout material processing to ensure the product meets the requirements stated herein.

4.0 Material Specifications

.1 Zone A Material

The Zone A material shall consist of hard, durable particles, shall be free of roots, topsoil, and deleterious material and shall have a particle size distribution, as measured by ASTM C136, as presented in Table 1003.1.

TABLE 100 .1 ONE A MATERIAL 10 MM MINUS PARTICLE SI E DISTRIBUTION LIMITS

Sie e Si e	Passin Fine Li i	Passin Coarse Li i
10	100	100
5	80	100
2	55	100
0.63	25	65
0.25	10	40
0.08	2	15

.2 Zone B Material

The Zone B material shall be free of roots, topsoil and other deleterious material and shall have a particle size distribution within the limits presented in Table 1003.2.

TABLE 100 .2 ONE B MATERIAL 200 MM MINUS PARTICLE SI E DISTRIBUTION LIMITS

Sie e Si e	Passin Fine Li i	Passin Coarse Li i
200	100	100
100	85	100
50	65	100
25	40	100
5	20	55
2	0	20

END OF SECTION

Section 1004

FILL PLACEMENT

FILL PLACEMENT

1.0 General

.1 The fill placement methods to be used during construction of the Waste Containment Facility are described in this Section.

.2 Construction shall be performed in accordance with the best modern practice and with equipment best adapted to the work being performed. Embankment materials shall be placed so that each zone is homogeneous; free of stratifications; ice chunks, lenses or pockets; and layers of material with different texture grading not conforming to the requirements stated herein.

.3 No fill material shall be placed on any part of the foundation until it has been prepared, as specified herein. Placement of fill material shall conform to the lines, grades and elevations shown on the Construction Drawings.

.4 Embankment construction shall not proceed when the work cannot be performed in accordance with the requirements of the Construction Specifications. Any part of the embankment that has been damaged by the action of rain, snow or any other cause shall be removed and replaced with the appropriate material conforming to the requirements stated herein.

.5 Stockpiling, loading, transporting, placing, and spreading of all materials shall be carried out in such a manner to avoid segregation. Segregated materials shall be removed and replaced with the materials meeting the requirements stated herein.

.6 The Contractor shall remove all debris, vegetation or any other material not conforming to the requirements stated herein. The Contractor shall dispose of these materials in an area approved by the Owner.

2.0 Zone B Material Placement

.1 The Zone B material shall be placed to the design elevation as specified in the Construction Drawings in lifts no greater than 500 mm in uncompacted thickness.

.2 The design elevation for the top of the Zone B berm material shall be no less than 0.5 m above original ground.

.3 Moisture condition and compact using the minimum number of passes established in accordance with section 1006.4.2.

3.0 Zone A Material Placement

.1 The Zone A material shall be placed as bedding for the liner system (minimum 300 mm thick) to the design grade specified in the Construction Drawings.

.2 Subsequent to the liner installation, the Zone A material shall be placed as liner system cover material. The liner system cover material shall be placed to the minimum thickness specified in Table 1004.1 dependent on the type of liner selected.

TABLE 1004.1 RECOMMENDED MINIMUM COVER THICKNESSES

Liner Ma erial	Mini u Re uired T ic ness
Enviro Liner® 4040 (Without Geocomposite)	1.3 m
Enviro Liner® 4040 (With Geocomposite)	0.3 m
HDPE 60	0.3 m
PVC 40 (With Geocomposite)	0.3 m

.3 The Construction Drawings are based on the selection of Enviro Liner® 4040 with the installation of a geocomposite reinforcing material. Other design alternatives are detailed in Section 1007.

.4 Zone A material shall be placed in lifts not exceeding 300 mm in uncompacted thickness. Vehicle traffic is prohibited from maneuvering within the Facility until the cover material has reached the minimum thickness required as specified in Table 1004.1.

.5 Moisture condition and compact with using the minimum number of passes established in accordance with section 1006.4.1.

.6 Equipment with ground pressures higher than 380 kPa should not be permitted inside the Facility once the liner system has been placed. Care is required to provide the appropriate thickness of fill beneath a vehicle when placing material above the liner system to ensure it is not damaged. Traffic in the area should be restricted to low ground pressure equipment.

END OF SECTION

Section 1005

LINER SYSTEM

LINER SYSTEM

1.0 General

.1 The product and installation specifications for the non-woven geotextile, liner systems and geocomposite materials to be used in the Waste Containment Facility are presented in this section.

.2 The liner system will be provided by the Owner and installed by the Contractor.

2.0 Reference Standards

.1 The most recent copy of the following American Society for Testing Materials standards:

a. ASTM D638 — Standard Methods for Tensile Properties of Plastics.

b. ASTM D792 — Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.

c. ASTM D1004 — Standard Test Methods for Initial Tear Resistance of Plastic Film and Sheeting.

d. ASTM D1603 — Standard Test Methods for Carbon Black in Olefin Plastics.

e. ASTM D1777 — Standard Test Methods for Thickness of Textile Materials.

f. ASTM D4533 — Standard Test Methods for Trapezoidal Tearing Strength of Geotextiles.

g. ASTM D4632 — Standard Test Methods for Grab Breaking Load and Elongation of Geotextile.

h. ASTM D4751 — Standard Test Methods for Determining Apparent Opening Size of a Geotextile.

i. ASTM D4833 Standard Test Methods for Index Puncture Resistance for Geotextile, Geomembranes, and Related Products.

j. ASTM D5199 Standard Test Methods for Measuring the Nominal Thickness of Geosynthetics.

k. ASTM D5261 Standard Test Methods for Measuring Mass per Unit Area of Geotextiles.

l. ASTM D5994 Standard Test Methods for Measuring Core Thickness of textured Geomembranes

.2 Federal Test Method

a. FTM Standard 101.

3.0 Materials

.1 Geotextile

a. The non-woven geotextile shall have a weight of 542 g/m^2. The manufacturer shall, prior to shipment of materials, provide to the Engineer a signed manufacturing certification that materials to be shipped to site have test values that meet or exceed the requirements listed in Table 1005.1.

TABLE 100 .1 RECOMMENDED MINIMUM GEOTEXTILE PROPERTIES

P ysical Proper y	Mini u A era e Roll Value Wea es Principle Direc ion
Thickness – Typical (ASTM D5199)	3.6 mm
Grab Tensile Strength (ASTM D4632)	1690 N
Elongation at Failure (ASTM D4632)	50 %
Trapezoidal Tear Strength (ASTM D4533)	645 N
Puncture (ASTM D4833)	1070 N
Apparent Opening Size (ASTM D4751)	150 microns
Weight – Typical (ASTM D5261)	542 g/m^2

b. Any visible damage to the shipment of geotextile shall be noted on the freight receipt and project records.

c. Storage of geotextile rolls on site shall be in a secure location that will minimize exposure to the elements, UV light and physical damage.

