



Jan. 8, 2007

Subject: Review of *Strategic Overview of Possible Mineral Development Scenarios – Phase 1 Peel River Watershed Planning Region* (the Gartner Lee report)

CPAWS-Yukon is gravely concerned with an inherent bias in this report: that *a priori* the highest and best use of land is mining. The report appears to assume that the public interest – these **are** public lands – is best served by exploitation of mineral resources, seemingly invoking the anachronistic doctrine of manifest destiny for mining.

For example, the report states that development of the Crest iron deposit is a certainty. We maintain instead that society will determine whether or not that deposit will be developed. To imply that in the vicinity of the Crest deposit a mining land use is predetermined is to snub the planning process.

Moreover, in the context of land use planning it is inappropriate to presume that mining can occur anywhere or everywhere in the Peel watershed. Mining interests would thus preclude all other considerations, a position at odds with the principles of land use planning. We trust that the planning commission will clearly differentiate its position from that of a government-sponsored document that the Commission now has posted prominently on its website. Furthermore, given its sensitivities about the optics of being associated with some submissions – e.g., the CPAWS-Yukon conservation rationale – we think that the Commission should acknowledge that the report is as much positional as it is informational. We understand that it was paid for by the Yukon Government's Department of Economic Development, whose mandate is to "...work with the Yukon business community and with other governments to support business development, trade and investment opportunities, and partnerships for the development of the Yukon economy"—hardly a neutral body.¹

The report also makes several important assumptions, some of which are not explicit. We are very concerned with the lack of appropriate context. An unwary reader could conclude that mining development happens in a vacuum. Failure to state clearly the constraints to mineral development undermines the report. Conservation and protected areas are recognized by the mining industry as a legitimate use of public lands. The Whitehorse Mining Initiative is an example of industry's recognition of this. Society's interest in properly managed public lands

¹ We also note that the Department of Economic Development prominently carries on its website a Yukon Mineral Information series including "Iron", which features the Crest deposit.

requires setting limits on where and how industry can operate. This applies as much to the mining industry as to other sectors.

We understand that the Yukon government remains officially committed to completing a protected areas network and to establishing protected areas through land claims processes. Regional land use planning is enshrined in Yukon land claims. Therefore, it is inappropriate for the report to ignore existing government policies, obligations, commitments, and agreements – which could be constraints on mineral development.

Beyond government regulations, current land use designations also constrain mineral development. For example, the Bonnet Plume River is a Canadian Heritage River. While it does not preclude mining activity, the designation requires a widely, and legally, acknowledged higher standard of care.

General Comments

The Gartner Lee report reflects an optimistic view of mineral development potential in the Yukon generally and in the Peel watershed specifically. It reads like a mining investment promotional piece – the sort of thing that might be handed out at a mining trade show. Also the sort of thing that a land use planning commission can take under advisement but would do well to regard with healthy scepticism and to subject to critical thinking. This is a good opportunity to bring **critical thinking** to the fore and to stress its importance.

Critical thinking involves thinking well and fair-mindedly about one's own beliefs and viewpoints as well as those that are opposed. The critical thinker does not just think hard about these beliefs and viewpoints, but explores and evaluates their adequacy, logic, cohesion, and reasonableness. The critical thinker also asks what is the evidence, what is the source, what are the implications, are there other opinions?

The report is thin on important details and economically realistic development scenarios. Repeated reference to upswings in markets and technological changes cannot breathe life into properties that are fundamentally un-developable, or that will likely be uneconomical without sustained, dramatically higher mineral prices and/or heavy subsidy by taxpayers. And development scenarios must be informed by constraints as well as possibilities, and must be able to withstand geological and economic scrutiny.

All models are fraught with challenges. The “state of the art” probabilistic mineral potential model that the report refers to does not in our view meaningfully reflect reality. Such ‘blue-sky’ models provide little useful information for lay people and few reliable estimates or predictions for experienced professional geologists and mining industry insiders.

We urge the Peel Commission and other readers of this report to keep in mind two things:

- 1) modelling /probabilistic analysis of mineral potential cannot predict whether or not an economically viable mineral resource will be found, and
- 2) at present there are no economically viable mining projects in the Peel watershed nor are there any likely free-market prospects on the horizon, despite the report's bullish outlook.

Specific Comments

Section 1.2 Statement of Limitations

To paraphrase this section of the report: knowledge of mineral resources is incomplete but ever-increasing, uncertainty is high, market trends are unpredictable, technology continues to evolve. In other words, the report implies that virtually anything could be found anywhere. The report argues that this is a reasonable approach to estimating mineral potential and managing "our environment and natural resources in the context of land use planning."

We disagree. On the contrary, this is an unreasonable approach to land use planning, which is fundamentally an exercise in zoning and deciding on appropriate and inappropriate resource uses in the different zones. **It is also possible that nothing may be found anywhere.** And, as experience with mineral exploration attests, the odds are that a find will not be economically viable.

