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To: Justin Stockwell, Lorax Environmental Services Ltd.

Cc: David Flather, Neil Mallen

From: Diane Lister
Date: October 28, 2011

RE: **Mount Nansen Closure: Synopsis of Remediation Field Work – Lorax Proposal J987-1 / YG Contract #C00010821**

Background and Objectives

In early October 2011 Lorax Environmental Services (Lorax) submitted Project Proposal #J987-1 outlining scope and estimated costs for a formal Project kick-off meeting and site visit to initiate programs in support of advancing the closure plan design and Yukon environmental and socio-economic assessment (YESA) of the Mount Nansen Project. Budget estimates were also provided to conduct field programs that were planned in conjunction with and/or following the scheduled site visit, including remediation/reclamation field work to be lead by Altura Environmental Consulting. Contract #C00010821 was subsequently issued by Assessment and Abandoned Mines (AAM).

Scope of the remediation/reclamation field work as stipulated in Contract # C00010821 and Table 3 of proposal J987-1 includes the following:

1. Preliminary reconnaissance in fall 2011 with Orion Kendrick (Sagebrush Nursery) and EDI Environmental Dynamics
2. Field investigation for mill area adit
3. Seed collection of fall species

Results:

October 17 to 18 field work at the Mount Nansen site was carried out by Diane Lister of Altura Environmental Consulting (Altura) and subcontracted technical consultant Orion Kendrick, a native species propagation specialist and proprietor of Sagebrush Nurseries in Oliver, B.C.

Weather was cool and dry the afternoon of October 17, with approximately 4 cm of snow during the evening.

Site overview and seed collection was carried on October 17. Some reconnaissance work was curtailed on October 18 due to the new snow and slippery conditions on side roads and hills.

Minor amounts of seed of certain available species, sufficient for research trial purposes were collected while on site. Species collected include: *Betula glandulosa* (scrub birch), *Ledum L.* (Labrador/trappers tea), *Carex spp.* (sedge, Photo 1), and *Arctostaphylos uva-ursi* (kinnikinnick). Recconnaissance was carried out for ripe cones of local conifer species. However, similar to findings of September fieldwork by Altura and EDI, only open cones from 2010 were observed and it appears that there was little or no new cone production in 2011.

A direct seeding trial (2011-01) for locally collected willow and scrub birch seed was established on the waste rock pile area. The in-situ waste rock was prepared to 'rough and loose' texture using 2 hours of excavator equipment time contracted through Graceland Construction. The preparation left a highly undulating surface with some exposed boulders (Photo 2). While this approach is an obvious deviation from a smooth "track-padded" surface seen at many revegetation sites, it has recently been recognized by prominent practitioners that natural recolonization in challenging substrate and moisture conditions such as waste rock can be enhanced through use of such a 'rough and loose' approach (Polster,2009 and Sweigard et al, 2007). This surface treatment provides sinks or traps for moisture, seeds and organic debris accumulation, and provides shelter for emerging seedlings (Photo 3). The location of trial 2011-01 is shown in Figure 2. Seeds were sown in three distinct quadrants of the re-worked area (Patches #1 through #3, shown in Photo 2). Each patch represents slightly different degrees of roughness and aspect as described in Table 3. A 20cm long flagged spike was placed in each of the four corners of the three patches. Although another potential site southeast of the mill had been earmarked for fall trials (Figure 3), safe access to the site was not possible on October 18 due to snowfall the previous evening.

Owing to the lateness in season, only partial identification of the naturally recolonizing species in mine disturbances and roadcuts was possible. Species observed included *Picea glauca* (white spruce), *Salix spp.* (willow), *Populus balsamifera* (balsam poplar) notably along the old road from pit to tailings turn-off, *Achillea millefolium* (yarrow), *Epilobium angustifolium* (fireweed), *Arabis spp.* (rock cress), *Erigeron sp.* (fleabane), various grasses and an unidentified legume.

