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Please find the attached document, which I am submitting on behalf of the BC Shellfish Growers Association (BCSGA). The document outlines the key issues that the BCSGA has identified within the proposed Raven Coal Mine draft Application Information Requirements (dAIR) for the Environmental Assessment.



Comments on the proposed Raven Coal Mine
Draft Application Information Requirements for the Environmental Assessment
Submitted by the BC Shellfish Growers Association

Executive Summary

The BC Shellfish Growers Association (BCSGA) has reviewed the draft Application Information Requirements (dAIR) for the proposed Raven Underground Coal Mine and proposes the following comments, amendments and additions to the dAIR:

Scientific comments:

- Annual environmental monitoring of Baynes Sound for the full life of the proposed mine operation and closure activities
- The baseline survey and annual monitoring program must be completed by a third party company that does not have a history of financial dealings with Compliance Coal Corporation.
- The baseline survey and annual monitoring program must include shellfish tissue sampling (mussels, Manila clams, Pacific oysters and Pacific scallops)
- Local and regional study areas must be expanded
- Water dispersion pathways of Baynes Sound must be adequately mapped
- Expand the list of marine valued components to include mussels, Manila clams, Pacific oysters and Pacific scallops

Socio-economic comments:

- The environmental assessment must be done by an independent expert review panel with full public hearings.
- Proposed mitigation must include a posting of a security or bond that adequately reflects the present and future economic significance of the Baynes Sound shellfish industry
- Add shellfish industry to the economic health valued components
- Include the Baynes Sound Coastal Plan for Shellfish Aquaculture as a resource for characterizing the economic health baseline and the social conditions valued components table

- The Aquatic Resources Environmental Management Plan must consider the full length of waterways in the affected area
- The Marine Resources Environmental Management Plan (section 10.2) needs to include operational activities of the mine, and the decommissioning and post-mining period, as well as construction and post-construction activities
- The shellfish aquaculture component of the Capacity of Renewable Resources must be approved by the BCSGA.

Part 1 - Scientific Comments

More than 50% of the shellfish farmed in BC come from Baynes Sound. The BC Shellfish Growers Association (BCSGA) is concerned that run off from the proposed Raven Underground Coal Mine, including acid rock drainage (ARD), will lead to increased concentrations of contaminants in Baynes Sound. Shellfish are prone to accumulation of toxins such as heavy metals and polycyclic aromatic hydrocarbons (PAHs), which makes them sensitive to these contaminants. It is well-documented that there are increased concentrations of heavy metals and PAHs in shellfish tissues from water exposed to coal mining or coal burning activities (Gusti et al., 1999; Gilbert et al., 2006; Abbe et al., 2000; Peltier et al., 2008; Peltier et al., 2009). To provide a local example, there were increased concentrations of arsenic found in freshwater mussel tissue exposed to wastewater from the nearby Quinsam Mine in Campbell River (Canadian Water Network, 2010). The BCSGA requests that the following components, missing from the draft Application Information Requirements (dAIR), be added to the final AIR.

1.1 Annual monitoring of Baynes Sound for full life of mine operation, closure activities and post-closure period.

In addition to the baseline survey described in section 5.6.2.1 of the dAIR, the proponent must be responsible for funding an annual monitoring program for Baynes Sound. Specific recommendations for both the baseline survey and annual monitoring program are described below.

1.2 The baseline survey and annual monitoring program must be completed by a third party company

The company must:

- Have no history working with Compliance or AMEC;
- Be familiar with the marine environment of Baynes Sound;
- Be familiar with the shellfish industry in Baynes Sound and
- Have the confidence of the BC Shellfish Growers Association.

1.3 The baseline survey and annual monitoring program must include shellfish tissue sampling

In addition to the water and sediment quality analysis discussed in section 5.6.2.1 of the dAIR, the baseline survey and annual monitoring program must include tissue analysis of both benthic and pelagic shellfish species (i.e. cultured off-bottom on rafts or similar). It is necessary to sample both pelagic and benthic shellfish because different types of both metals and PAHs can be found in higher concentrations in the water column if they have a lighter molecular makeup or in higher concentration in the sediments if they have a heavier molecular makeup (Manfra et al., 2010). Results of all surveys and monitoring studies must be submitted to the BCSGA as part of the EA commitments.

Benthic species recommended for tissue analysis:

- Manila clams - *Ruditapes philippinarum*

Pelagic species recommended for tissue analysis:

- Mussels - *Mytilus* spp
- Pacific Oysters - *Crassostrea gigas*
- Pacific Scallop - *Patinopecten X*

While mussels are not commonly farmed in this area, they are recommended for tissue analysis because mussels are widely used as a bioindicator of both metals and PAHs. See Appendix A for examples of scientific studies that utilize mussels as a bioindicator.

The shellfish tissues must be analyzed for all of the metals listed in Table 5.3-2 of the dAIR as well as PAHs.

