Jang, Monica JTST:EX

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Sent from my iPhone

Begin forwarded message:

From: "Hoffman, Al EMNG:EX" <<u>Al.Hoffman@gov.bc.ca</u>> Date: December 5, 2012, 10:22:52 AM PST To: "'jody.shimkus@hdminingintl.com''' <jody.shimkus@hdminingintl.com>, "'<u>GGeankoplis@Finavera.com</u>''' <<u>GGeankoplis@Finavera.com></u> Cc: "Johnstone, Heather EMNG:EX" <<u>Heather.Johnstone@gov.bc.ca</u>>, "Bonnyman, Sue EMNG:EX" <<u>Sue.Bonnyman@gov.bc.ca</u>>, "Booth, Richard EMNG:EX" <<u>Richard.Booth@gov.bc.ca</u>>, "Koyanagi, Victor EMNG:EX" <<u>Victor.Koyanagi@gov.bc.ca</u>>, "Cullen, Heather J EMNG:EX" <<u>Heather.Cullen@gov.bc.ca</u>>, "Bondaroff, Todd T FLNR:EX" <<u>Todd.Bondaroff@gov.bc.ca</u>>, "Fraser, Megan MCF:EX" <<u>Megan.Fraser@gov.bc.ca</u>>, "MarchukFraser, Marnie EMNG:EX" <<u>Marnie.MarchukFraser@gov.bc.ca</u>>, "Forrester, David''' <<u>David.Forrester@aecom.com</u>>, "Brody, Margo X EMNG:EX" <<u>Margo.Brody@gov.bc.ca</u>>, "Junck, Carrera EMNG:EX" <<u>Carrera.Junck@gov.bc.ca</u>> Subject: FW: 2012 11 09 60270723-R-DR BC Subsidence - Revised Draft

Jody Shimkus Vice President Regulatory Affairs HD Mining International Suite 433 -595 Burrard Street PO Box 49161 Vancouver, BC V7X 1 J1 Greta Geankoplis Senior Manager Environment Finavera Wind Energy 1800 – 570 Granville Street Vancouver, BC V6C 3P1

I regret the delay in forwarding this final DRAFT report. The site visit and literature review were initiated by the Ministry of Energy, Mines and Natural Gas on the effect of mine subsidence on the tenure overlap between the Finavera wind farm and the proposed Murray River mine ultimate mine plan (non – permitted at the present time).

Please take your time to review the report and I will organize a separate teleconference call with each of your companies early in the New Year. As expected, the report does not give definitive answers but it does give some idea of what the subsidence impacts may be and what mitigation could be applied to reduce these impacts.

Sincerely, Al Hoffman, P.Eng. Chief Inspector of Mines



British Columbia (BC) Ministry of Energy, Mines and Natural Gas

A Discussion Paper on "Underground Coal Mine Subsidence Influences on Overlapping **Multi-land Tenure Holders in NE British** Columbia, Specifically on Wind Energy"

RPT-2012-11-09-BC-MEM-DR-60270723

REVISED DRAFT

Prepared by:

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Date: November 2012

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November 9, 2012

Al Hoffman, P.Eng. Chief Inspector of Mines Ministry of Energy, Mines and Natural Gas Mines and Mineral Resources Division PO Box 9320 Stn Prov Gov't Victoria, BC V8W 9N3

Dear Mr. Hoffman:

 Regarding:
 Ministry Contract No.: CS13MMR001 Subsidence Study

 Revised Draft Discussion Paper: Underground Coal Mine Subsidence Influences on

 Overlapping Multi-land Tenure Holders in NE British Columbia, Specifically on Wind

 Energy

AECOM Canada Ltd. (AECOM) were retained by British Columbia (BC) Ministry of Energy, Mines and Natural Gas (MEM) to complete a high level study of potential mining subsidence effects on wind energy development in NE BC under Contract CS13MMR001, see **Appendix 1**.

AECOM is pleased to attach a Revised Draft Discussion Paper incorporating changes received from Ms. Heather Johnstone on October 22, 2012. This revised draft discussion paper is to be provided to HD Mining for their comment before it is finalized for public distribution.

Please contact the undersigned should you have any questions or require additional details.

Sincerely, AECOM Canada Ltd.

Original Signed By

David Forrester, PhD. P.Eng. Project Manager david.forrester@aecom.com

cc: Bruce Noble Stephen Pinto

Distribution List

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1		David Forrester , Project Manager
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Revision Log

Revision #	Revised By	Date	Issue / Revision Description
0		2012 07 24	Preliminary Draft issued for Client Review
1	David Forrester	2012 09 11	Draft Issued for Client External Review
2	David Forrester	2012 11 09	Revised Draft Issued for Client External Review

AECOM Signatures

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Report Reviewed and Approved By:

REVISED DRAFT

Stephen Pinto, P.Ag., EP

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Executive Summary

AECOM Canada Ltd. (AECOM) was retained by British Columbia (BC) Ministry of Energy, Mines and Natural Gas (MEM) in June 2012 to complete a high level study of potential mining subsidence effects on wind energy development in NE BC under Contract CS13MMR001. The study resulted in this discussion paper on underground coal mine subsidence influences on overlapping multi-land tenure holders in NE British Columbia, specifically on wind energy.

Rich in natural resources, especially in those relating to energy production, the province of BC encourages concurrent activity in common locations by multi-land tenure holders which contributes to maximizing benefit from these valuable energy resources. From time to time specific overlap issues can arise which require specialized consideration. Recently, this has been the case in Northeastern BC, particularly in the area around Tumbler Ridge highlighted during recent permitting activity. Specifically, the land tenure overlap issue is the general lack of technical information among the broad stakeholder grouping on the impact of the HD Mining International (HD Mining) deep underground coal mine project on other land tenure holders, in particular that involving Finavera Wind Energy (Finavera) Tumbler Ridge wind farm. This topic was flagged in the recent formal BC Environmental Assessment process as "an unresolved issue of concern requiring more study and work". The impetus for this paper is further discussion on this issue.

Essentially the issue is this: extraction of coal deep in the ground can create significant deformation of the overlying ground surface, known as mining subsidence, and individual wind turbines and their supporting infrastructure (access roads and transmission lines, etc.) are not typically designed to tolerate significant ground movement; so what are the implications at Tumbler Ridge of HD Mining's plans to potentially undermine Finavera's wind turbines?

The underlying issue is broad, as there are potential impacts on other land tenure holders or land users in the area of HD Mining's proposed deep underground mine, such as: natural gas wells, plants and pipelines; electrical transmission lines; surface infrastructure including roads, railways and bridges; and natural features such as rivers, cliffs and steep slopes.

MEM therefore commissioned a generic discussion paper to be prepared by AECOM, to more fully inform stakeholders by providing a high level overview of the longwall mining subsidence, its surface effects and impacts on surface structures and facilities. This would identify relevant experience elsewhere with mitigation of subsidence hazards and illustrate with reference to the overlap between Finavera and HD Mining at Tumbler Ridge.