.2 Enviro Liner® 4040

a. The Enviro Liner® shall be 1.0 mm (40 mil) thick geomembrane or equivalent. The manufacturer shall, prior to shipment of materials, provide to the Engineer a signed manufacturing certification that materials to be shipped to site have test values that meet or exceed the requirements listed in Table 1005.2.

TABLE 100 .2 RECOMMENDED MINIMUM GEOMEMBRANE PROPERTIES

Proper y	En iro Liner 4040
Minimum Average Thickness (ASTM D5994)	1.0 mm
Relative Density (ASTM D792)	0.939
Tensile Strength at Yield (ASTM D638)	26.6 N/mm
Elongation at Yield (ASTM D638)	800 %
Tear Resistance (ASTM D1004)	98 N
Puncture Resistance (FTMS 101)	271 N
Carbon Black Content (ASTM D1603)	2.0 – 3.0 %

b. The liner material supplied under the specifications shall not have any blisters, holes, undispersed raw materials or any signs of contamination or inclusions of foreign matter. Such defects shall be repaired using techniques in accordance with manufacturer's recommendations. Excessive defects may be grounds for rejecting the entire roll of liner.

c. Storage of geomembrane rolls on site shall be in a secure location that will minimize exposure to the elements and physical damage.

d. Enviro Liner® geomembrane is suitable for secondary containment of hydrocarbons and other chemicals, and primary containment of water and water based effluents or as approved by manufacturer.

.3 HDPE Liner

a. The HDPE geomembrane shall be 1.5 mm (60 mil) thick geomembrane or equivalent. The manufacturer shall, prior to shipment of materials, provide to the Engineer a signed manufacturing certification that materials to be shipped to site have test values that meet or exceed the requirements listed in Table 1005.3.

TABLE 100 . RECOMMENDED MINIMUM GEOMEMBRANE PROPERTIES

Proper y	Tex ured HDPE 0
Minimum Average Thickness (ASTM D5994)	1.5 mm
Relative Density (ASTM D792)	0.94
Tensile Strength at Yield (ASTM D638)	22.0 kN/m
Elongation at Yield (ASTM D638)	12 %
Tear Resistance (ASTM D1004)	187 N
Puncture Resistance (FTMS 101)	480 N
Carbon Black Content (ASTM D1603)	2.0 – 3.0 %

b. The liner material supplied under the specifications shall not have any blisters, holes, undispersed raw materials or any signs of contamination or inclusions of foreign matter. Such defects shall be repaired using welding techniques in accordance with manufacturer's recommendations. Excessive defects may be grounds for rejecting the entire roll of liner.

c. Extrusion resin used for extrusion joining of sheets and for repairs should be HDPE from the same resin batch as the sheet resin. Physical properties must be the same as the liner sheets.

d. HDPE liner is suitable for containment of hydrocarbons and chemicals as well as water and water based effluents or as approved by manufacturer.

e. Storage of geomembrane rolls on site shall be in a secure location that will minimize exposure to the elements and physical damage.

.4 PVC Liner

a. The PVC geomembrane shall be 0.95 mm (38 mil) thick geomembrane or equivalent. The manufacturer shall, prior to shipment of materials, provide to the

Engineer a signed manufacturing certification that materials to be shipped to site have test values that meet or exceed the requirements listed in Table 1005.4.

TABLE 100 .4 RECOMMENDED MINIMUM GEOMEMBRANE PROPERTIES	
Proper y	PVC 40
Minimum Average Thickness (ASTM D5994)	0.95 mm
Tensile Strength at Yield (ASTM D638)	17 N/mm
Elongation at Yield (ASTM D638)	430 %
Tear Resistance (ASTM D1004)	44 N

b. The liner material supplied under the specifications shall not have any blisters, holes, undispersed raw materials or any signs of contamination or inclusions of foreign matter. Such defects shall be repaired using techniques in accordance with manufacturer's recommendations. Excessive defects may be grounds for rejecting the entire roll of liner.

c. PVC liner is suitable for containment of water and water based effluents or as approved by manufacturer. It is not suitable for containment of hydrocarbons.

d. Storage of geomembrane rolls on site shall be in a secure location that will minimize exposure to the elements, UV light and physical damage.

.5 Geocomposite

a. The geocomposite reinforcing material shall be 5 mm (200 mil) thick or equivalent. The manufacturer shall, prior to shipment of materials, provide to the Engineer a signed manufacturing certification that materials to be shipped to site have test values that meet or exceed the requirements listed in Table 1005.5.

TABLE 100 . RECOMMENDED MINIMUM GEOCOMPOSITE PROPERTIES	
Proper y	Geo Co p
Minimum Average Thickness (ASTM D5994)	5 mm
Relative Density (ASTM D792)	0.94
Tensile Strength at Yield (ASTM D638)	79 N/cm
Puncture Resistance (FTMS 101)	489 N
Carbon Black Content (ASTM D1603)	2.0 %

b. The geocomposite material supplied under the specifications shall not have defects or any signs of contamination or inclusions of foreign matter. Excessive defects may be grounds for rejecting the entire roll of geocomposite.

4.0 Installation - Enviro Liner® 4040 Design (with Geocomposite)

.1 The liner system consists of the following layers (starting from the top layer):

- Geo-Comp 5 or equivalent geocomposite
- Enviroliner 4040 or equivalent geomembrane

.2 The liner should line the entire surface of the Facility, which includes the crest of the berms, inside slopes, and floor. The geocomposite material is only required on the floor and approach berm of the Facility.

.3 The Contractor shall ensure that the integrity of the liner system and its components are not compromised during construction. Precautions the Contractor may take to avoid damaging the liner system may include, but will not be limited to, providing light plants in the work area to improve visibility or using pylons to mark the lift/liner system interface.

.4 Any damage to the liner system and/or its components shall be repaired as soon as possible. Fill placement shall cease immediately in an area where the integrity of the liner system has been compromised. Fill surrounding the damaged liner system may have to be excavated, without further damaging the integrity of the liner, to permit repairs to be made. Hand excavation shall be used to expose damaged portions of the liner for repair.

