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Memorandum

To:	Heather Saggers, President, NND DC
CC:	Bill Dunn, P. Eng., Yukon Government, Energy, Mines and Resources
	D. Ewing, Ewing Transport Ltd.
	R. Trimble, P. Eng., EBA Engineering Consultants
Internal cc:	D. Cornett, P.Biol, CCEP, T. Ritchie, P. Biol.
From:	Rob McIntyre, R.E.T., AScT
Date:	October 14, 2003
Re:	**Gross estimates for Cost Comparison of Some Potential Treatment Options at Galkeno 300**

Further to an email to you from YTG on October 24, 2003, wherein Mr. Bill Dunn, P. Eng., requested gross cost estimates for three treatment options for the Galkeno 300 Mine and; we are pleased to provide you with our estimates, prepared in conjunction with EBA Engineering Consultants Ltd. It is, however, our recommendation that none of the options as presented should be chosen, based solely on this cursory cost comparison.

We reiterate our caution that, developing cost estimates for options that have not undergone the level of assessment that is a necessary fist step in the design and implementation of properly engineered instalments, is a potentially dangerous exercise. We therefore submit these cost estimates with this clear and unequivocal recommendation. In our view, you should advise the Government of Yukon that the development and implementation of the right solution for the effluent problem at Galkeno 300 should follow the process as outlined below:

Step 1: Options Conceptualization – a small team of technical experts in fields such as water treatment technology, permafrost engineering, and environmental impact mitigation, working with those with site experience, should undertake a brief review of currently available treatment methods, and site conditions, to develop a preliminary list of

treatment options. From this exercise, the full range of feasible options available to government will be established.

Step 2: Comparative Analysis of Treatment Alternatives – the technical team should then perform a relative evaluation of the identified alternatives, ranking each option on criteria such as: Constructability Considerations, Environmental Impact, Engineering Design, Capital Costs, Operating and Maintenance Costs, Overall Risk, and NND FN & Local Public Acceptance.

After this exercise, further work can be undertaken towards design and construction of the selected treatment option.

Step 3: Preliminary Design – the selected option should then undergo preliminary engineering design, including acquisition of field data if required, more detailed cost estimation, preparation of preliminary drawings and specifications. Environmental studies and permitting, if deemed required after preliminary environmental assessment (including public and NND FN consultation), would commence at this stage.

Step 4 Final Design **–** conclusion and refinement of engineering design, budgeting, logistics, and environmental assessment, and acquisition of any necessary regulatory permits/licences.

Step 5: Construction **–** project construction, initialization, inspection and monitoring, reporting and preparation of as built drawings and plans.

The above process, although it might seem weighty for what might be considered by some as a relatively small issue at the Keno Hill site, would, in our opinion, offer the best possible chance of solving the Galkeno 300 effluent problem. Also, the process need not be overly lengthy or expensive; rather, we suggest that it could be potentially disruptive and expensive to short-circuit this process.

We would like to thank you for your input and assistance in developing the gross cost estimates for the three options, and we look forward to assisting you with any questions that may be directed to you about this, by the Government of Yukon.

Access Consulting Group

Robert L. McIntyre, R.E.T., AScT
President

Cost Estimate for Water Treatment of Galkeno 300 Effluent - Cost Comparison of Three Options as presented by Yukon Government

Task	YG Option #1: Install Conventional Lime Application System & Treat at G300 Adit	YG Option #2: Buried Pipeline to G900, Increase Size of Existing Lime Treatment facilities;	YG Option #3: Convey by collection ditches/piping to G900, Increase Size of Existing Treatment Facilities
Gross Estimate of Project Capital Costs:			
Engineering, Procurement & Construction Management[1]	$110,000	$170,000	$320,000
Provision of electrical supply infrastructure	$25,000	$5,000	$250,000
Construction - Treatment Plant	$60,000	$75,000	$75,000
Construction - Settling Ponds	$100,000	$120,000	$120,000
Pipe	$0	$100,000	$700,000
Capital Cost Sub total	**$295,000**	**$470,000**	**$1,465,000**
Gross Estimate of Project Operating Costs (annual):			
Electricity	$60,000	$85,000	$400,000
Lime[2]	$180,000	$216,000	$225,000
Inspection & Monitoring	$85,000	$85,000	$150,000
System Operation	$360,000	$100,000	$150,000
Operating Costs Sub Total	**$685,000**	**$486,000**	**$925,000**
Total	**$980,000**	**$956,000**	**$2,390,000**

[1] *Engineering, Procurement & Construction Management: includes laboratory water treatability studies, plant and pond design, pipe design as req'd., environmental studies & permitting, geotechnical investigations, survey, purchasing, contract admin., quality assurance & quality control, tendering,scheduling, expediting, cost monitoring & control, environmental & engineering inspection & monitoring. These tasks to be performed by NND DC, Access Consulting Group, Canadian Environmental & Metallurgical Inc. & EBA Engineering Consultants Inc.*

[2] *Lime application rates unknown until treatability studies completed*

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