The assignment began with a fact finding trip to BC by AECOM's project manager, Dr. David Forrester. AECOM and MEM representatives attended separate meetings with the two (2) land tenure holders to ascertain specific information about the two (2) projects. Dr. Forrester then made a site visit of the land tenure blocks in the Tumbler Ridge area with representatives of the Ministry of Forests, Lands and Natural Resource Operations (MFLNRO) to gain an understanding of the terrain and geographic extent of the lands to be involved.

The resultant discussion paper intent is to be just that – a discussion paper, not a report, with an educational purpose to inform stakeholders on technical considerations; it is not intended to have conclusions and recommendations in the sense of indicating that any party should or should not do anything, but it should prompt further discussion leading to more detailed studies and project-specific studies in the future. It has three parts: Part 1 introduces typical longwall mine subsidence movements, and then outlines typical surface impacts and a range of options for mitigative measures. Part 2 outlines the illustrative overlap case in NE BC by outlining the principal features of first the Finavera Wind Farm and second the HD Mining Murray River Project. Some broad conceptual subsidence estimates are then presented. Possible subsidence impacts are then discussed and some mitigative approach options are suggested. Part 3 focuses on the underlying issues for the Province of BC and its land tenure holders in this area to consider in the form of questions to prompt dialogue.

1. Introduction

In June 2012, AECOM Canada Ltd. (AECOM) was retained by British Columbia (BC) Ministry of Energy, Mines and Natural Gas (MEM) to complete a high level study of potential mining subsidence effects on wind energy development in NE BC under Contract CS13MMR001, see **Appendix 1**. This document forms the single deliverable entitled "A Discussion Paper on Underground Coal Mine Subsidence Influences on Overlapping Multi-land Tenure Holders in NE British Columbia, Specifically on Wind Energy."

The province of BC is rich in natural resources, especially in those relating to energy production, for example, oil, gas, coal and wind. The province encourages concurrent activity in common locations by multi-land tenure holders which contributes to maximizing benefit from these valuable energy resources. From time to time; specific overlap issues can arise which require specialized consideration.

In recent years there has been a resurgence of energy resource development in Northeastern BC, particularly in the area around Tumbler Ridge where recent permitting activity has highlighted one such land tenure overlap issue identified by MEM in terms of a lack of technical information among the broad stakeholder grouping on the impact of the HD Mining International (HD Mining) deep underground coal mine project on other land tenure holders, in particular that involving Finavera Wind Energy (Finavera) Tumbler Ridge wind farm. This topic was flagged in the recent formal BC Environmental Assessment process as "an unresolved issue of concern requiring more study and work". The impetus for this paper is further discussion on this issue.

The issue is essentially this: extraction of coal deep in the ground can create significant deformation of the overlying ground surface, known as mining subsidence, and individual wind turbines and their supporting infrastructure (access roads and transmission lines, etc.) are not typically designed to tolerate significant ground movement; so what are the implications at Tumbler Ridge of HD Mining's plans to potentially undermine Finavera's wind turbines?

The issue is actually a broader one, as there are potentially other land tenure holders or land users in the area of HD Mining's proposed deep underground mine such as: natural gas wells, plants and pipelines; electrical transmission lines; surface infrastructure including roads, railways and bridges; and natural features such as rivers, cliffs and steep slopes.

In order to address this issue, MEM commissioned a generic discussion paper to be prepared by AECOM, to more fully inform stakeholders by providing a high level overview of the longwall mining subsidence, its surface effects and impacts on surface structures and facilities. This discussion paper would identify relevant experience elsewhere with mitigation of subsidence hazards and illustrated with reference to the overlap between Finavera and HD Mining at Tumbler Ridge. AECOM has provided the following services:

- A complete study reviewing potential conflicts, particularly mining subsidence, and other relevant points relating to overlapping underground (deep long wall coal) mines and wind farms, including options for hazard mitigation.
- An overview giving preliminary subsidence estimates based on conceptual mine plan and conceptual wind farm design. It is expected that results from the review will also inform future statutory decisions regarding overlapping tenures for proposed underground mining and wind power projects.
- A discussion paper consisting of research and discussions with stakeholders to review potential conflicts applicable to the Province, including conceptual impacts, subsidence model, review of Subsidence Engineers Handbook (SEH) (NCB 1975), influence of depth, conceptual wind farm and wind mill design, and the type and range of impacts.

The assignment began with a fact finding trip to BC by AECOM's Project Manager, Dr. David Forrester. AECOM and MEM representatives attended separate meetings on June 26, 2012 with the two (2) land tenure holders, to

ascertain specific information about the two (2) projects. On June 28, 2012, Dr. Forrester then made a site visit of the land tenure blocks in the Tumbler Ridge area with representatives of the Ministry of Forests, Lands and Natural Resource Operations (MFLNRO) to gain an understanding of the terrain and geographic extent of the lands to be involved. Photographs taken on the site visit are included in **Annex 1**.

The resultant discussion paper intent is to be just that – a discussion paper, not a report, with an educational purpose to inform stakeholders on technical considerations; it is not intended to have conclusions and recommendations in the sense of indicating that any party should or should not do anything, but it should prompt further discussion leading to more detailed studies and project-specific studies in the future.

This discussion paper forms the only deliverable of the contract. It has three parts: Part 1 introduces typical longwall mine subsidence movements, and then outlines typical surface impacts and a range of options for mitigative measures. Part 2 outlines the illustrative overlap case in NE BC by outlining the principal features of first the Finavera Wind Farm and second the HD Mining Murray River Project. Some broad conceptual subsidence estimates are then presented. Possible subsidence impacts are then discussed and some mitigative approach options are suggested. Part 3 focuses on the underlying issues for the Province of BC and its land tenure holders in this area to consider in the form of questions.

2. Part I – Longwall Mining Subsidence

The creation of any opening underground influences the stress state of the surrounding ground with related deformation and displacements of the material. As their magnitude increases, the rock may eventually collapse causing further stress redistribution in the overlying rocks; eventually the deformations and displacements propagate up to the surface causing subsidence. Such mining subsidence movement has both vertical and lateral components and can be continuous (smooth) or discontinuous (stepped or cracked) depending on specific mining and geological conditions.

With reference to **Figure 1**, underground coal mines, which use the mechanized longwall method to extract coal from the *in situ* coal seams, typically use a panel and pillar layout. In the past, these pillars tended to be solid but modern practice has largely replaced those with chain pillars. The longwall panels are typically rectangular in shape with a mined width of 150 to 350 metres (m), a length in excess of 1,000 m long and extract a seam height in a range from 1.5 to 5.5 m high depending on seam conditions at the mine. Extraction is highly mechanized with production at the longwall face located at the active end of the panel where the shearer, face conveyor and supporting equipment and personnel are fully protected by substantial hydraulically operated roof supports.

As each strip of coal is mined, the face moves further from the start of the panel and closer to its end. This progressively creates an empty void behind the longwall roof supports where the overlying rock or strata is unsupported and is allowed to collapse filling the void, known as the "waste" or "goaf" area. Weaker, thinly bedded rocks collapse quickly and fill the void to close behind the face supports; however, stronger and thickly bedded strata can cantilever and break in large pieces leaving spaces in the collapsed rock rubble.