.5 The liner system shall be anchored at the top of the berm so that movement downslope does not occur during backfilling at any stage of construction.

.6 The Contractor shall take the necessary steps to ensure that backfilling does not induce tensile stress in the liner system. Care shall be taken to avoid making sharp turns, sudden stops or sudden starts adjacent to the liner system. Non-essential heavy equipment traffic in the immediate vicinity of the liner system shall not be permitted.

Enviro Liner® Installation

.7 The Enviro Liner® should be deployed subsequent to the placement of Zone A bedding material.

.8 The Engineer should walk the liner to observe for any defects caused by on-site equipment and tools. Any liner area showing injury due to excessive scuffing, puncture, or distress from any cause should be replaced or repaired with an additional piece of Enviro Liner® installed as per the manufacturer's specifications over the defective area. All patches should have rounded edges and extend a minimum of 150 mm beyond the affected area.

.9 Low ground pressure equipment should be used to deploy the liner material. No equipment shall be allowed on the liner.

Geocomposite Reinforcing Installation

.10 The geocomposite material should be deployed subsequent to the placement of the Liner.

.11 No equipment is permitted on the liner material during the placing of the geocomposite reinforcing material. The geocomposite reinforcing material must rolled out by hand and the cover material placed in accordance with Section 1004.

Material Quantities

.12 Estimated material quantities required for the lined pad are listed in Table 1005.6

TABLE 100 . MATERIAL QUANTITY ESTIMATES

Ma erial	To al Area 2
Enviro Liner® 4040	1900
Geo-Comp 5	905

5.0 Installation - HDPE 60 Design

.1 The liner system consists of the following layers (starting from the top layer):

- HDPE 60 mil or equivalent geomembrane

.2 The liner should line the entire surface of the Facility, which includes the crest of the berms, inside slopes, and floor.

.3 The Contractor shall ensure that the integrity of the liner system and its components are not compromised during construction. Precautions the Contractor may take to avoid damaging the liner system may include, but will not be limited to, providing light plants in the work area to improve visibility or using pylons to mark the lift/liner system interface.

.4 Any damage to the liner system and/or its components shall be repaired as soon as possible. Fill placement shall cease immediately in an area where the integrity of the liner system has been compromised. Fill surrounding the damaged liner system may have to be excavated, without further damaging the integrity of the liner, to permit repairs to be made. Hand excavation shall be used to expose damaged portions of the liner for repair.

.5 The liner system shall be anchored at the top of the berm so that movement downslope does not occur during backfilling at any stage of construction.

.6 The Contractor shall take the necessary steps to ensure that backfilling does not induce tensile stress in the liner system. Care shall be taken to avoid making sharp turns, sudden stops or sudden starts adjacent to the liner system. Non-essential heavy equipment traffic in the immediate vicinity of the liner system shall not be permitted.

HDPE Liner Installation

.7 The HDPE liner should be deployed subsequent to the placement of Zone A bedding material. The liner should be placed with no horizontal seams on the slopes. Tie-in seams should be located on the floor at a minimum of 1.5 m from the toe of the slopes.

.8 The liner panels shall be welded together along the full length of the seam to the top of the berm.

.9 Both the wedge and the extrusion welding equipment should be qualified by conducting trial seam tests prior to start-up each day and at approximately 4-hour intervals during seaming operations. During the trial seam, the minimum peel and shear strength criteria set by the manufacturer for the 60 mil HDPE geomembrane should be met. The industry-accepted peel and shear strengths for 60 mil HDPE geomembrane are 78 ppi (pounds/inch) and 120 ppi, respectively.

.10 The Engineer should walk the liner to observe for any defects caused by on-site equipment and tools. Any liner area showing injury due to excessive scuffing, puncture, or distress from any cause should be replaced or repaired with an additional piece of HDPE liner extrusion welded over the defective area. All patches should have rounded edges and extend a minimum of 150 mm beyond the affected area.

.11 Low ground pressure equipment should be used to deploy the liner material. No track-wheel equipment shall be allowed on the liner. Equipment travel on the liner material should be kept to a minimum.

Material Quantities

.12 Estimated material quantities required for the lined pad are listed in Table 1005.7

TABLE 100 . MATERIAL QUANTITY ESTIMATES

Ma erial	To al Area 2
HDPE 60 Liner	1900

6.0 Installation - PVC 40 Design

.1 The liner system consists of the following layers (starting from the top layer):

- Geo-Comp 5 or equivalent geocomposite
- PVC 40 mil or equivalent geomembrane

.2 The liner system should line the entire surface of the Facility, which includes the crest of the berms, inside slopes, and floor. The geocomposite material is only required on the floor and approach berm of the Facility.

.3 The Contractor shall ensure that the integrity of the liner system and its components are not compromised during construction. Precautions the Contractor may take to avoid damaging the liner system may include, but will not be limited to, providing light plants in the work area to improve visibility or using pylons to mark the lift/liner system interface.

.4 Any damage to the liner system and/or its components shall be repaired as soon as possible. Fill placement shall cease immediately in an area where the integrity of the liner system has been compromised. Fill surrounding the damaged liner system may have to be excavated, without further damaging the integrity of the liner, to permit repairs to be made. Hand excavation shall be used to expose damaged portions of the liner for repair.

.5 The liner system shall be anchored at the top of the berm so that movement downslope does not occur during backfilling at any stage of construction.

.6 The Contractor shall take the necessary steps to ensure that backfilling does not induce tensile stress in the liner system. Care shall be taken to avoid making sharp turns, sudden stops or sudden starts adjacent to the liner system. Non-essential heavy equipment traffic in the immediate vicinity of the liner system shall not be permitted.

PVC Liner Installation

.7 The PVC liner should be deployed subsequent to the placement of Zone A bedding material.

.8 The Engineer should walk the liner to observe for any defects caused by on-site equipment and tools. Any liner area showing injury due to excessive scuffing, puncture, or distress from any cause should be replaced or repaired with an additional piece of PVC liner installed as per the manufacturer's specifications over the defective area. All patches should have rounded edges and extend a minimum of 150 mm beyond the affected area.

.9 Low ground pressure equipment should be used to deploy the liner material. No equipment shall be allowed on the liner.

Geocomposite Reinforcing Installation

.10 The geocomposite material should be deployed subsequent to the placement of the Liner.

.11 No equipment is permitted on the liner material during the placing of the geocomposite reinforcing material. The geocomposite reinforcing material must rolled out by hand and the cover material placed in accordance with Section 1004.