The Heustis 4100' adit area was briefly visited on October 18, 2011. Snow was on the ground with Dome Creek flowing. Moisture was evident through the snow in the zone up-gradient of seep MS-S-03 emerging from the side of the road to the mill (Photo 4). The adit and local conditions were discussed with Tom Becker of Norwest who was on site at the time. Tom clearly recalled the presence of the adit during his early 1980's work in the area as an exploration geological field assistant. Tom recalled that the timbers at the portal were severely caved and prevented access. The use of an excavator for further investigation was discussed, and it was agreed that the existing map information, photos, and oral accounts sufficiently document the adit's historical alignment. It was also agreed that reconnaissance-level excavation would be unlikely to yield additional information, and could present risks to the main road used to access the mill and/or to Dome Creek. The approximate alignment of the adit was derived utilizing historic maps from site and field evidence (Figure 1).

At the request of Justin Stockwell and following a meeting between the Yukon Geological Survey, AAM, and Altura, the availability of geological maps in the vault and office area was also assessed to supplement the geological base map information being compiled by the Yukon Geological Survey. Some property geological maps from Archer Cathro work (approximately 1985-1989) were noted, however in most cases the maps were no longer with the accompanying reports.

Upon return from site a brief follow-up meeting was held with Pat Tobler of EDI on October 19, 2011 (in lieu of their originally-envisaged participation in the site visit). Previous reclamation site work, relevant field information from the terrestrial effects study, and relevant revegetation information from other Yukon sites (eg. Faro) were discussed.

Following the site work Sagebrush Nurseries also carried out some initial processing of some of the collected seed at their facility in Oliver (cleaning, and placement in overwintering containers under conditions suitable to each species). Table 4 describes the actions taken and/or envisioned for the various species of collected seed.

Synopsis of Task Objectives and Outcomes

A summary comparison of the contract's original objectives and outcomes is provided in Table 1. As noted in the table, two additional tasks (revegetation trial establishment and geological map assessment) were carried out during the October 17 to 18 field visit.

Table 1. Synopsis of Contract #C C00010821 Objectives and Outcomes

Original Objective per Contract #C00010368	Outcome with Respect to Original Objective	Other Explanatory Notes
1. Preliminary reconnaissance in fall 2011 with Orion Kendrick (Sagebrush Nursery) and EDI Environmental Dynamics	Completed	A brief follow-up meeting was held with EDI (Pat Tobler) on October 19 (in lieu of EDI's originally-envisaged participation in the site visit)
2. Field investigation for mill area adit	Completed	The use of an excavator for further adit investigation was discussed with Norwest personnel on site, and it was agreed that the existing map information, photos, and oral accounts sufficiently document the adit's historical alignment. Furthermore, reconnaissance-level excavation would be unlikely to yield additional information, and could present risks to the main road access to the mill and/or to Dome Creek.
3. Seed collection of fall species	Completed	
Other Tasks Completed		
Revegetation trial established with some of the collected scrub birch and willow seed.		Discussed with Lorax in early October 2011, and the required equipment time was incorporated into total task budget
Checked vault and office area with respect to availability of geological maps (to supplement the geological base map information being compiled by the Yukon Geological Survey)		Requested by Lorax following project kick-off meeting

Synopsis of Budget

A total of $8,490.25 was invoiced under this task, less than the $12,102.00 estimated budget.