2.1 Environmental and Socio-economic Assessment

The report states that such assessment "is done before any decisions are taken on whether, or how, a mining project may proceed." Yes we know this comes under the heading Mineral Development *Legislation and Regulation* Overview, but in principle land use planning should come first and in its zoning would make some decisions "on whether, or how" mining may proceed. This is not a statutory requirement but surely the UFA and the Final Agreements of the affected First Nations imply some sort of prior authority?

3. Discussion of the Mineral Commodity Market Trends and Mineral Development

The short-term and long-term outlooks are both standard stuff, but there is no analysis (or even mention) of long-term trends in costs--of fuel, transportation, labour, etc.--that negatively affect the viability of mineral development projects. Such costs would drive the cost of development higher, counter to the trend the report highlights: "mining technology improves over time, driving the cost of mine development ever lower ... This allows for the development of deposits that were historically sub-economic." Thus, while technological improvements are a fact of life, increased production costs can reasonably be expected to offset at least some of the gains provided by these advances. Nor is there mention of the fact that the long term market trend for mineral prices has been lower real prices over time. So while technological advances have allowed exploitation of some economically marginal resources, the long term trend of lower market prices for mineral commodities can further offset advantages provided by technology. We have seen these effects over the last two decades – increased production, development of enormous low grade deposits and low world prices that made mining profitably a challenge for many large and small companies. And which drove investment away from the Yukon.

The report distinguishes short-term market trends from market fundamentals. It quotes (p. 8) the World Bank "After several years of rising commodity prices, there are indications of a stabilization and even reversal of gains in the markets for...metals and minerals." Evidently the Gartner Lee report views the price correction as a short-term trend rather than a return to long-term market patterns. One page later the report declares that:

It appears that much of current upward pressure on mineral commodities relates to continued demand within China for mineral products. China is now becoming a net importer, rather than exporter of metals. It is reasonable to believe, as the Chinese and other Asian economies continue to develop rapidly, that commodity prices will continue to show strength in the coming years.

A conservative or even-handed analysis would also consider it reasonable to anticipate the converse; that Chinese growth will plateau and associated economic factors will cause a weakness in commodity prices in the coming years—as per the World Bank review.

Over recent months the financial press has put forward both projections of increased economic growth rates and demand for resources and projections of slower growth rates and a corresponding decrease in demand for resources. There are some indications that Asian growth is slowing. Given that the Gartner Lee report does not supply sources to support its case for ever higher mineral commodity prices, we cannot place much confidence in its projections.

Note also that every mineral producing region in the world is vying to export into the Chinese/Asian market. There is substantial competition for this market. Regions or businesses with limited competitive advantage – such as the Yukon - may not be able to access that market in meaningful time.

The report references both a “John Tilden” and a “Tildon” on page 9. We assume that the reference is to John E. Tilton, Chair, Mineral Economics, Pontificia Universidad Católica de Chile and Research Professor, Colorado School of Mines. In a recent address to a *Resources for the Future* conference Tilton stated the following²:

“Conventional wisdom also points out that over the last century or so... many mineral commodities rather than having become scarcer have actually become more available in the sense that their real prices have fallen over time.”

The point being that long run trends in mineral development - because of technological and other factors – result in lower prices. One would expect this trend to benefit low cost producers, a significant factor in a relatively high cost environment such as the Yukon generally and the Peel watershed specifically. Tilton also draws attention to the important role that recycling, substitution and public concerns with some minerals play in the supply and demand equation. He states that there are no major concerns with scarcity in metals supply for the foreseeable future.

We would also argue that substitution and changes in demand for minerals and other commodities are a fact of economic life. Consumer tastes change, we learn that commonly used materials are dangerous to human health (e.g., lead in paints and automotive fuels, asbestos), and technological innovations allow us to replace commonly used materials with new stuff; e.g., plastics, carbon fibre and other materials have replaced metals in many applications.

² John E. Tilton, “The 3rd Annual Hans Landsberg Memorial Lecture: The Hungry Giant: China and Minerals”, Wednesday, December 14, 2005 <http://www.rff.org/events/The-Hungry-Giant-China-and-Minerals.cfm>

The report also appears to assume that government (taxpayer) subsidies for transportation infrastructure and environmental mitigation/clean-up are a given; there is no reference to true-cost accounting. Yet back in 1974 when discussing the viability of the Crest property, Chevron's C. Dahlstrom noted: "In economics the two most critical items are the price of iron ore in Japan *and the amount of support the Canadian government will provide.*" (*italics ours*)

4.2 Crest Iron

The report retails the dogma "Given the importance of this resource, it is not a question of *if* the Crest deposit will be developed, but rather a question of *when* the deposit will be developed. If the Crest iron deposit is not developed in a near future metal cycle, then it will be a resource that will be utilized by our children or our grandchildren."