Material Quantities

.12 Estimated material quantities required for the lined pad are listed in Table 1005.8

TABLE 100 .8 MATERIAL QUANTITY ESTIMATES	
Ma erial	To al Area 2
PVC 40 Liner	1900
Geo-Comp 5	905

END OF SECTION

Section 1006

QUALITY ASSURANCE

QUALITY ASSURANCE

1.0 General

.1 The quality assurance testing suggested is described in this section.

2.0 Reference Standards

.1 The most recent edition of the following American Society for Testing Materials standards:

a. ASTM C136 – Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

b. ASTM D698 – Standard -Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))

d. ASTM D4437 – Standard Practice for Determining the Integrity of Field Seams Used in Joining Flexible Polymeric Sheet Geomembranes.

.2 Geosynthetic Research Institute

a. GRI Test Method GM6 – Pressurized Air Channel Test for Dual Seamed Geomembranes.

3.0 Fill Particle Size Testing Requirements

.1 Zone A Material

a. Samples of the Zone A material should be evaluated from locations within the borrow source prior to construction. One sample will be evaluated every 500 m^3 placed during construction to ensure the placed gradation meets the specification stated herein. The required tests and testing frequency for the Zone A material are presented in Table 1006.1.

TABLE 100 .1 TESTING AND FREQUENCY OF ONE A MATERIAL	
Tes	Tes Fre uency
Particle Size Analysis	One (1) test every 500 m³ during construction.

.2 Zone B Material

a. Samples of the Zone B material will be evaluated from the foundation material within the Facility prior to construction and every 2000 m^3 placed during construction to ensure the placed gradation meets the specification stated herein. The required tests and testing frequency for the Zone B material are presented in Table 1006.2.

TABLE 100 .2 TESTING AND FREQUENCY OF ONE B MATERIAL	
Tes	Tes Fre uency
Particle Size Analysis	One (1) location within the Facility and One (1) test every 2000 m³ during construction.

4.0 Fill Compaction Testing Requirements

.1 Zone A Material

a. Compact each lift with a minimum of six passes using a large smooth-drum, vibratory compactor. The optimum vibratory frequency and number of passes should be determined during construction using proof-roll tests, which demonstrate optimum compaction. The Engineer should inspect the compaction effort to ensure that this effort results in a density equivalent to about 95% MDD.

.2 Zone B Material

a. Compact each lift with a minimum of six passes using a large smooth-drum, vibratory compactor. The optimum vibratory frequency and number of passes should be determined during construction using proof-roll tests, which demonstrate optimum compaction. The Engineer should inspect the compaction effort to ensure that this effort results in a density equivalent to about 98% MDD.

b. The foundation material (Zone B or subcut material) should also be compacted as specified in section 1006.4.1.

5.0 Geomembrane Testing Requirements

.1 General

a. The Contractor is responsible for obtaining mill certificates from the manufacturer and forwarding them to the Engineer.

b. If applicable, the Contractor shall record all seam parameters (i.e. time, date, operator, welding speed and temperature) on the liner.

c. If applicable, the Contractor shall be responsible for completing the vacuum box testing and pressure testing for the appropriate seams. The Contractor shall mark the test number and parameters on the liner.

d. If applicable, the Contractor shall supply and use a field tensiometer for testing liner seams for shear and peel strength.

e. The Contractor is responsible for maintaining testing records.

f. All coupons and test specimens remain the property of the Owner.

.2 Qualifying Welds

a. Qualifying seams shall be conducted on fragmented pieces of material at the following times:

- At the start of each shift of production seaming, and at 4 hour intervals during production seaming;
- When a new operator or new machine starts welding;
- When a machine is restarted after repairs;
- When welding is stopped for sixty (60) minutes or more;
- When there is a change in the ambient conditions; and
- At the discretion of the Engineer.

b. Qualifying seams shall be 1 m long, and shall be subject to shear and peel testing. The test seam shall meet the minimum requirements stated herein for seam strength, when tested on a field tensiometer. If a qualifying seam fails, the seaming procedure shall be reviewed and the test shall be repeated.

.3 Non-Destructive Testing

a. Test all wedge-welded seams over their full length using a vacuum unit or air pressure test.

- Seam intersections will also be subject to vacuum box testing, regardless of seaming method employed.
- The Contractor shall supply all apparatus and personnel for this type of test.
- The tests shall be witnessed and documented by the Engineer.

b. Clean all seams to permit proper inspection.

c. Repair any seams which fail non-destructive testing in accordance with this Specification. Repairs shall be fully documented by the Contractor.

.4 Vacuum Box Testing

a. Extrusion welded seams should be tested using either vacuum box testing or pick-testing. Vacuum box testing involves placing the extrusion weld under a vacuum. The weld is first coated with a soapy water solution and any holes in a weld would be indicated by a stream of bubbles when vacuum is applied.

b. No leaks shall be permitted while conducting vacuum box testing.

c. Pick-testing is conducted on uneven surfaces where a vacuum cannot be maintained. During pick testing, attention should be paid to the following specific items:

- The width of the weld;
- Weld bond to the underlying geomembrane;
- Joints between three panels (“T” joints);
- Defects such as bubbles created within the weld due to moisture; and
- Textured weld surfaces due to temperature fluctuation in the extrusion welder.

.5 Air Pressure Testing

a. Wedge welded seams should be air-pressure tested over their full lengths using an air pressure test. Air pressure testing involves pressurizing the air channel located between the dual tracks of the seams to a minimum pressure of 40 psi for a period of five minutes.

b. During the test, the air pressure is not allowed to drop more than 4 psi (10% allowance). Any leaks and bubbling in the seams found during the non-destructive tests must be repaired by extruding a patch of HDPE material over the defect.

c. Air pressure testing shall be carried out according to GRI Test Method GM6, Pressurized Air Channel Test for Dual Seamed Geomembranes.

.6 Destructive Testing for Production Seams

a. Cut-out coupons shall be taken at a minimum frequency of one (1) per 150 m of seam, or once per seam. Coupons shall be cut by the contractor at the location directed by the Engineer. Coupons shall generally be taken from a location that does not affect the performance of the liner. All cut-outs shall have rounded corners. Care shall be taken to ensure that no slits penetrate the parent liner.

b. All holes left by cut outs shall be patched immediately.

.7 Testing of Repairs

a. All repairs shall be tested using the Vacuum Box in accordance with test method ASTM 4437.