Table 2. Budget Synopsis of Contract # C00010821, Remediation/Reclamation Task

	Prof. Fees	Heavy Equip.	Other Consum-ables	Airfare	Hotel	Travel and Meals	Total
Original Estimate J987-1, Table 3	$7,030.00	$2,500.00	$150.00	$750.00	$300.00	$1,372.00	$12,102.00
Actual Invoiced Amount	$5,540.00	$330.00	$46.40	$1,111.50	$218.00	$1,244.35	$8,490.25
Variance	$1,490.00	$2,170.00	$103.60	($361.50)	$82.00	$127.65	$3,611.75

Next Steps / Recommendations

The following work is recommended as specific follow-up to this field campaign:

1. Compile information gathered from September and October campaigns (for example, details of revegetation trial 2011-01);
2. Assess trial 2011-01 for emerged seedlings commencing in early to mid-summer 2012;
3. Ongoing research of propagation of the species collected (nursery germination and propagation, direct seeding trials); and
4. Follow up with Yukon Geological Survey on their contacting Archer Cathro directly to obtain use of their archived Mount Nansen reports from the 1980's.

References

Polster, D. F. 2009. Natural Processes: *The Application of Natural Systems for the Reclamation of Drastically Disturbed Sites.* paper presented at the B.C. Technical and Research Committee on Reclamation, BC Mine Reclamation Symposium. Cranbrook, B.C. September 14-17, 2009.

Sweigard, R., Burger, J., Zipper, C., Skousen, J., Barton, C., and Angel, P., 2007. *Low Compaction Grading to Enhance Reforestation Success on Coal Surface Mines.* Appalachian Regional Reforestation Initiative, Forest Reclamation Advisory No. 3, July 2007.

Table 3. Location of Revegetation Trial Site 2011-01, established October 18, 2011

Trial#	Easting (NAD 83 UTM 8V)	Northing (NAD 83 UTM 8V)	Elevation (masl)	Description
2011-01	388956	6881302	1218	Waste rock prepared to 'rough and loose' texture; 3 patches approximately 3x3m, each representing slightly different degrees of roughness and aspect. Locally collected willow and scrub birch seed dispersed in each patch.
Patch #1				Overall flat aspect with small hummocks (0.5m), in lee of large berm
Patch #2				Gentle NE aspect, least textured and most exposed of the 3 patches
Patch #3				Deepest hummocks (1-1.5m), walls relatively steep (close to angle of repose)

Table 4. 2011 Collected Seed and Target Application

Species	Seed Collection Information (Collection Location and Date)	Target Use Of Seed					Comments
		Seed Used in Trial 2011-01, Waste Rock Pile	Seed Used in Fall 2011 Sowing (Nursery)	Potential Use: Early Spring Sowing for June 2012 Outplanting (Nursery)	Potential Use: Spring 2012 Direct Seeding Trial	Potential Use: Spring Propagation for Fall 2012 Outplanting (Nursery)	
Scrub Birch	Pit Area Sept 1/11	x		x	x	x	
Scrub Birch	Tailings Area Sept 1/11	x		x	x	x	
Scrub Birch	Weber / Flex Area Oct 17/11	x			x	x	
Cotton Grass	Mill Area Sept 1/11		x				
Kinnikinnick	Weber / Flex Area Oct 17/11					x	
Labrador Tea	Tailings Area Oct 17/11		x				only very limited quantities could be obtained
Willow	Mill Area Sept 1/11	x					
Willow	Waste Rock Area Oct 18/11	x					

