

SOME DEFICIENCIES IN THE DRAFT APPLICATION INFORMATION REQUIREMENTS FOR RAVEN UNDERGROUND COAL PROJECT, VERSION 7, MAY 2011

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26 June 2011 (As submitted in PDF)*

Please publish my name and location along with my comments.

SUMMARY OF RECOMMENDATIONS

Recommendation 1: that the BCEAO and federal CEAA ("the Agencies") require that the impact assessment for the Raven Project be expanded to include assessment of possible impacts of development of the Bear and Anderson Lake properties, as well as any other reasonably foreseeable developments within the regional holdings of the proponent.

Recommendation 2: that the Agencies require the proponent to provide more details of planned baseline studies and modelling of hydrogeology and groundwater quality and to make this information available for public review prior to approval of the AIR. In particular, the additional information should include locations and descriptions of new groundwater monitoring stations and a conceptual description of the hydrogeological model.

Recommendation 3: that the Aquatic Spatial Boundaries be expanded to encompass all surface freshwater systems of the Raven Project Land Tenure as well as the wetlands and creeks of the Baynes Sound shoreline—i.e. the same spatial boundaries now applied to groundwater and hydrogeology studies (Fig 5.3-1). If the geographical scope of the assessment is expanded per my Recommendation 1, then these Aquatic Spatial Boundaries should be correspondingly expanded.

Recommendation 4: that the proponent provide credible population estimates of all salmonid populations of the Raven Project Land Tenure as benchmarks against which to measure possible project impacts. For anadromous populations (Coho, Pink and Chum Salmon; Steelhead and Cutthroat Trout), such population estimates should include estimates of both outmigrant smolts and adult spawners. Population enumerations should be conducted for several years prior to project construction and ongoingly for the life of the mine and after decommissioning should the project proceed.

Recommendation 5: that the list of marine Valued Components include at least the following:

- Plankton—phytoplankton and zooplankton communities, including seasonal timing of blooms
- Marine Plants—Eelgrass and attached macroalgae
- Shellfish—(in addition to Pacific Oyster already on the list) Manila, Littleneck, Butter and Geoduck Clams; Scallops (native and cultured); Prawns and Crabs (*Cancer* and *Pugettia*)
- Finfish—marine salmonids (Coho, Pink, Chum and Chinook Salmon; Steelhead and Sea-run Cutthroat Trout), Pacific Herring, Pacific Sand Lance, and groundfish (Lingcod, Rockfish spp., Staghorn and other Sculpins, Plainfin Midshipman, flatfish including Starry Flounder, and Pacific Hake)
- Seabirds—year-round residents (Pelagic Cormorant, Great Blue Heron, Glaucous-winged Gull); winter residents (Trumpeter Swan, American Wigeon, Surf and White-winged Scoters, Pacific Loon, Black Turnstone, Mew Gull); spring migrants (Brant)
- Marine Mammals—Harbor Seal, California and Steller Sea Lions.

Recommendation 6: that the Baynes Sound Marine LSA be expanded to include the full width of Baynes Sound adjacent to the Raven Project Land Tenure. And that the corresponding RSA include all of Baynes Sound from approximately Mapleguard Point-Boyle Point in the south to Comox Harbour and the Courtenay Estuary in the north.

Recommendation 7: that marine baseline sampling of water quality, sediment quality and characterization of benthic infauna as currently proposed be carried out over a more extensive marine area, including more offshore areas, deeper sediments and sampling stations throughout Baynes Sound. In addition, the proponent should carry out baseline studies of tissue concentrations of metals and other contaminants that may be introduced into the food web by mine effluent; such studies should document tissue loads in a number of indicator species from phytoplankton and zooplankton through higher trophic levels at all seasons of the year.

SPATIAL SCOPE OF REVIEW

In my comments below I provisionally accept the proponent's definition of the project area as the Raven Project Land Tenure as shown in Fig 2.2-2 of the draft Application Information Requirements, version 7 ("dAIRv7"). However, given that the proponent owns coal rights to a much larger area contiguous with the Raven Project and that there are at least two commercially promising prospects nearby (Bear and Anderson Lake), I recommend as follows:

Recommendation 1: that the BCEAO and federal CEEA ("the Agencies") require that the impact assessment for the Raven Project be expanded to include assessment of possible impacts of development of the Bear and Anderson Lake properties, as well as any other reasonably foreseeable developments within the regional holdings of the proponent.

If the Agencies decide to expand the spatial scope of the review, then my comments below regarding spatial scope should be expanded accordingly.

GROUNDWATER

Spatial Boundaries (Fig 5.3-1)

I note that the LSA and RSA for hydrogeology and groundwater quality studies have been expanded from the boundaries shown in the original Project Description (2009) and Addendum (2010) to coincide approximately with the boundaries of the Raven Project Land Tenure. Subject to my recommendation above about the need for consideration of other potential coal developments in the area, I think this expansion is appropriate and helpful.