END OF SECTION

Section 1007

DESIGN ALTERNATIVES

DESIGN ALTERNATIVES

1.0 General

.1 This section provides design alternatives for the Facility should the fill materials available on or near site not adhere to the gradation specifications stated in Tables 1003.1 and 1003.2.

.2 Should Zone A, Zone B or both materials not meet the gradation specifications stated in Tables 1003.1 and 1003.2 then the recommended design alternatives are available in Table 1007.1.

TABLE 100 .1 RECOMMENDED DESIGN ALTERNATIVES FOR GRADATION NON COMPLIANCE

		one B		
		Mee s Speci ica ions	Grada ion Belo Fine Li i	Grada ion A o e Coarse Li i
one A	Mee s Speci ica ions	This section does not apply	This section does not apply	See Section 1007.2
	Grada ion Belo Fine Li i	See Section 1007.2	See Section 1007.2	See Section 1007.2
	Grada ion A o e Coarse Li i	See Section 1007.3	See Section 1007.3	See Section 1007.4

2.0 Detailed Design Alternatives – Non-Compliance Criteria I

.1 If the fill materials do not comply with gradation specifications as per Table 1007.1 geotextile material is required at the interface between Zone A and Zone B materials.

.2 The geotextile material should be deployed prior to the placement of Zone A material.

.3 The geotextile should be placed with a minimum overlap of 150 mm and connected at the seam by heat bonding. If heat bonding is not available an overlap of 300 mm should be used. Horizontal seams should be kept to a minimum on the side slopes. If a horizontal seam is unavoidable, the overlap shall be capped with a 300 mm wide strip of the same geotextile and heat bonded to the underlying material.

.4 Any tears or holes made in the geotextile should be repaired by placing a patch of geotextile on the defect and held in place by heat bonding. The patch should extend at least 300 mm beyond the damage, in all directions.

3.0 Detailed Design Alternatives – Non-Compliance Criteria II

.1 If the fill materials do not comply with gradation specifications as per Table 1007.1 geotextile material is required above and below the liner system.

.2 The geotextile material should be deployed prior to the deployment of the liner system as well as subsequent to the deployment of the liner system.

.3 The geotextile should be placed with a minimum overlap of 150 mm and connected at the seam by heat bonding. If heat bonding is not available an overlap of 300 mm should be used. Horizontal seams should be kept to a minimum on the side slopes. If a horizontal seam is unavoidable, the overlap shall be capped with a 300 mm wide strip of the same geotextile and heat bonded to the underlying material.

.4 Any tears or holes made in the geotextile should be repaired by placing a patch of geotextile on the defect and held in place by heat bonding. The patch should extend at least 300 mm beyond the damage, in all directions.

4.0 Detailed Design Alternatives – Non-Compliance Criteria III

.1 If the fill materials do not comply with gradation specifications as per Table 1007.1 geotextile material is required above and below the liner system as well as at the interface between Zone A and Zone B materials.

.2 The geotextile material should be placed prior to the placing of Zone A material, prior to the deployment of the liner system as well as subsequent to the deployment of the liner system.

.3 The geotextile should be placed with a minimum overlap of 150 mm and connected at the seam by heat bonding. If heat bonding is not available an overlap of 300 mm should be used. Horizontal seams should be kept to a minimum on the side slopes. If a horizontal seam is unavoidable, the overlap shall be capped with a 300 mm wide strip of the same geotextile and heat bonded to the underlying material.

.4 Any tears or holes made in the geotextile should be repaired by placing a patch of geotextile on the defect and held in place by heat bonding. The patch should extend at least 300 mm beyond the damage, in all directions.

END OF SECTION

Section 1008

OPERATION AND MAINTENANCE

OPERATION AND MAINTENANCE

5.0 General

.1 This section provides a general guideline for the operation and maintenance of the Waste Containment Facility.

6.0 Geomembrane Lined Pad

.1 Structure Maintenance

a. This section refers to the structure as the berm, side slopes, and floor of the Facility.

b. The structure shall be inspected regularly. Attention shall be concentrated on the following:

- Eroded and/or damaged granular slope and floor surfaces and
- Exposed liner material

c. Any identified problems should be repaired immediately. The repair can be conducted by reconstructing the damaged or eroded slopes with a material of similar gradation to Zone A material. Any exposed liner material can be recovered with Zone A material; however, if the liner material is damaged, liner installation personnel shall be retained to repair the liner.

.2 Surface Water Management

a. The Facility is designed to drain all surface water to the installed vertical culvert. Each month, the water lever must be inspected, pumped and disposed of appropriately.

b. The frequency of monitoring must be increased during times of high precipitation or snow melt within the Facility.

7.0 Filling Procedure

.1 The filling procedure for the Facility is as follows:

a. Waste material is not to exceed a height of 3.0 m above the level of the top of the berm unless approved by the Engineer;

b. Waste material is not to be placed higher than relative elevation 0.5 m below the crest of the liner unless approved by the Engineer.

8.0 Closure

.1 Upon reaching capacity the Facility will be capped with material meeting the specifications outlined in Table 1008.1 or as approved by the Engineer.

TABLE 1008.1 CAPPING MATERIAL PARTICLE SI E DISTRIBUTION LIMITS

Sie e Si e	Passin Fine Li i	Passin Coarse Li i
100	100	100
50	95	100
25	90	100
20	85	100
5	65	90
0.63	35	60
0.08	5	20

.2 The capping material shall have a minimum thickness of 0.5 m.

.3 The vegetative cover must be capable of self-regeneration without continuous dependence on fertilizer or re-seeding.

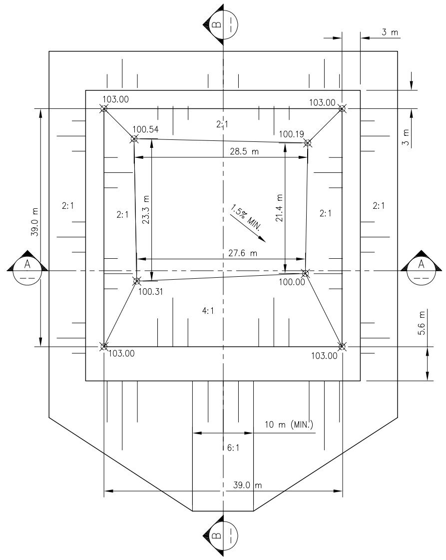
.4 The vegetative cover must have sufficient density and species diversity to stabilize the surface against the effects of long term erosion.

.5 Closure monitoring should include inspection for any ponding water. If ponded water is present capping material should be added or re-graded.