2.1 Typical Mining Subsidence over a Longwall Panel

Figure 2 is a transverse cross-section through a longwall panel. This can further be divided into zones (Bai & Kendorski 1995), as illustrated in **Figure 3**. As a panel is mined the roof rock moves to fill the void, creating four (4) distinct zones: (i) a 'caving zone' is located immediately above the face, as the waste develops in size the caving zone reaches a maximum caved height which does not increase as mining continues; (ii) a 'fractured zone' forms above the caving zone as the overlying rock mass progressively deforms downwards, weaker rocks cracking and sometimes peeling away from overlying strong strata forming bed separations; (iii) then above that a 'bending zone' with little inter-connected cracking until the settlement eventually reaches the surface creating (iv) a 'surface fracture/subsidence zone', which typically is trough or basin shaped, the edges of which usually extend significantly beyond the limits of underground extraction in the longwall panel below, defined by the 'angle of draw'.

The magnitude and extent of the surface subsidence depends primarily on the method of working, geometry of the mined-out void (depth, width, length, height, inclination), the extent or percentage of extraction, rate of extraction, overburden rock mass properties (in particular, the proportion of strong rock), geological structure and discontinuities (faults, joints, folds, inter-bedding, etc.), hydrogeology, ground conditions at surface – topography, bedrock and soils, (for example, features such as unconsolidated deposits, steep slopes, rock fissures, geological faults, etc.), surface activities, and timing to develop subsidence.

Typically the three-dimensional subsidence trough is more easily viewed by dissecting it in two (2) directions: longitudinal and transverse. Once formed, the transverse profile is a permanent deformation of the ground, similarly for the final longitudinal profile, except that during extraction of the panel the leading edge of the longitudinal profile above the longwall face is actually a dynamic profile, which is transitory, moving like a wave through the ground.

When a surface point is impacted by the longwall panel it will deform three dimensionally and follow a 'corkscrew' path down to its final position. The magnitude and direction of this movement will depend on exactly where a surface point is located over the panel. Again, these movements can viewed in terms of their components: two (2) horizontal

components (x, y) and vertical component (subsidence) (z) which can combine to produce tilt. Differential horizontal movement is called strain, which can be either tensile (+ve) or compressive (-ve) and differential subsidence is tilt and its derivative is curvature. These are shown for a typical transverse profile in **Figure 4**. Each of these components can impact affected surface structures.

Having defined the basic subsidence trough it must be understood that its shape depends on the panel width. As it increases so the shape expands until a critical width is reached. Any further widening of the panel is super-critical when the trough does not deepen and the transverse profile over each edge of the panel separate, see **Figures 4 & 5**.

The above illustrations have assumed a constant depth across the panel with a flat surface and a level seam. However, if either of these is sloping significantly, e.g., by more than 15 degrees (or ~26%), the shape of a typical subsidence transverse profile alters, being steeper and tighter on the shallower side than on the deeper side, see **Figures 6 & 7**. Another key concept based on many field observations in the deeper UK mines (e.g., depth > 300 m, NCB 1975) for any angle of dip of the seam is that the centre of the subsidence trough is not located vertically above the centre of the panel, rather it is projected at right-angles or normal to the dip of the seam. This value of 90 degrees was adjusted by Fiseki in 1982 by suggesting the angle = $90 - ((1-0.7) \times 10^{-1}) \times 10^{-1}$ (Figure 6). This factor has a significant influence on which surface properties are impacted and how. A similar distortion in the shape of the transverse profile is seen for level seams with steeply sloping ground (Figure 7) (Shu & Bhattacharrya 1992).

The above discussion has focused mainly on single longwall panels in a single seam, but modern coal mines typically mine many adjacent panels in sequence, typically separate by narrow chain pillars. They may also target mining extraction in a number of seams, usually in a stated sequence, but sometimes simultaneously. In these circumstances, observations have shown that the principle of super-imposition applies. This means that the individual subsidence predictions and profiles can be superimposed and accumulated. It is this process that enables the partial extraction system to work, whereby adjacent panels are designed such that the maximum tensile strains of the first panel are then cancelled out on one side by the next panels and so on (NCB 1975). It also means that if a number of seams are to be mined in the same area the surface subsidence effects can add up and significant magnitudes of vertical subsidence and related tilt, strains and curvature can develop over time.

Subsidence prediction techniques may be characterized as either analytical, which use numerical models to simulate rock deformation behaviour, or empirical, using various models and formulas based on observation and experience. An example of an analytical model is the Comprehensive and Integrated Subsidence Prediction Model (CISPM) developed by West Virginia University Department of Mining Engineering (Luo 2008) using influence function theory and calibrated using mainly Eastern USA field data of depths 50 to 300 m and seams of less than 25% (~14 degree) dip. A well known example of an empirical model is the National Coal Boards Subsidence Engineers Handbook (SEH - NCB 1975) first published in 1966 and updated in 1975, derived from hundreds of field observations in the UK which reflect depths mainly in the range of 300 to 1,200 m and seam extraction heights from 1 to 4 m with relatively slow advance rates of less than 50 m/week in seams inclined from 0 to 45 degrees.

Country	Angle of Draw (degrees) Ref. SME Table 8-9-1	Depth range (m)	Reference
United Kingdom	25 – 35	150 – 1100	Holla & Hughson 1986, SME 2011,
New South Wales, Aus	25 – 35 (26.5)	200 – 600	Mine Subsidence Eng- ineering Consultants 2007, Holla & Hughson 1986
Eastern USA	15 - 27	50 – 300	Peng 1992
Balmer, BC, Canada	0 - 30	50 – 200	Fisekeci et al. 1982

There are two (2) distinct phases of occurrence of longwall subsidence: active and residual. Active subsidence occurs when mining operations influence the surface, whereas residual subsidence occurs from the point that mining ceases to influence an area to the completion of ground movement. Typically residual subsidence comprises less than 10% of total subsidence (i.e., active + residual) and occurs for up to 6 years (SME 1992, Table 8-9-3). Residual subsidence may be concentrated over chain pillar systems between adjacent panels (SME 2011).

2.2 Typical Potential Subsidence Impacts

Longwall mining subsidence impacts on surface features are influenced by a number of factors, such as:

- Mining: geometry, dip.
- Surface: geological structure, bedrock geology, soils, topography, surface activities.
- Structure: types and sensitivities.
- Time: dynamic, residual.
- Number of seams to be mined.

Surface structures respond to movement of the ground on which they are built. As foundations follow movement of the ground they are built on, failure may occur through cracking or tilting and then damage commonly propagates upward into the main part of the structure.