Groundwater Baseline Data and Modelling (Sec 5.3.2.1)

The current dAIRv7 provides insufficient detail on the proponent's plan for data collection and modelling of hydrogeology and groundwater quality. The eight test wells described in Section 5.3.2.1 do not appear adequate to provide data for the expanded study area shown in Fig 5.3-1. In the Working Group Issues Tracking Tables ("Tracking Tables") the proponent states an intention to provide additional information regarding the hydrogeological model and additional groundwater monitoring sites (Tracking Tables, Provincial and Local Agency Issues, p19 at DILTC-II-04). However, this information is not scheduled to be provided until the next version of the dAIR is released; at the Courtenay Public Meeting of 30 May 2011, the proponent stated that the next version of the dAIR would not be available until after the present Public Comment Period had ended.

Recommendation 2: that the Agencies require the proponent to provide more details of planned baseline studies and modelling of hydrogeology and groundwater quality and to make this information available for public review prior to approval

of the AIR. In particular, the additional information should include locations and descriptions of new groundwater monitoring stations and a conceptual description of the hydrogeological model.

HYDROLOGY

Spatial Boundaries (Fig 5.4-1)

The proposed Aquatic Spatial Boundaries encompass only the watershed of Cowie and Cougar Smith Creeks plus two small tributaries of the adjacent Tsable River system. These boundaries apply to all surface water studies, including Hydrology, Surface Water and Sediment Quality, and Freshwater Fisheries and Aquatic Resources. (The dAIR states that these boundaries also apply to studies of Hydrogeology and Groundwater Quality [dAIRv7, Sec 5.4.1.1, p87], but I assume this is an error persisting from earlier versions of the dAIR.)

The proponent's rationale for these boundaries is that "... the proposed Raven Project is confined to Cowie Creek and some of its tributaries. The possible proposed Raven Project influence on water quality and stream flows is therefore limited to the watershed in which it is located." (dAIRv7, Sec 5.4.1.1, p87) In the absence of a detailed mine plan, water management plan, and detailed hydrogeological mapping to illustrate possible subsurface connections among surface and groundwater systems, there is no evidence that this statement is correct.

Recommendation 3: that the Aquatic Spatial Boundaries be expanded to encompass all surface freshwater systems of the Raven Project Land Tenure as well as the wetlands and creeks of the Baynes Sound shoreline—i.e. the same spatial boundaries now applied to groundwater and hydrogeology studies (Fig 5.3-1). If the geographical scope of the assessment is expanded per my Recommendation 1, then these Aquatic Spatial Boundaries should be correspondingly expanded.

FRESHWATER FISHERIES AND AQUATIC RESOURCES

Spatial Boundaries (Fig 5.4-1)

As noted above, the Aquatic Spatial Boundaries are too restrictive and should be expanded per my Recommendation 3. In dAIRv7, fisheries and aquatic biology studies would be restricted to the Cowie/Cougar Creek watershed and would ignore the much larger and more productive adjacent Tsable River and Wilfred (Coal) Creek systems, both of which are at risk if the Raven Project proceeds.

Freshwater Fisheries Baseline Studies (Sec 5.5.2.1)

The fisheries impact assessment envisioned in the dAIR is based primarily on estimation of freshwater fish habitat and projections of potential habitat loss due to mine impacts. The relation between fish populations and our measurements of the extent and quality of habitat is not precise.

The proposed baseline studies may provide credible estimates of populations of stream-resident salmonids (Rainbow and Cutthroat Trout). Likewise they will provide indices of the abundance of juveniles for stream-rearing species (Coho Salmon and anadromous Cutthroat and Rainbow Trout [Steelhead]); however, they will provide no information on numbers of smolts of these species that leave the rearing streams, nor will they estimate numbers of spawning adults. Finally, proposed baseline studies will provide no information at all on the present status of Pink and Chum Salmon that spawn in streams of the project area but rear and mature entirely in marine waters. Federal and provincial government agencies have no quantitative estimates of the anadromous salmonid populations of any of the streams of the project area since 2004.

Recommendation 4: that the proponent provide credible population estimates of all salmonid populations of the Raven Project Land Tenure as benchmarks against which to measure possible project impacts. For anadromous populations (Coho, Pink and Chum Salmon; Steelhead and Cutthroat Trout), such population estimates should include estimates of both outmigrant smolts and adult spawners. Population enumerations should be conducted for several years prior to project construction and ongoingly for the life of the mine and after decommissioning should the project proceed.

MARINE ENVIRONMENT

Valued Components (S 5.6.1 and Table 5.6-1)

The proponent acknowledges that the list of marine VCs is preliminary (dAIRv7:p108). In fact for Baynes Sound the list is practically nonexistent.