1.4 Expand local (LSA) and regional marine study areas (RSA) (Figure 5.6-1 of dAIR)

The study area needs to be expanded to include all of Baynes Sound. Specifically:

- The reference stations need to be located further away from mining activities;
- Station 1 (Figure 5.6-1 of the dAIR) is inappropriate as a reference station because the impacts of previous coal mining activities on the aquatic environment are still apparent there;
- The scale and replication of the baseline survey and monitoring program need to represent the scale of the shellfish industry in the sound: All of Baynes Sound (Figure 1); and
- The location of study sites and reference sites need to be determined after the water dispersion pathways of Baynes Sound have been mapped (see section 1.5).



Figure 1. Shellfish tenures in Baynes Sound.

1.5 Map water dispersion pathways of Baynes Sound

The water dispersion pathways of the Baynes Sound need to be identified and mapped prior to selecting sampling stations for the baseline survey and annual monitoring program. The water dynamics for

estuarine environments are very complex and dynamic due to freshwater/saltwater mixing, tides, currents and bathymetry. Mapping the water dynamics of Baynes Sound is essential in order to select meaningful sampling stations for both study sites and reference sites. The boundaries of the LSA and RSA (as outlined in Figure 5.6-1 of the dAIR) need to be redefined based on the results of the water dynamic mapping. Tim Bekhuys, AMEC, stated that the proponent "may use potential contaminant plume modeling" in Baynes Sound during the public meeting in Union Bay on June 3rd.

1.6 Expand the list of marine valued components (Table 5.6-1 of dAIR)

Table 5.6-1 of the dAIR, which currently only lists the Pacific oyster, Sixgill shark, Humpback whale and Marbled murrelet as marine valued components, need to be expanded to include the following economically, socially and environmentally important species:

- Manila clam - *Ruditapes philippinarum*;
- Pacific scallop - *Patinopecten X*;
- Geoduck - *Panopea abrupta*; and
- Mussel - *Mytilus* spp

Part 2: Socio-economic comments

The shellfish industry provides 1,000 jobs in BC, over half of these in Baynes Sound. BC shellfish growers produce \$38 million worth of shellfish annually, half of which comes from Baynes Sound. This environmentally and economically sustainable industry is based on a responsibly farmed resource, and depends on a clean, contaminant-free marine environment for its continued success. The BCSGA requests that the significance of this industry is reflected more fully in the dAIR for the proposed Raven Underground Mine Project, by including the following components:

2.1 The environmental assessment process must be done by an independent expert review panel with full public hearings.

The social, economic and environmental significance of the Baynes Sound area, both for shellfish aquaculture and as a region of high biodiversity and ecological significance, warrants that the proposed coal mine project be assessed using the most rigorous and scientifically sound method available. The shellfish growers and the general public have much at stake in this proposal and deserve the most thorough environmental assessment possible.

2.2 Add shellfish industry to the economic health valued components (Table 6.2-1)

Shellfish industry jobs in Baynes Sound, including associated processing facilities, transportation and distribution services are an important and sustainable part of the local and regional economy.

2.3 Include Baynes Sound Coastal Plan for Shellfish Aquaculture (MSRM 2002) as a resource for characterizing the economic health baseline (Section 6.2.2.1) and social conditions valued components table (Table 7.2-1)

Data used in community and regional economic profiles should include Baynes Sound Coastal Plan. This plan provides information and guidance regarding the sustainable management of the Baynes Sound shellfish aquaculture industry, in the context of other resources uses within the area. The plan should be included as a resource for assessing the marine uses and tenures component of the non-traditional land uses (Table 7.2-1, page 159).

2.4 Proposed mitigation must include a bond that adequately reflects the present and future economic significance of the Baynes Sound shellfish industry (Sections 6.2.2.2 and 2.2.10)

This is a crucial piece missing from the dAIR. The "potential effects on the aquaculture sector" is listed under "other economic effects" in Section 6.2.2.2, page 153. This significant sector of the local and regional economy must receive a greater level of acknowledgement in the AIR. Mitigation must include posting of a security or bond that represents a reasonable and fair compensation for the Baynes Sound shellfish industry, in the event that the industry is negatively impacted as a result, directly or indirectly, of mine operation, construction, closure and/or abandonment.

There is ample evidence of mines on Vancouver Island causing contamination in watersheds, destruction of salmon runs and other harmful environmental effects (e.g. arsenic in Long Lake from Quinsam Coal Mine, metals and ARD in Tsolum River from Mount Washington Copper Mine). Recent reviews of environmental legacies of coal mining in BC (Stano 2011, a,b) and the lack of adequate enforcement of federal and provincial environmental standards are of concern to the BCSGA. Potentially at stake are more than 500 year-round full-time jobs that the shellfish industry provides in the Baynes Sound area, not to mention the significant contribution that this highly productive area makes to local food security. This sector of the local and regional economy is likely to continue to grow and provide sustainable livelihoods for people far into the future, providing the marine environment remains healthy. As stated by Stano (2011a), "... the current lack of enforcement [by government] – combined with the willingness to relax permit conditions when faced with non-compliance -- runs counter to both public sentiment and sound environmental management. This places local communities and provincial taxpayers at significant risk." (p. 21). With the future of an environmentally and economically sustainable shellfish aquaculture industry at stake, this risk is even more significant and warrants a correspondingly adequate security be required of the proponent.