Longwall subsidence has the following five components relevant to inducing surface effects: vertical displacement; tilt; vertical curvature or flexure (given approximately by the derivative of tilt); horizontal displacement; and horizontal strains (both tensile and compressive). These can have various impacts on surface features and structures depending on their sensitivity to ground movement and the magnitude of the mining-induced movements involved. Some typical effects include:

- Tension features e.g., cracking, loosening and pulling apart of ground, masonry, etc.
- Compression features e.g., buckling of pavement or pipes.
- Slope or tilt effects e.g., reversing flow in drains.
- Distortion effects, e.g., doors and windows wedging or jamming.

The magnitude and extent of surface structural effects depends not only on the movement of the ground but also on the type, size, complexity and orientation/location and condition of the affected structure.

Non-Mining Causes of Similar Damage

In lands undermined by longwall coal mine workings some structural damage to residential properties is *not* caused by mine subsidence. It is important to be aware of structural damage which closely resembles damage caused by mine subsidence but may in fact result from other factors, including:

- Sulphates reacting with cement.
- Shrinkable or expanding clay.
- Differential settlement in the structure which may be caused by numerous situations:
 - Settling of poorly compacted soils or erosion of soils.
 - Uplift or heave due to expanding bedrock or fill.
 - Clay soil shrinkage due to lowering of water table e.g., from wells, trees roots, or dewatering from adjacent activity.
 - Sinking into bedrock cavities e.g. naturally occurring limestone or gypsum caverns.
- Altering of conditions owing to poor drainage of soils.
- Rust damage.
- Thermal effect
- Poor construction.

• Poor maintenance of a structure.

2.3 Some Generic Mitigative Approaches to Subsidence Impacts

In many underground coal mining districts in the world the interaction of the coal mine operator with other land users to manage the effects and impacts of longwall subsidence is a routine matter and there are many success stories. Expectations are expressed in a well respected text book "Mining Engineers Handbook "(SME, 2011) by Harrison. "Successful implementation of any surface land use or mine plans requires extensive knowledge of the requirements of each and complete collaboration between the various interested parties". Such collaboration involves consideration of various options:

- Modification of mine layout/working methods:
 - Do not mine certain parcels of coal in order to protect sensitive overlying surface areas.
 - Modify the layout to minimise subsidence effects e.g., partial extraction narrow panels of equal width to pillars.
 - Modify the sequence and/or rate of longwall operation, again to minimise subsidence effects.
- Modify existing structures:
 - Relocate a structure permanently or temporarily to avoid or minimize exposure to subsidence (e.g., roads, railways or even rivers/streams).
 - Alter structures (e.g., separate connected buildings with weatherproof joints, install flexible couplings in pipes, expose pipes).
 - Some recent examples from Illinois (Bauer. 2008) are included for illustration (see Photos 1-4)

3. Part 2 – Illustrative Overlap in NE BC

3.1 Finavera Wind Energy – Tumbler Ridge Project

Finavera's web-site, (see Section 5) describes their Tumbler Ridge project as follows: The Tumbler Ridge Wind Project is included in the four 25-year electricity purchase agreements (EPA) Finavera has with BC Hydro (the Provincial Crown corporation British Columbia Hydro and Power Authority). The project area is located eight kilometres southwest of the community of Tumbler Ridge and can be accessed by existing roads. The data supporting this project is comprised of approximately four years of wind and climatic data from on-site meteorological towers. It is anticipated that commercial operations will begin in 2013. When in operation, the wind farm has an expected capacity of 47.2 megawatts (MW) under the EPA with BC Hydro. Throughout the project development, Finavera will continue to engage their partners, surrounding communities and other stakeholders.

The Tumbler Ridge Wind Farm Wind Turbine Generator (WTG) Systems will be laid out along the top of a mountain ridge as shown in their conceptual layout in **Figure 8** (it is recognized that the construction layout may vary in number and precise location within the project area shown).

The Project consists of the following major project components:

- Approximately 33 WTGs.
- Access road between existing highways and the WTG siting area.
- Connector roads and electrical connections:
 - Connector lines, often underground.
 - Collector lines to the sub-station.
- Substation and operations centre.
- Overhead transmission line to connect the project to the existing electrical grid.

Each of the 33 WTGs will be similar, comprising the following components (in ascending order): foundation; tower; nacelle; and blades.

Foundation: Finavera are using a gravity base foundation with a pedestal to accommodate the heavily reinforced concrete. It is understood that the minimum acceptable values for the maximum allowable inclination and foundation stiffness are specified for Finavera at Tumbler Ridge. The maximum permissible inclination is six (6) mm/m comprising a foundation inclination of three (3) mm/m after settlement (to accommodate any uneven settling due to uniform gravity loads and the predicted/anticipated variation in soil properties) and three (3) mm/m more of out of verticality due to accuracy of tower installation. This excludes any inclination during operation as a result of the extreme or operational loading fixed-end bending moments.

Tower :The tower is of modular design comprising an anchor ring, bottom section, two (2) mid-sections and a top section. The Finavera towers will have a hub height of 85 m above the foundation. The hub and nose cone assembly sits on top of the tower and has a weight of approximately 25 tonnes. Three blades, each 50 m long, rotate around the hub.

Nacelle Also located at hub height, adjacent the hub and nose cone is the Nacelle (or equipment housing). These are located above a bearing ring which permits the whole top structure to rotate freely through 360 degrees to accommodate changing wind direction. The nacelle contains the supporting equipment such as gearbox, generator, control room, power conditioning units and possibly a transformer and in total weighs approximately 84 tonnes (including internal components but excluding the hub and blades). The tower base ring has a weight of approximately 10 tonnes and the anchor ring approximately three (3) tonnes. The tower base ring is to be connected to the foundation through anchor bolts. The top of the foundation is smooth and provides support for the access stairs.

Blades: There will be three (3) equally spaced 50 m long blades each weighing 9.3 tonnes each.

Supporting Infrastructure

In summary, this typically will comprise:

- Gravel access roads
- Possible transformer pad adjacent the tower foundation
- Collection lines
- Connector lines
- Transmission lines

Setback Distances

<u>Spacing:</u> Typically the minimum spacing is 50 m between blade tips and 150 m between towers, although 200 m between towers is more typical.

Toppling: A minimum setback to avoid toppling impact is maximum height plus 25% approximately 170 m.

Timeframe

The permitted life of the Tumbler Ridge wind farm is 25 years, coinciding with the design life for each WTG. Any extension on this would require permit approvals and a major equipment overhaul and technical assessment of the tower structure. Commercial generation of electrical power is scheduled to begin in 2013 and reach full capacity in 2014.

3.2 HD Mining International, Murray River Project

HD Mining describes their Murray River Project in their formal Project Description (reference: HD web-site, see Section 5 below) as follows:

PROJECT SUMMARY

HD Mining International Inc. (HD Mining) is proposing to develop the Murray River property located 12.5 km south of Tumbler Ridge, British Columbia. The property consists of 57 coal licences covering an area of 16,024 hectares and is situated within the Dawson Creek Land and Resource Management Plan. HD Mining's proposed Murray River Project will be an underground mine with an annual production of six million tonnes of metallurgical coal over 31 years. Surface facilities will include a mine portal, coal handling and preparation plant, coal rejects pile, administrative offices, change house, maintenance building, and warehouse. The Project will provide about 600 direct jobs and 700 indirect jobs. The Project's estimated capital cost is \$300 million Canadian dollars.