END OF SECTION

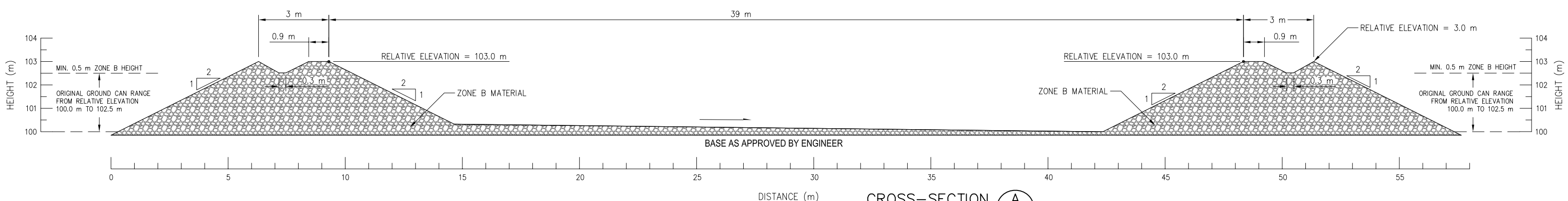
APPENDIX

APPENDIX A CONSTRUCTION DRAWINGS



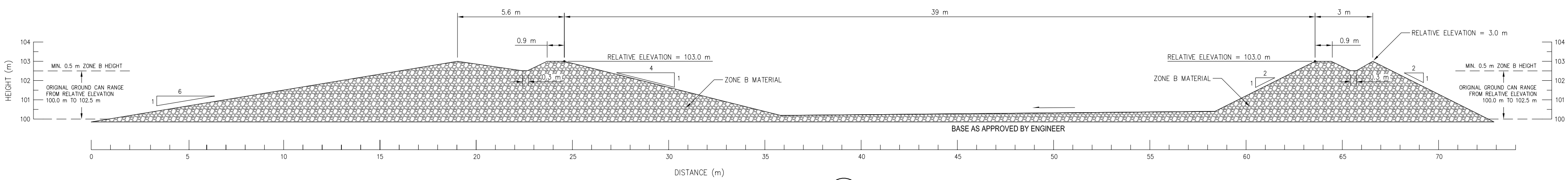
PLAN – ZONE B MATERIAL

SCALE: 1 : 400



CROSS–SECTION A

SCALE: 1 : 100



CROSS–SECTION B

SCALE: 1 : 100

ISSUED FOR CONSTRUCTION

NOTES

1. CONTAINMENT FACILITY SIZED FOR 1900 m² OF GEOMEMBRANE. CONFIGURATION OF BASE AREA CAN BE MODIFIED SHOULD SITE CONDITIONS WARRANT. HOWEVER, SPECIFIED BERM CROSS-SECTION, FILL MATERIALS, LINER SYSTEM AND GENERAL DESIGN CRITERIA MUST BE ADHERED TO.
2. SPECIFIC CONDITIONS AND FACILITY LOCATION HAVE NOT BEEN PROVIDED OR CONSIDERED. ONCE FACILITY LOCATION AND SITE SPECIFIC CONDITIONS ARE KNOWN, THEY MUST BE APPROVED BY THE ENGINEER PRIOR TO CONSTRUCTION.
3. ALL ELEVATIONS ON PLAN ARE FOR TOP OF ZONE B MATERIAL.

REVISIONS

NUM	DATE	DWN	CKD	APR	DESCRIPTION

DRAWING STATUS

NUM	DATE	APR	DESCRIPTION
B	08/0708	JPB	ISSUED FOR CONSTRUCTION
A	08/06/25	JPB	ISSUED FOR REVIEW

ORIGINAL
SIGNED AND SEALED

Permit: J. Richard Trimble, P.Eng.
Date: July 8, 2008

Seal: Jason Berkers, P.Eng.
Date: July 8, 2008

The signed Professional Seal and Permit to Practice stamps reside on the executed drawing which is held and controlled by EBA Engineering Consultants Ltd.

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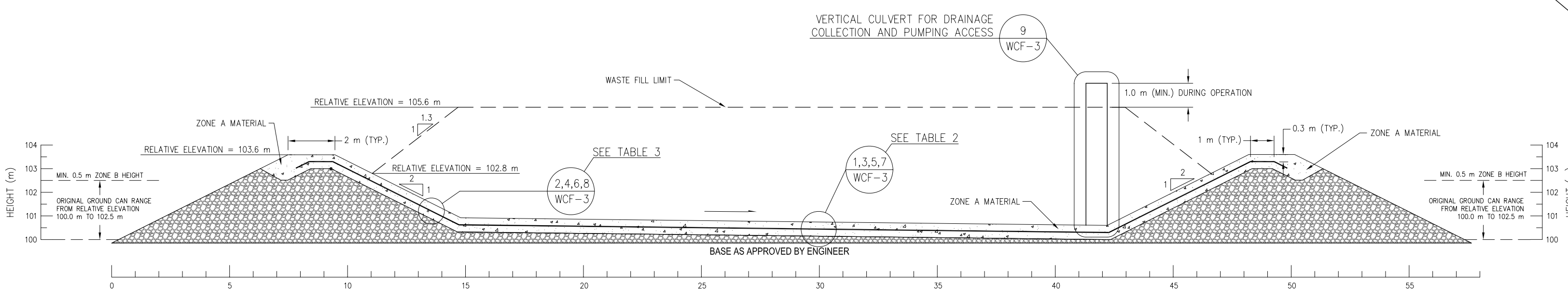
EBA Engineering Consultants Ltd.