This is an opinion unsupported by evidence and in our view based on specious reasoning. Applying the same logic one could say that there is a huge demand for silicon-based products therefore big Yukon deposits of sand are sure to be developed. Or, there are such vast mineral deposits on the moon that it's a certainty they will ultimately be developed. Maybe, maybe not. What happened to the high level of uncertainty in Section 1.2? It is also an inter-generationally presumptuous statement. Society may determine today or in the future that its interest is best served by keeping the Three Rivers area free of industrial development, including mining. Our children and grandchildren may decide what to do with the resource, but they will not be compelled to utilize it.

It is also instructive to consider Chevron's perspective on the future development of the Crest deposit and the potential resource that could be extracted.

In one of two 1974 internal memos on file, C. Dahlstrom refers to the relatively high phosphorous content of the Crest iron ores (the Gartner Lee report refers to "phosphate"), which he notes is one of two "critical" engineering problems facing the proposed project. Dahlstrom then notes "It has to be resumed to decide (*sic*) whether selective mining coupled with inefficient conventional metallurgical technique will yield a marketable product at tolerable cost, or whether an unconventional technique developed in the laboratory by the National Research Council of Canada will work on Snake River ore on a commercial scale..." In other words, Dahlstrom seems to be advocating for selective mining, which presumably would reduce the amount of ore mined at the Crest deposit. A subsequent (October 16, 1974) Dahlstrom memo, entitled Evaluation of the Snake River Iron Deposit, lays out some options for future development of the Crest deposit, including selective-mining the low phosphorous segments of the ore and applying conventional ore dressing techniques. "The reserves at Snake River are tremendous so there is no real need to mine the full thickness of the ore bed. If one part of the ore is more amenable to treatment than another we could mine selectively." In other words, Chevron was considering high-grading the deposit. Selectively mining the deposit could significantly reduce the potential volume of iron recovered and therefore bring into serious question some of the assumptions of the Gartner Lee report.

The report did not reference this publicly available material and did not integrate Chevron's important deliberations into *its* scenario development. This strikes us a serious oversight.

The report speaks of resources, reserves and reserve bases without defining what they mean. In the absence of clear definitions, discussion of the associated figures can be meaningless and

confusing. Since the report uses a US source for its iron ore information, here are the USGS definitions for these terms³:

Resource.—A concentration of naturally occurring solid, liquid, or gaseous material in or on the Earth’s crust in such form and amount that economic extraction of a commodity from the concentration is currently or potentially feasible.

Reserve Base.—That part of an identified resource that meets specified minimum physical and chemical criteria related to current mining and production practices, including those for grade, quality, thickness, and depth. The reserve base is the in-place demonstrated (measured plus indicated) resource from which reserves are estimated. It may encompass those parts of the resources that have a reasonable potential for becoming economically available within planning horizons beyond those that assume proven technology and current economics. The reserve base includes those resources that are currently economic (reserves), marginally economic (marginal reserves), and some of those that are currently subeconomic (subeconomic resources). The term “geologic reserve” has been applied by others generally to the reserve-base category, but it also may include the inferred-reserve-base category; it is not a part of this classification system.

Reserves.—That part of the reserve base which could be economically extracted or produced at the time of determination. The term reserves need not signify that extraction facilities are in place and operative. Reserves include only recoverable materials; thus, terms such as “extractable reserves” and “recoverable reserves” are redundant and are not a part of this classification system.

Thus there are important distinctions to be made among these terms. The Gartner Lee report does not make these distinctions nor does it sufficiently acknowledge known constraints to potential development of the Crest deposit. These factors are critical to making *any* technical or economic projections about the potential future exploitation of the resources. Therefore, we recommend that considerable caution be exercised by anyone attempting to use this report to guide land use decision-making.

Firstly, statements to the effect that the deposit is “a world class size deposit” or that it is “of national and global importance” are hyperbolic and require several caveats. Yes, the Crest deposit is a large deposit. But is it “world class”? Is Canada a “world class” producer?

The Crest deposit is not currently economically viable and has not been for almost 40 years. An important resource is one that can be exploited in a meaningful timeframe. There is nothing predetermined or inevitable about the future development of the Crest deposit. We think that it is speculative and inappropriate for the report to seemingly preordain the future exploitation of the deposit. We are not aware of evidence to support the Gartner Lee presumption of inevitability, nor does the report reference constraints that the resource owner has already identified. Therefore we think it imprudent to make speculative guesses in a report that was to “generate probable mineral development scenarios for the Peel River, given the known opportunities and constraints, to assist the Peel River Watershed Planning Commission with assessing future land use scenarios for the region.” (See 1.1 Scope of Work)

³ Appendix C: A Resource/Reserve Classification for Minerals: Mineral Commodity Summaries 2006, <http://minerals.usgs.gov/minerals/pubs/mcs/2006/mcs2006.pdf> United States Geological Survey, Reston, VA. .