The Murray River property is located within the Peace River Coalfield (PRC), an area with a long history of metallurgical grade coal open pit mining. Previous exploration in the area was conducted by various major oil and gas companies in the 1970s, Quintette Coal Limited (Quintette) and more recently in 2006 and 2007 by Kennecott Coal Exploration Inc. (Kennecott). The exploration programs in the 1970s were generally regional in nature, comprising widely spaced seismic lines and drilling of a small number of primarily oil and gas wells. These programs helped Quintette and Kennecott identify target areas for more detailed coal exploration and eventual mining. The target seams for the Murray River Project are part of the Gates Formation (Fort Saint John Group). Kennecott's exploration program is the only known coal specific exploration program conducted within the Murray River licence area. It consisted of one rotary and three core holes (two others were abandoned), surface mapping and interpretation of two (2) seismic lines. Because of difficulties encountered during drilling, only one core hole was

completed through the Gates Formation. A preliminary geologic model has been developed for the property. In 2009, Canadian Dehua International Mines Group Inc. obtained the Murray River coal property. Detailed exploration consisting of 12 drill holes was carried out in 2009 and 2010 focusing on the central part of the property (about 37.45 km²). On July 17, 2010, Huiyong Holdings Group Ltd. signed a "Cooperation Agreement on Canada Murray River Coalfield" with Canada Dehua International Mines Group Inc. From August 2010, additional exploration was performed on the property with a total of 20 holes drilled. On June 9, 2011, HD Mining International Ltd. was registered for incorporation in Canada.

The mining method will be longwall mining. HD Mining is planning to use natural gas to power the mine and has initiated discussion with the local natural gas supplier. Coal from the run of the mine will be conveyed to a stockpile for primary screening and crushing before being conveyed to the coal preparation plant. The clean coal from the preparation plant will be conveyed to a stockpile. Coal from the stockpile will be transported from the mine site to a rail loadout located along the CN Rail mainline.Coarse and fine rejects will be collected and disposed of at one location near the surface facilities. Water from the fines will be recycled for use in the coal handling and preparation plant. The underground mine is expected to produce water. A water management plan that includes a discharge to the receiving environment will be developed.

HD Mining's schedule for the proposed Murray River Coal Project has coal being produced in June 2015. The project schedule includes submitting the Provincial Environmental Assessment (EA) Application in April 2013. Environmental baseline studies were initiated in 2010. These studies will continue through to the end of March 2013. Engineering and scoping studies have been completed by Norwest Corporation. HD Mining received approvals from the BC Government in February 2012 and March 2012 to mine a 100,000 tonne bulk sample to test the coal for use as a coking coal and to perform coal washability testing.

MINING

HD Mining is proposing to construct an underground coal mine at the Murray River property. The Project is anticipated to produce six million tonnes of metallurgical coal per year over 31 years. The proposed surface layout for the mine was sited with reference to the following criteria:

- Avoidance of significant environmental features.
- Avoidance of major water courses.
- Consistency with the Dawson Creek Land and Resource Management Plan (LRMP).
- Proximity to existing roads, railway.
- A sufficiently large area for the required facilities including coal washing rejects.

Subsurface factors considered in the selection of the mine site include:

- Estimated depth of the glacial till.
- Overburden depth to the coal.
- Distance to mineable coal.

Mining conditions of the Murray River property seams are summarized below:

- Dip Seam slopes typically range from 0% to 36%. Some portions of the seams slope greater than 58%.
- Thickness 0 to 9.20 metres.
- Strike The deposit in general strikes to the Southeast-Northwest.
- Roof and floor rocks The rock mass structure is an integrate block structure, of which most are stable and the geotechnical conditions are comparatively simple.
- Water The drill logs and other available information indicate that water is likely to be encountered underground.

- Seams partings Partings of differing thicknesses may be encountered.
- Methane potential Methane gas can be expected in various quantities.
- Seam continuity As noted in the Geology section of this report (Section 4.2), potential faulting is possible.
- Quality Varying degrees of coking coal potential.

These characteristics are based upon existing geologic information available for the Murray River property. The combination of these characteristics will determine and influence the selection of mining equipment. The Provincially-permitted bulk coal sample will provide more geological information.

The main workable coal seams of the mine are seams D, E, F, G/I, and J. Seams D and E are thin or moderately-thick, F and J are moderately thick, whereas G and I are very thin, and therefore not targeted. The distance between the coal seams is 80-120 m. In order to achieve the mine's production capacity, seams F and J are the main mining seams, and seams D and E are the auxiliary mining seams. Mining resources in the four seams, D, E, F and J, were established.

A conceptual mine plan has been prepared (**Figure 9**) it shows longwall panel orientations in a number of distinct mining blocks. Of interest to this consideration of subsidence is the indication that a pillar of unmined coal will be left at least 100 m wide to support the Murray River, which implies an assumed angle of draw of approximately 10 degrees.

It is noted that this is the first mechanized longwall mine proposed in BC, it is relatively deep and there is no data on ground movement and subsidence. The first five (5) plus years of operation provide an excellent opportunity to obtain this information over the first series of panels in each different coal seam to be mined in Phase 1.

3.3 Possible Subsidence Impacts on a Wind Farm in NE BC

3.3.1 Superimposition of the Two Projects

A formal figure overlaying the proposed Finavera Tumbler Ridge project wind turbine locations over the conceptual Murray River coal mine layout provided by HD Mining was not available. Suitable geo-referenced digital files were requested and provided by each company and the resultant super-imposition is shown in **Figure 10**. It is acknowledged that this is only a conceptual representation and details can be expected to change through time as plans for both HD and Finavera's projects evolve. However, it can be used to give a general picture of the extent of overlap which appears significant as it shows that at least half of the proposed 33 wind turbine sites are located over the Murray River Coal Mine Phase 1 (first 30 years of mining); overlying three (3)of the six (6) proposed mining blocks. It is understood from HD Mining that the first mining block, to be operated possibly from years one (1) to five (5) or ten (10), would mainly be in the south-eastern part of Phase 1 and **Figure 10** implies that this may only influence one or two WTGs.

3.3.2 Order of Magnitude Ground Movements (NCB SEH) Single Seam, Four Seams

The order of magnitude of possible mining subsidence movements were assessed very simply using both the NCB Subsidence Engineers Handbook (NCB 1975) (based on deep European experience) and the Comprehensive and Integrated Subsidence Prediction Model (CISPM 2012) (calibrated mainly on shallower Appalachian USA experience).

Using the typical panel information provided by HD Mining of panel width of 200 m, panel length of 1,000 m panel depth of 600 m and extraction height 3 m with 30% strong rocks in overburden, the two (2) methods were used to estimate for a single panel: the subsidence factor, maximum subsidence, maximum tilt, maximum tensile and maximum compressive strains as follows.