TYPICAL WASTE CONTAINMENT FACILITY DESIGN
KENO HILL SILVER DISTRICT, YT

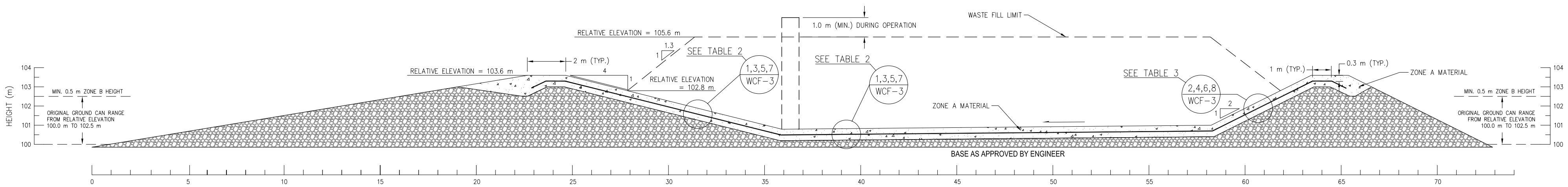
ZONE B MATERIAL PLAN & CROSS SECTIONS

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
W14101142	WHSE	JTP	JPB	0	WCF-1
DATE	SHEET No.	DWN	APP	STATUS	
June 25, 2008	1 of 4	KJT	JRT	B	



CROSS–SECTION A

SCALE: 1 : 100



CROSS–SECTION B

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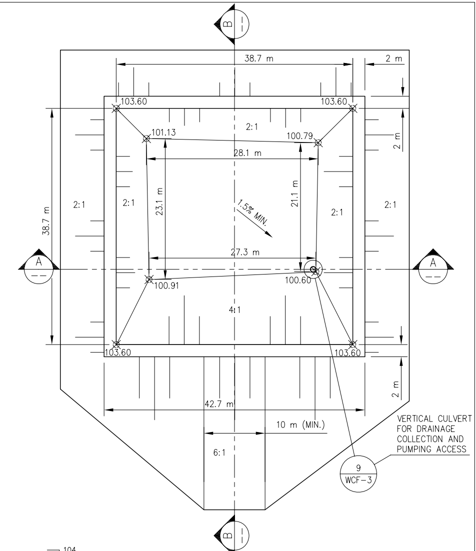

PLAN – ZONE A MATERIAL

SCALE: 1 : 400

ISSUED FOR CONSTRUCTION

NOTES

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3. ALL ELEVATIONS ON PLAN ARE FOR TOP OF ZONE A MATERIAL.

REVISIONS

NUM	DATE	DWN	CKD	APR	DESCRIPTION

DRAWING STATUS

NUM	DATE	APR	DESCRIPTION
B	08/07/08	JPB	ISSUED FOR CONSTRUCTION
A	08/06/25	JPB	ISSUED FOR REVIEW

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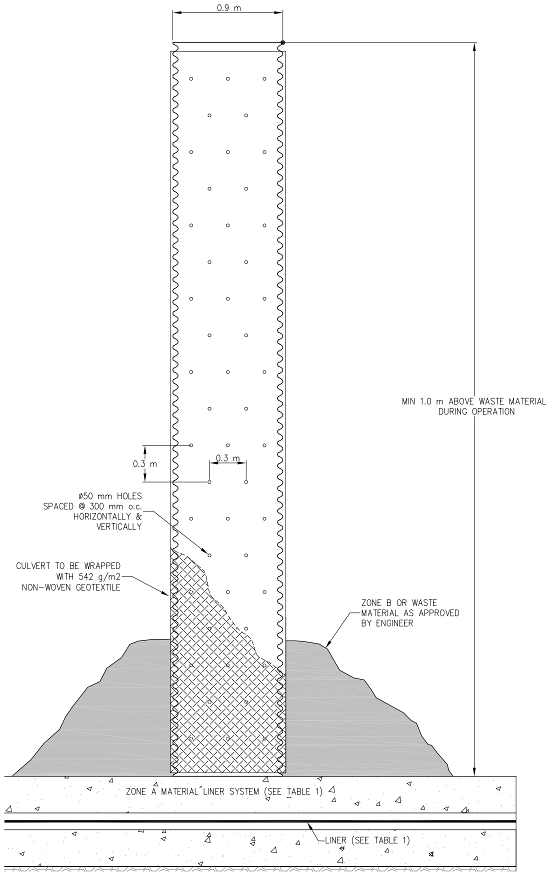
TYPICAL WASTE CONTAINMENT FACILITY DESIGN
KENO HILL SILVER DISTRICT, YT

ZONE A MATERIAL PLAN & CROSS SECTIONS

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
W14101142	WHSE	JTP	JPB	0	WCF-2
DATE: June 25, 2008	SHEET No. 2 of 4	DWN KJT	APP JRT	STATUS B	

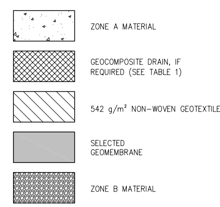


DETAIL 1 – VERTICAL CULVERT (9 / WCF-1)

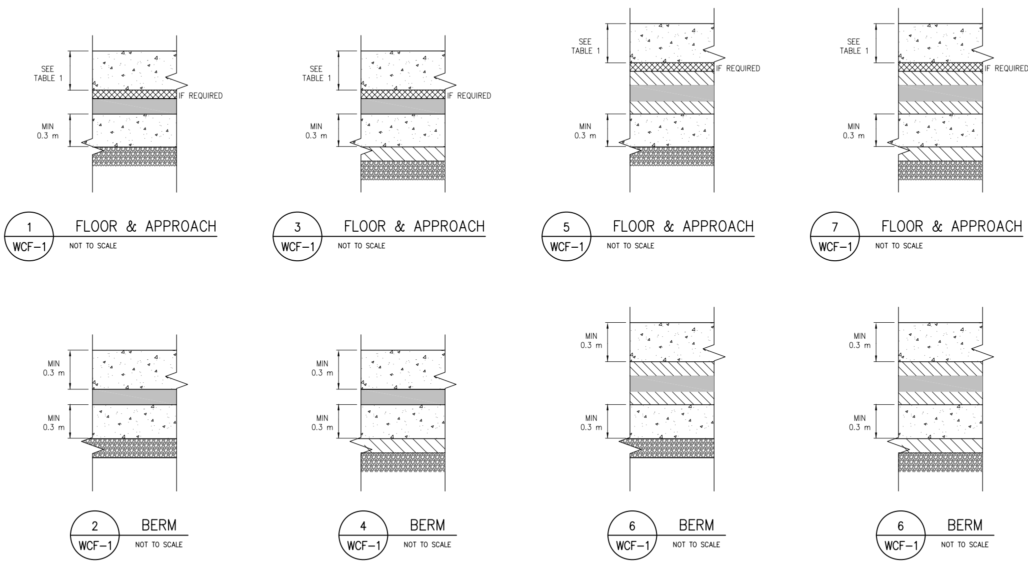
SCALE: 1 : 20

LINER SYSTEM FLOOR & APPROACH BERM

LINER SYSTEM DETAIL KEY



LINER SYSTEM BERMS



T 1R M C T

L M	D C	M R T
Enviro Liner® 4040 (Without Geocomposite)	Not Required	1.3 m
Enviro Liner® 4040 (With Geocomposite)	Required	0.3 m
HDPE 60	Not Required	0.3 m
PVC 40 (With Geocomposite)	Required	0.3 m