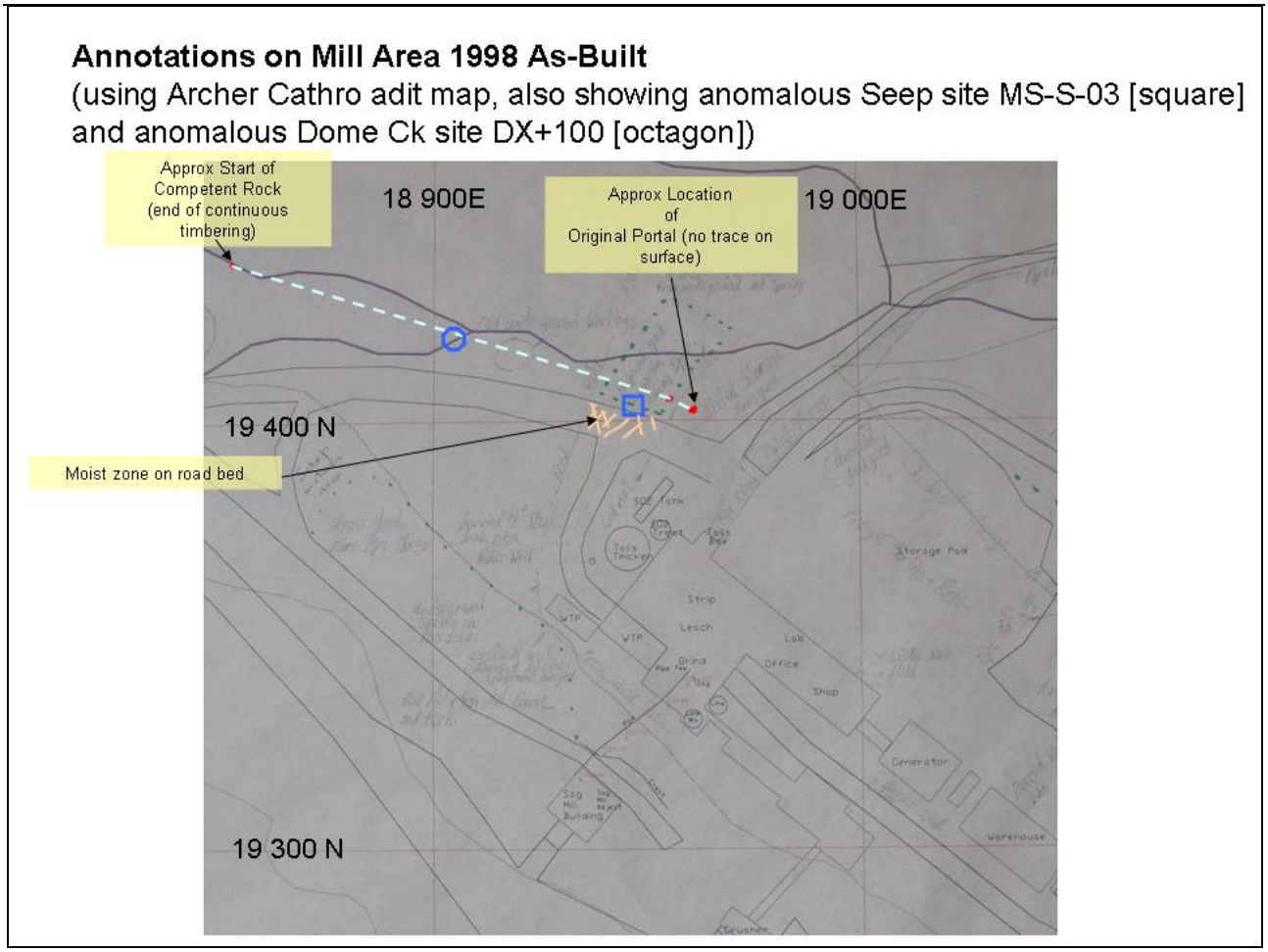

Figure 1. Approximate alignment of trace of Huestis 4100' adit based on available map information and field evidence. Coordinate system shown is that of the mine/exploration area grid.

Figure 2. Location of Direct Seeding Trial 2011-01.