It is important to note that the environmental importance of Baynes Sound depends upon its integrity as a functioning ecosystem that provides many services to the human and non-human communities of the region. It is this function that must be protected, not simply a list of components. That said, it is reasonable and practical to list particular species and other components of particular importance to humans and to the ecosystem along with other species and ecological groupings that may act as indicators of overall ecosystem health. Once having made such a list, it is important to recognize that our present understanding of ecosystem structure and function is very limited and that any list of components may fail to include important elements of the system. Therefore, ongoing monitoring of the entire ecosystem is required in order to detect unforeseen impacts.

Recommendation 5: that the list of marine Valued Components include at least the following:

- **Plankton—phytoplankton and zooplankton communities, including seasonal timing of blooms**
- **Marine Plants—Eelgrass and attached macroalgae**
- **Shellfish—(in addition to Pacific Oyster already on the list) Manila, Littleneck, Butter and Geoduck Clams; Scallops (native and cultured); Prawns and Crabs (*Cancer* and *Pugettia*)**
- **Finfish—marine salmonids (Coho, Pink, Chum and Chinook Salmon; Steelhead and Sea-run Cutthroat Trout), Pacific Herring, Pacific Sand Lance, and groundfish (Lingcod, Rockfish spp., Staghorn and other sculpins, Plainfin Midshipman, flatfish including Starry Flounder, and Pacific Hake)**
- **Seabirds—year-round residents (Pelagic Cormorant, Great Blue Heron, Glaucous-winged Gull); winter residents (Trumpeter Swan, American Wigeon, Surf and White-winged Scoters, Pacific Loon, Black Turnstone, Mew Gull); spring migrants (Brant)**
- **Marine Mammals—Harbor Seal, California and Steller Sea Lions.**

Spatial Boundaries (Fig 5.6-1)

The marine LSA for Baynes Sound proposed in dAIRv7 includes only the nearshore subtidal area near the mouth of Cowie Creek in Fanny Bay. The proposed RSA includes the full width of Baynes Sound from Buckley Bay north of the mouth of Tsable River to McNaughton Creek north of Deep Bay.

The proponent offers no rationale for these boundaries. Presumably the choice of LSA boundaries is based on the same logic that guided the restriction of the Aquatic Spatial Boundaries to the watershed in which the mine surface works are planned—i.e. that the mine will have no impact on other surface waters. I reject that thinking on the grounds detailed above. The RSA boundaries in dAIRv7 encompass the portion of Baynes Sound adjacent to the mouths of the major stream systems draining the Raven Project Land Tenure.

In my opinion, the LSA should include the full width of Baynes Sound adjacent to the entire Raven Project Land Tenure, from approximately the mouth of Hindoo Creek south to at least Mud Bay in order to monitor the effects of runoff and subsurface seepage from all proposed surface and underground mine works. The RSA should include all of Baynes Sound so as to establish baselines for the whole Baynes Sound ecosystem, including all shellfish aquaculture tenures and also known point sources of Acid Mine Drainage (Union Bay coal piles and Courtenay River, which receives effluent originating in the abandoned Mt Washington Mine on Tsolum River.

Recommendation 6: that the Baynes Sound Marine LSA be expanded to include the full width of Baynes Sound adjacent to the Raven Project Land Tenure. And that the corresponding RSA include all of Baynes Sound from approximately Mapleguard Point-Boyle Point in the south to Comox Harbour and the Courtenay Estuary in the north.

Detailed Marine Baseline Studies (Sec 5.6.2.1)

The baseline studies proposed in dAIRv7 include only water quality, sediment quality, and benthic infauna characterization in nearshore subtidal study areas. These data are worth collecting as a step toward monitoring how, where and in what form mine contaminants might enter Baynes Sound if the proposed project goes ahead.

In addition, it will be essential to be prepared to monitor how contaminants may disperse through the ecosystem after reaching Baynes Sound. Contaminants that precipitate into the nearshore sediments may disperse through passive transport by wind, waves, currents and gravity. Contaminants may also be incorporated into organisms and enter the food web. Accordingly it is appropriate to establish baseline levels not only in the water column, nearshore sediments and burrowing organisms, but also in deeper water and sediments and in selected indicator organisms at all levels in the food web. It is important that this baseline sampling of the ecosystem be carried out throughout Baynes Sound, since various contaminants, including those originating in Acid Mine Drainage, are already known to be present in the system, and it will be important to be able to determine incremental effects of the Raven Project if it proceeds. The deposits of coal washings known as the Union Bay coal piles at the mouth of Hart Creek provide an interesting opportunity to trace the historical and ongoing dispersal of coal waste leachate through the Baynes Sound system.

Recommendation 7: that marine baseline sampling of water quality, sediment quality and characterization of benthic infauna as currently proposed be carried out over a more extensive marine area, including more offshore areas, deeper sediments and sampling stations throughout Baynes Sound. In addition, the proponent should carry out baseline studies of tissue concentrations of metals and other contaminants that may be introduced into the food web by mine effluent; such studies should document tissue loads in a number of indicator species from phytoplankton and zooplankton through higher trophic levels at all seasons of the year.