T 2L S F A

A / M S F L A C L	M S	F L	A C L
	Detail 1	Detail 1	Detail 3
	Detail 3	Detail 3	Detail 3
	Detail 5	Detail 5	Detail 7

T 3L S

A / M S F L A C L	M S	F L	A C L
	Detail 1	Detail 1	Detail 3
	Detail 3	Detail 3	Detail 3
	Detail 5	Detail 5	Detail 7

T 4 AM 10 M P S D L

S S	P F L	P C L
10	100	100
5	80	100
2	55	100
0.63	25	65
0.25	10	40
0.08	2	15

T 5 M 200 M P S D L

S S	P F L	P C L
200	100	100
100	85	100
50	65	100
25	40	100
5	20	55
2	0	20

ISSUED FOR CONSTRUCTION

NOTES

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REVISIONS

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DRAWING STATUS

NUM	DATE	APR	DESCRIPTION
B	08/07/08	JPB	ISSUED FOR CONSTRUCTION
A	08/06/25	JPB	ISSUED FOR REVIEW

ORIGINAL
SIGNED AND SEALED

Permit: J. Richard Trimble, P.Eng. Date: July 8, 2008

Seal: Jason Berkers, P.Eng. Date: July 8, 2008

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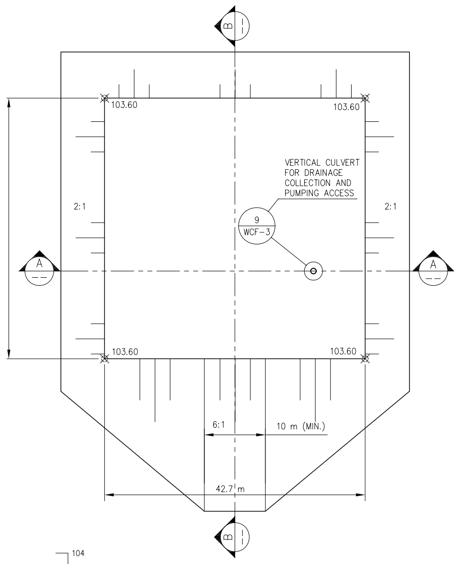
TYPICAL WASTE CONTAINMENT FACILITY DESIGN
KENO HILL SILVER DISTRICT, YT

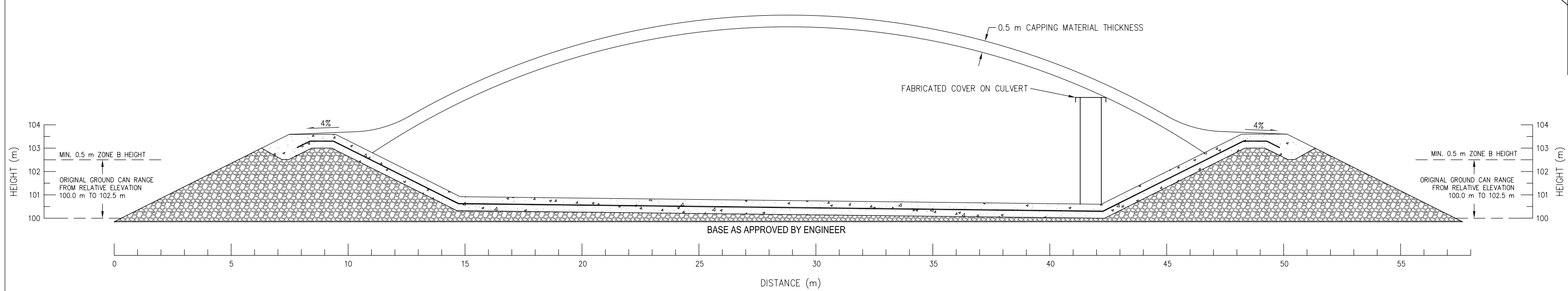
DETAILS

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
W14101142	WHSE	JTP	JPB	0	WCF-3
DATE: JUNE 25, 2008	SHEET No. 3 of 4	DWN KJT	APP JRT	STATUS B	



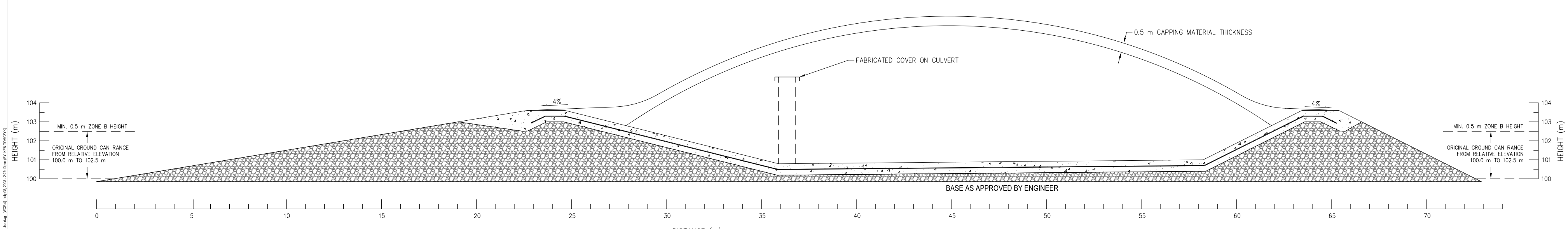
PLAN – FACILITY CLOSURE

SCALE: 1 : 400



CROSS–SECTION A

SCALE: 1 : 100



CROSS–SECTION B

SCALE: 1 : 100

ISSUED FOR CONSTRUCTION

NOTES

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REVISIONS

NUM	DATE	DWN	CKD	APR	DESCRIPTION

DRAWING STATUS

NUM	DATE	APR	DESCRIPTION
2	08/07/08	JPB	ISSUED FOR CONSTRUCTION
1	08/06/25	JPB	ISSUED FOR REVIEW

ORIGINAL
SIGNED AND SEALED

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Seal: Jason Berkers, P.Eng.
Date: July 8, 2008

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TYPICAL WASTE CONTAINMENT FACILITY DESIGN KENO HILL SILVER DISTRICT, YT

FACILITY CLOSURE PLAN & CROSS SECTIONS

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
W14101142	WHSE	JTP	JPB	0	WCF-4
DATE: June 25, 2008	SHEET No. 4 of 4	DWN KJT	APP JRT	STATUS B	