Single Panel in a single seam				
Parameter	CISPM	NCB	Comment	
Width/depth ratio	0.25	200/600 (use of nomogram)		
Subsidence Factor	0.3x (using NCB adjusted option)	0.25	NCB reduces to 0.05 for Ps = 0.3 [Zhang 1994]	
Maximum Subsidence	0.82m (2.7 to 5ft)	0.75m	NCB reduces to 0.04m for Ps = 0.3 [Zhang 1994]	
Smax / Depth	n/a	0.00041		
Maximum Tilt	n/a	X 2.7 = ~ 1.1mm/m		
Maximum Tensile Strain	~4mm/m	X 0.66 = ~ +0.3mm/m		
Maximum Compressive Strain	~8mm/m	X 2.20 = ~ - 0.9mm/m		

Four Panels (assuming negligible chain pillar width) in a single seam				
Parameter	CISPM	NCB	Comment	
Width/depth ratio	1.4	850/600 (use of nomogram)		
Subsidence Factor	0.3x (using NCB adjusted option)	0.9	NCB reduces to 0.6 for Ps = 0.3 [Zhang1994]	
Maximum Subsidence	1.5 to 2.1 m (5 to 7 ft)	2.7m	NCB reduces to 1.8m for Ps = 0.3 [Zhang 1994]	
Smax / Depth	n/a	0.0045	NCB reduces to 0.003 for Ps = 0.3 [Zhang 1994]	
Maximum Tilt	n/a	X 2.75 = ~ 12.4mm/m	Reduces to ~ 8.3mm/m	
Maximum Tensile Strain	~10mm/m	X 0.66 = ~ + 3.3mm/m	Reduces to ~ 2.0mm/m	
Maximum Compressive Strain	~15mm/m	X 0.5 = ~ - 2.3mm/m	Reduces to ~ -1.5mm/m	

These are a very broad general type/level estimates, but they show that at these depths a single panel will produce relatively low subsidence movements, however at the edges of a four panel section tilts and strains are more significant. The maximum strain of 3.3 mm/m over a foundation length of 18 m is equivalent to a change of length of 0.06 m, which, according to SEH Table 8 "NCB Classification of subsidence damage" (NCB 1975), is bordering slight to appreciable: causing slight fracture on exterior and possibly causing service pipes to break.

All of the above would be subject to detailed re-calculations during preparation of a formal subsidence plan for the coal mine considering all relevant factors for each specific surface structure involved for the number of panels influencing it and for each successive seam to be mined under it.

3.3.3 Timing

The proposed wind farm has a nominal life of 20 years after which it is assumed that the WTGs would be decommissioned. The HD Mine has a life of 30 years. Thus, theoretically if the WTGs were decommissioned after 20 years and the mine planned extraction were deferred to years 21 - 30, then there would be no impact with the WTG structures removed. However, it is quite possible that major overhaul and refurbishment of the WTGs would be done instead, increasing their active life significantly and hence eliminating this option.

3.3.4 Possible Impacts from Mining Subsidence Alone

3.3.4.1 Structural Stability

The impact of predicted tilts would need to be calculated for each WTG to see its impact on centre of gravity and hence potential for inducing toppling.

3.3.4.2 Structural Integrity

The impact of predicted ground movements on the integrity of the foundation, tower and blades during rotation would need to be calculated for each WTGS to determine its impact on design tolerances to highlight any potential concerns about distortion/twisting of the structure during operation.

3.3.4.3 Structural Functionality

The impact of predicted ground movements on the functionality of the WTGS would need to be calculated for each WTGS to see its impact on design tolerances to highlight any potential concerns about disruption of all aspects of the ability to function normally during operation (including any communication signal transmissions that may be involved).

3.3.4.4 Abnormal Ground Movements

All the above would need to be revisited if there were any geological, geotechnical, geomorphological or other factors which could distort, aggravate, disrupt or magnify the typical mining subsidence effects, for example steep and/or sensitive slopes and outcrops, geological faults, landslips and rivers.

3.3.5 Possible Mitigative Approaches

Consideration of a formal mining subsidence plan by other land tenure holders may lead to concerns new to the mining company, requiring revision to their analysis to produce a revised subsidence plan. Such options to be considered, depending upon the significance of the projected subsidence effects and the sensitivity of the structure, may include:

- 1. No mining: pillars > significant sterilization of valuable coal energy reserves.
- 2. Partial extraction: (panel-pillar w/h=0.2-0.25) > some sterilization of valuable coal energy reserves but at extra mining cost.
- 3. Mining with precautionary/preventive/remedial measures > limited sterilization of valuable coal energy reserves but at extra mining cost.
- 4. No WTGs or relocation away from coal mine workings> significant sterilization of valuable wind energy reserves.
- 5. Time scheduled mining to mine before or after WTG installation and operation.

Alternatively, further options could be considered, such as:

- Unrestricted: unaltered mining plan (full undermining) with repair of damage (at whose cost?) > at unacceptably high additional cost and possibly disruption to both operators.
- Protection: protective pillars (no under mining) > significant sterilization of valuable coal energy reserves.
- Precaution: partial extraction (reduced undermining); backfilling waste rock into waste area to reduce size of void
 some sterilization of valuable coal energy reserves but at extra mining cost.
- Precaution: preparation of/strengthening of structures/repair of minor damage > at additional cost to coal mine operator and with unanticipated additional work for wind operator.
- Prevention: remove surface structure (relocation) > significant extra cost and disruption to wind operator.
- Prevention: mutual re-sequencing of surface and underground activity to prevent any impact. > significant extra cost and disruption to coal operator.

4. Part 3 Matters Arising - Towards A Way Forward

4.1 Some Technical Considerations

A review of the preceding text and supporting references yields some pointers to inform future dialogue on longwall mining subsidence in NE BC. These are summarized in the bullets below:

- Longwall undermining of utility infrastructure is common, including roads, railways, bridges, transmission lines and underground pipelines, references: NCB 1975, Holla & Hughson 1986, Peng 1992, Bauer 2006 & 2008, SME 2011.
- Transmission and communications towers have been successfully undermined. For example, Holla & Hughson concluded that transmission towers in New South Wales (NSW), Australia would not be damaged by longwall workings more than 200 m deep (they have a very high % strong rock in overburden) but that at less than 100 m deep partial extraction methods maybe necessary to avoid damage (Holla & Hughson 1986). They noted that in South Africa in 1984 four transmission towers were undermined by a longwall extracting a height of 2.9 m, 121 m deep and 212 m wide which induced a total subsidence of 1.3 m with a maximum tilt of 35 mm/m and maximum strains of +8/-7 mm/m without structural damage. They also noted that foundations could be strengthened to withstand subsidence movements at a cost of seven times the original foundation cost, which could be phased to be done just before mining took place. Luo's research on undermining a communication tower noted that by strengthening the foundation by cable wrapping and adding guy ropes it successfully tolerated peak strains of +3.1/ -2.0 mm/m, as monitored. References: Holla & Hughson 1986, Luxbacher 1992, Luo 2003 & 2008, Peng 1992.
- WTG systems can be sited on abandoned coal mine lands for example by filling underlying shallow old mine
 workings and in poor soils such as on coal waste rock piles by using micro-piles. Luin, looking at siting of WTGs
 over old longwall and room and pillar workings, looked in depth at residual subsidence and concluded that room
 and pillar with less than 50% recovery will have no residual subsidence, and that with 32% strong sandstones,
 they will bridge local roof failures. Luo's comprehensive predictions showed that only one of the 100 wind turbine
 sites could incur significant residual subsidence and so that one site was moved 140 feet to a stable area.
 References: Luo 2008, Kopchynski & Bahma 2011, BBC Manchester 2006.
- Wind turbine foundations are sensitive to settlement, as illustrated by cases in Europe and Massachusetts. Settlement has resulted in destabilization of some offshore WTGs in Europe. It is believed that a design flaw with the concrete used to fix some turbines to their steel foundation has led to the concrete wearing away and reportedly causing the turbines to drop "a few inches" [references: http://thegwpf.org/energy-news/6009foundations-of-1000-offshore-wind-turbines-crumbling.html]. Scouring of WTG base foundation stone armouring and concrete by wave- and tide-driven sediment has led to settlement of some shallow-water turbines by as much as 1.5 m in three years [references, in August 2012: <u>http://www.rechargenews.com/</u> energy/wind/article302545.ece].

During scheduled maintenance, it was determined that the foundation of the newly built Charlestown Wind Turbine in Everett Massachusetts had settled an inch more than planned. Work to reinforce the foundation is underway. This entails installing a concrete ring and new piles around the existing foundation. References in August 2012: <u>http://www.myfoxboston.com/story/18985069/2012/07/09/mwra-turbine-stopped-by-sinking-foundation; http://www.mwra.state.ma.us/01news/2012/update-charlestownturbine.html.</u>

- Mitigation of structural impacts (NCB SEH 1975, Peng 1992, Bauer 2006 & 2008, SME 2011).
- Blasting effects on infrastructures, such as vibrations and dynamic shock loading is barely relevant here, but there is mention of effects on electrical transmission towers (Richards & Moore 2007).

- Tolerance of structures to ground movement, Bruhn introduces the concepts of damage classification namely: cosmetic damage (surficial only); functional damage (which disrupts usefulness); and structural damage which impairs stability and/or safety (Bruhn 1992).
- Pipelines can be protected from subsidence damage by digging them out and exposing them during mining, or alternatively surrounding them with compressible material or leaving them exposed with support (cribs and elevation adjustments); they can be strengthened to resist subsidence damage by strengthening welded joints, adding shut-off valves, adding compensation sections (e.g., U – to absorb compression or extension) and/or by inserting/adding sleeve compensators (Peng 1992, Section 6.5).
- For structural protection, many approaches are outlined by Peng 1992, Section 6, including remove building; slotting (split size of building, also Luo *et al.* 2005); underpinning/jacking/split house from basement; install temporary load bearing springs, trenching, reinforcing, e.g., tension rods (also Luo 2008); shoring and bracing; strapping e.g., concrete beams; sliding bed: sand/lubricated bitumen blankets or polyester; weather-proofed expansion joints (Peng 1992, Section 6).
- Mine layouts can be altered to reduce impact, for example by leaving pillar unmined, by increasing size of panel pillars, by altering sequencing by adding backfilling of wastes and/or by reducing extraction height temporarily (NCB SEH 1975; Peng 1992).
- Vibrations into the ground from the WTGs does not seem to be an issue (Finavera 2012).
- Potential toppling of a WTGs must consider the fact that a WTGs is designed to accommodate the wind's aerodynamic and mechanical force, which are concentrated at the top of the tower creating a major over-turning moment at the tower base which must be resisted by the foundation; similarly the centre of gravity is high with a mass of over 100 tonnes suspended 85 m above the ground by a relatively slender tower structure. The two (2) largest single items are located in the nacelle at the top of the tower, some 85 m above the ground, and comprise the gearbox (approximately 23 tonne) and the generator (approximately eight (8) tonne).
- Groundwater levels may be lowered because of drainage into the mine, but normally this is retarded by an intermediate low-permeability zone, and is a problem only for deeper wells that penetrate the lower fractured zone (Booth 2003).

4.2 Some Points for Discussion

4.2.1 Initial Questions for Consideration

Some key points arising from the above sections are presented below, each generating some questions for further consideration *which are italicised*.

It can be seen from the above that a longwall mine is proposed which will induce extensive surface subsidence ground movements. Most of the area comprises wilderness and forest, but there are significant other land tenure holders with facilities that maybe impacted by subsidence, specifically, wind turbines and related substations, electrical transmission lines and access roads for the illustrative case here, but also including others, for example: natural gas wells, plants, transmission pipelines and access roads, possibly coal bed methane wells and facilities and forestry. Thus the following questions can be asked: *Have all the various land tenure holders involved been identified? How will all the potentially impacted facilities be identified? With the time frame for the mine being over 30 years, how will possible future stakeholders be identified and included in the subsidence planning process? Are known stakeholders willing to identify not only their existing facilities in the mine area but also those anticipated and currently in planning stages, given a proposed mine life of 30 years?*

Impacts from longwall subsidence are essentially ground lowering, tilting, stretching and compressing, and they can be locally modified by geological structures such as faults and near-surface features such as blocky rock outcrops

and steep sensitive slopes. These longwall subsidence movements can significantly impact surface structures lying above them. This appears not to be well known among stakeholders, what kind of processes will facilitate better informed decisions both governmental and private sector?

Longwall mining subsidence surface impacts may not be well known in BC, but they are common in other areas of the world where longwall mining has been and is widely used such as UK, Germany, Poland, South Africa, China, Australia, and USA¹; where effective management of subsidence impacts on surface structures is an everyday matter. Best practice approaches and specialized techniques have been developed and are commonly used to mitigate and repair subsidence effects to acceptable levels within jurisdictional guidelines, codes and regulations. Typically the coal mine operator is held responsible for minimizing and rectifying any adverse surface effects in an acceptable manner. Some jurisdictions have regulated subsidence compensation schemes (e.g., UK and NSW, Australia) and others have insurance schemes (e.g., many Appalachian states in the USA). As noted in Section 2.3, this is widely recognized in an international textbook and close consultations and negotiations between relevant stakeholders are not only expected, but also the 'norm' from the early stage of mine planning through to the closing of operations. In addition, in the UK it was typical for longwall mines to carry subsidence costs as a line-item in their operating budgets, and at some mines in the 1980s in extreme cases this could be up to 20% of the budget. *Has BC considered the need for any formal subsidence compensation or insurance scheme for longwall mining subsidence, if not what is their approach to alternative means of providing a suitable framework to guide stakeholder operations and relations?*