2.5 The Aquatic Resources Environmental Management Plan must consider the full length of waterways in the affected area (section 10.2)

This section should include aquatic resources that are not only in the "vicinity" of the proposed mine, as stated on page 189, but downstream as well, to include the full length of the watercourses affected. This will help ensure that contaminants will not enter waterways and affect downstream shellfish beds in Baynes Sound.

2.6 The Marine Resources Environmental Management Plan (section 10.2) needs to include operational activities of the mine, and the decommissioning and post-mining period, as well as construction and post-construction activities

As well, this section of the dAIR makes no mention at all of the shellfish industry (p. 192). The BCSGA

requests that it be involved with development of this management plan to ensure that the interests of the shellfish growers in Baynes Sound are considered and adequately addressed.

2.7 The shellfish aquaculture component of the Capacity of Renewable Resources (section 2.2.20) must be approved by the BCSGA.

The assessment of the sustainability of shellfish resources and the likelihood of their being affected by the proposed coal mine should be done in full consultation with the BCSGA or its appointees.

Part 3 References

Abbe, G.R., Riedel, G.F., Sanders, J.G. 2000. Factors that influence the accumulation of copper and cadmium by transplanted eastern oysters (*Crassostrea virginica*) in the Patuxent River, Maryland. *Marine Environmental Research* 49(4), 377-396.

Baynes Sound Coastal Plan for Shellfish Aquaculture, 2002. BC Ministry of Sustainable Resource Management, Coast and Marine Planning Branch, 79pp.

Canadian Water Network, Environmental Sciences Group - Royal Military College, University of British Columbia. 2010. An Environmental Investigation of the Quinsam Watershed.

Gilbert, E., Doodoo, D.K., Okai-Sam, F., Essuman, K., Quagraine, E.K. 2006. Characterization and source assessment of heavy metals and polycyclic aromatic hydrocarbons (PAHs) in sediments of the Fosu Lagoon, Ghana. *Journal of Environmental Science and Health* 41(12), 2747-2775.

Giusti, L., Williamson, A.C., Mistry, A. 1999. Biologically available trace metals in *Mytilus edulis* from the coast of northeast England. *Environment International* 25(8), 969-981.

Manfra, L., Maggi, C., Lorini, F., Cocozziello, B., Accornero, A. 2010. The use of semi-permeable membrane devices in order to investigate the partitioning of PAHs in sediments and their potential fugacity. *Presentius Environmental Bulletin* 19(5A), 1031-1037.

Peltier, G.L., Meyer, J.L., Jagoe, C.H., Hopkins, W.A. 2008. Using trace element concentrations in *Corbicula fluminea* to identify potential sources of contamination in an urban river. *Environmental Pollution* 154(2), 283-290.

Peltier, G.L., Wright, M.S., Hopkins, W.A., Meyer, J.L. 2009. Accumulation of trace elements and growth responses in *Corbicula fluminea* downstream of a coal-fired power plant. *Ecotoxicology and Environmental Safety* 72(5), 1384-1391.

Stano, Maya 2011 a The Raven Mine: A regulatory and fiscal black hole? University of Victoria Environmental Law Centre, Victoria, BC

Stano, Maya 2011 b. Bearing the heavy burden of coal mining. Unpublished manuscript.

Appendix A - Scientific studies that use mussels as a bioindicator of metal and PAH contamination

Metals

Canadian Water Network, Environmental Sciences Group - Royal Military College, University of British Columbia. 2010. An Environmental Investigation of the Quinsam Watershed.

Giusti, L., Williamson, A.C., Mistry, A. 1999. Biologically available trace metals in *Mytilus edulis* from the coast of northeast England. *Environment International* 25(8), 969-981.

PAHs

Chou, C.L., Paon, L.A., Moffatt, J.D., King, T. 2003. Selection of bioindicators for monitoring marine environmental quality in the Bay of Fundy, Atlantic Canada. *Marine Pollution Bulletin* 46(6), 756-762.

Marvin, C., Allan, L., Bryant, D., McCarry, B. 2000. Use of the zebra mussel (*Dreissena polymorpha*) as a bioindicator for aromatic hydrocarbons in Hamilton Harbour. *Water Quality Research of Canada* 35(1), 59-72.

Oros, D.R., Ross, J.R.M. 2005. Polycyclic aromatic hydrocarbons in bivalves from the San Francisco estuary: Spatial distributions, temporal trends, and sources (1993-2001). *Marine Environmental Research* 60(4), 466-488.