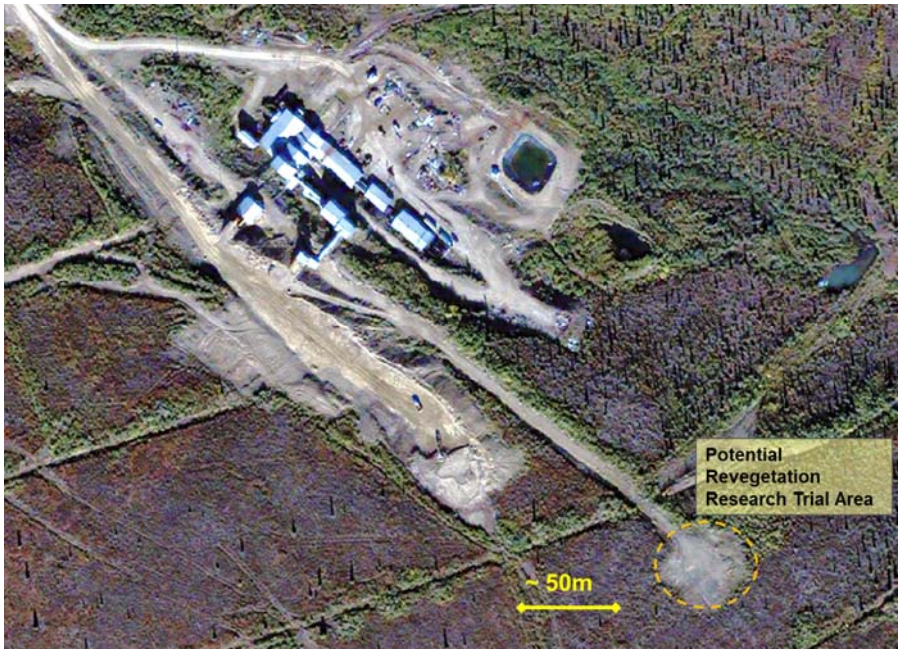

Figure 3. Location of Potential Revegetation Trial Area (not used in 2011).

Photo 1. *Carex sp.* (sedge) seed head at lower Dome Creek at Mount Nansen road.

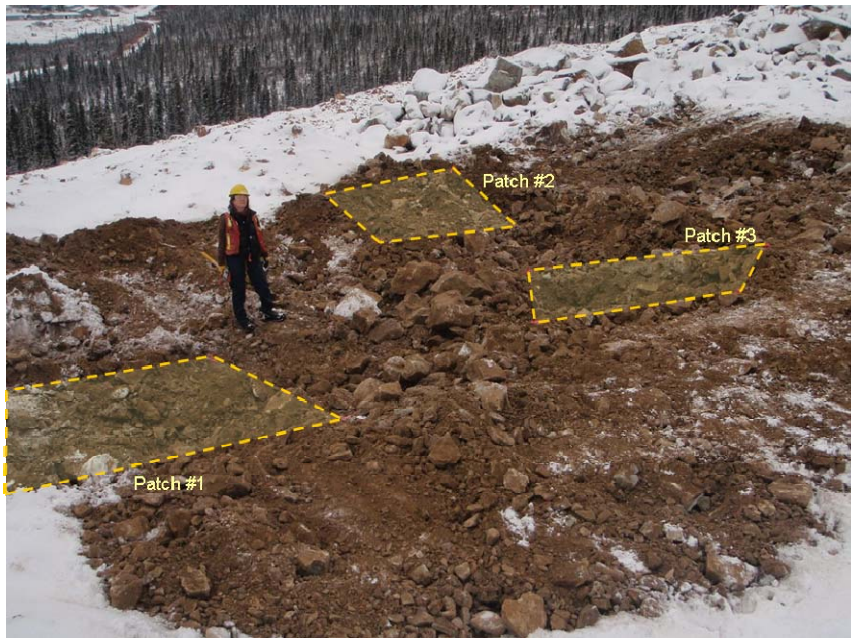

Photo 2. Revegetation trial 2011-01 on the South Pile; direct seeding of willow and birch on 'rough and loose' prepared waste rock surface.

Photo 3. Examples of 'Rough and Loose' surface preparation at other sites. Left: tailings area in southern British Columbia (photo – Altura); Right: platform in central Alberta illustrating the 'snow-trap' effect in depressions (photo – Polster Environmental Services Ltd.)

Photo 4. Moisture zone on access road to lower mill platform, October 18.