Secondly, as we noted in an earlier submission to the Peel Watershed Planning Commission, the iron ore business is a global business. Increased integration and concentration of ownership characterize the industry. The Crest deposit may indeed contain 2.6 billion tons of iron but it is one deposit among many in the world. And the North American iron ore reserve base is not all that important globally. Using the same source as the report, we note that with 7,100 billion tons, North America's combined iron reserve base is 4% of the world total. Brazil by contrast controls 22% of the world reserve base almost 6 times as much as both Canada and the US together - China has 2.1 times, Ukraine - 2.8 times, Australia - 3.5 times and Russia - 4.4 times.⁴ Why didn't the report mention this important context?

If we look at the estimated world iron ore and iron resource (*see definition above*), the Crest deposit can also be assessed comparatively. According to the United States Geological Survey⁵ the current world crude iron ore reserve base is 370 billion tons and contains 180 billion tons of iron. By either measure, the Crest iron ore deposit would contain a little over 1% of the world's iron reserve base. Although the Crest deposit is large, there are many other important iron resources that are much more favoured by geography, climate and infrastructure.

We believe that the statement (p. 21), "The progressive reclamation would backfill the pit behind mining with waste rock, thereby restoring the landscape as the mine progresses through the deposit area," is a gross over-simplification of reclamation and landscape restoration. There is little likelihood that the landscape of the Snake River would be acceptably reclaimed and restored. Based on our understanding of large projects elsewhere, we think that a large open-pit iron mine would have a permanent impact on the Peel watershed.

4.3 and 4.4 Wernecke Breccias, Carbonate Hosted Lead-Zinc Deposits

This section is also incautious and hyperbolic, although we concur that there is a "high degree of uncertainty" when assessing probabilistic models. Scepticism is an understandable reaction to reading, with reference to iron-oxide copper gold deposits, that "there is excellent potential for their discovery." "Excellent potential" that is immediately qualified: "To date, there have been no deposits of this type delineated in the Yukon."

One could equally advance "excellent potential" and "absolutely no potential" for discovery of such deposits. There are no data to support the supposition that deposits of this type – economically viable or not - can be or will ever be discovered in the Yukon. The presence of similar suite of rocks and mineralization found in Australia or anywhere may have zero bearing on the potential, "excellent" or otherwise, of finding similar or any deposits of this type. Moreover, the discovery of this type of deposit does not mean that any other would be found or that it would be economically viable to extract the resource.

This section reads rather like mining promoter literature. Having spent most of 20 mostly fruitless years chasing mineral deposits that were of one type or another, one of us (MH) would recommend a cautionary approach to promotional statements of the sort found in this report. Moreover, economics are the cornerstone of mineral deposit assessment yet there is scant

⁴ Jorgenson, J.D., 2006: Mineral Commodity Summaries, January 2006, <http://minerals.usgs.gov/minerals/pubs/mcs/2006/mcs2006.pdf> United States Geological Survey, Reston, VA

⁵ Jorgenson op. cit.

information describing the conjunction of factors necessary for a successful and economically viable project.

Reference to construction of a railway to the Crest deposit seems to be the linchpin of virtually all scenario runs. This is speculative and not of much value in understanding the economics of any particular scenario.

5.4.2 Coal Processing

"For an on-site power plant, the coal may require minimal to no processing. Should the coal be shipped off-site, it will require 'cleaning' to reduce ash content." That refers to Bonnet Plume coal. So much for the 'greater standard of care' that is supposed to obtain along a Heritage River.

6. Conclusion

We read that "... no mining will take place without several important conditions being met. These include: finding a suitable deposit; sufficient metal prices; appropriate technology for mining processing; infrastructure necessary to support the mining operation. In addition, environmental and regulatory requirements would also have to be met." There is no acknowledgement that land use planning (i.e., zoning) could also apply conditions.

Opportunity Lost?

This report could have provided a useful assessment of mineral potential based on reasonable and defensible assumptions. Instead, we encounter a document which in some aspects more a piece of trade literature. It is long on speculation, short on meaningful context, and regards future development with unwarranted hubris. It is selective in identifying constraints to development and seems to assume that mineral development is necessarily the highest and best use of lands in the Peel watershed, if not in the entire Yukon. This is simply unacceptable in a report of this sort and undermines its value and credibility. Presumably the consultant followed parameters given by the Department of Economic Development, which begs the question why the Yukon Government did not specify a balanced and credible analysis. We also are unclear whether this report is an official report of the commission? We hope not. Nonetheless we appreciate the opportunity to provide our comments.

Sincerely yours,

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