Mitigative measures resulting from such negotiations can range from at one extreme the leaving of valuable coal energy resources unmined, to the other extreme of mining as planned with little forethought to surface impacts and repairing any damage caused as it happens. It is noted that typically, leaving coal pillars unmined is usually used only to protect structures whose safety is paramount and where preventive or precautionary measures would be prohibitively expensive such as reservoir dams, hospitals, schools or to protect buildings of national historic importance. In between these extremes are numerous options to select the appropriate protective and precautionary measures to allow undermining specific surface facilities without disruption to either operations (coal mine, wind generators, gas producers, etc.), with minimal disturbance, minimal impact and at reasonable additional cost. *How does BC anticipate guiding stakeholders in these matters – are pillars of protection mandated already and if so are there plans to change this?*

The literature search yielded numerous examples of successful undermining of large buildings, roads, railways, bridges, pipelines and electrical transmission lines and communication towers. Only one reference was sound to mining subsidence and wind turbine generator systems in Pennsylvania and that involved residual subsidence, not active subsidence. However, the body of knowledge and experience is such that there is no reason to expect that an appropriate method of longwall coal mining actively under WTG units cannot be developed given the full involvement of well qualified and experienced specialists. *This seems a reasonable expectation for NE BC, but what are the hurdles to achieving this and is there a process in place to overcome them?*

One (1) stakeholder raised the potential for longwall mining to theoretically and indirectly induce surface subsidence if it inadvertently caused significant dewatering of aquifers. This would require some specialized investigation at the planning stage to determine its applicability to the proposed longwall mining; additional subsidence maybe induced and this would have to be assessed. *Is this seen as significant in BC or not?*

¹ In Canada two coalfields have used mechanized longwall mining under land: (1) in the mid-1990s in the Smoky River Coalfield in Alberta and in the late 1960s in the Sydney Coalfield in Cape Breton, NS – both were very limited operations and mined under undeveloped forested lands. A third group of mechanized longwalls were operated by the Cape Breton Development Corporation in the 1960s to 2000s in the Sydney Coalfield but these were all under the Atlantic Ocean where subsidence impacts were critically important to safe mining operations but are not relevant here.

4.2.2 Some Additional questions to be posed

A preliminary consideration of the discussion points above can point towards some more specific questions to start to focus discussion. For convenience these are grouped under sub-headings: regulatory framework for mining subsidence effects, subsidence damage, compensation, and mining subsidence plan.

4.2.2.1 Regulatory Framework for Mining Subsidence Effects

- Given that longwall mining is widely and successfully practiced under sensitive surface structures, a framework
 is needed in NE BC to facilitate a reasonable and responsible development of such practices in the Tumbler
 Ridge area; this begs the questions:
 - Does such a framework exist? If so are responsibilities clear and is it adequate for NE BC?
 - If not, can any other existing framework be adequately and easily modified to accommodate the specifics of mining subsidence in NE BC and in particular of undermining a wind farm? Possible models for consideration would be those in place in NSW and Illinois – if not who is responsible for developing it and who are the key stakeholders to be involved in making it happen." What is a reasonable yet realisitic time frame?
- Such a framework needs to address key questions that have arisen in discussion during this project and, though it is recognized that others are sure to arise in future dialogue, these include:
 - Is there seniority or ranking of the various land tenure holders? If so, what is it based on for instance on the first to apply for a certain permit or the first to be awarded that permit?
 - If so, then what merits, privileges and rights does such ranking carry, if any, and how do those influence development of a mutually acceptable mine subsidence plan?
- Such a framework would be expected to give guidelines to the key elements in a mining subsidence plan to be developed and submitted by the coal mine operator.

4.2.2.2 Subsidence Damage

- *i.* How is mining subsidence damage defined?
- ii. How is it identified?
- *iii.* Who is responsible for determining the cause of subsidence, *i.e.*, by mining or some other cause (including poor maintenance/upkeep)?
- *iv.* Is there a need for baseline surveys and, if so, who conducts the surveys? Do the facility operator and the mine operator conduct separate surveys?
- v. What are acceptable levels of subsidence damage (if any)? Who determines if health and safety considerations are adequately incorporated?

4.2.2.3 Compensation

- i. Who is responsible for deciding that mining subsidence damage is caused by mining and not some other cause (including poor maintenance/upkeep) need for baseline surveys? For example the United Kingdom Subsidence Engineers Handbook (NCB 1975) and Coal Mining subsidence Act 1991 (UK 1991).
- *ii.* Who is responsible for compensation of such damage? How are preventive/precautionary works prior to mining to be financed and implemented?
- iii. Is the coal mine operator automatically responsible for the cost of mitigation and repairs of mining subsidence damage, and in all cases?

4.2.2.4 Mining Subsidence Plan

- There are merits on preparation of a Mining Subsidence Plan using a qualitative risk assessment basis, such that a base mining layout and subsidence effects are presented and assessed for all hazards, consequences and risks. Any unacceptable hazards are then addressed by introducing engineering to mitigate unacceptable risks to acceptable levels, producing a corresponding revised mine layout. *Is this approach considered reasonable and who is responsible for implementing it?*
- Elements to be included:
 - Identification of other land tenure holders that could be influenced by subsidence.
 - Identification of the issues associated with each land tenure holders: the type and components of the facilities to be impacted and their sensitivity to subsidence.
 - Identification of the estimated magnitude and extent of subsidence impacts of the base mining plan on each component of the facilities and whether or not they exceed existing design tolerances and hence identify specific concerns.
 - Indicate principal options for mitigating such concerns, including:
 - Potential change in mining layout (narrower panels and/or wider pillars, reduced extraction height, backfilling, protective pillars, etc.).
 - Potential change in sequencing of mine layout.
 - Preventive/precautionary measure(s) to be taken at the facility(s).
 - Cost estimation of both the impacts and mitigative measures and details of responsibility/costsharing, etc.
 - Supporting details of subsidence estimates.
 - Monitoring plan to measure actual subsidence as it develops through time at each facility.
 - Monitoring response plan should significant deviations from estimates arise (trigger levels, immediate actions for both mine operator and surface mine operator, communication plan).
 - Methodology for reviewing mining subsidence plan clearly identifying the progression from initial draft to final plan, indicating who is involved at each stage and the sign-off.
 - Are these reasonable and what others could be included?

4.3 Towards a Way Forward

It is expected that MEM will meet with other provincial stakeholders involved in the permitting processes and develop a strategy for moving forward. These will include MEM, Ministry of Environment (Environmental Assessment Office), MFLNRO, etc. It is anticipated that this strategy will include distribution of this discussion paper in the next few months to the broader stakeholder grouping. It is hoped that the information provided, the issues raised, and the questions posed will facilitate dialogue to enable well informed decisions to map out a clear go-forward plan.

Presumably the aim of the process will be to develop clear guidelines for all the stakeholders to manage the perceived conflicts among multi-land tenure holders caused by the introduction of longwall mining into the energy resource mix in NE BC.

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Figures/Photos



Figure 1 – Cut-away View of a Typical Longwall Mine

Figure 2 – General Behaviour of Strata above Longwall Panels (NSW Coal Association 1989)





Figure 3b – Zones of Strata Behaviour above High Extraction Mining

Figure 3a – Zones Induced by Longwall Mining Reference: M Bai, F Kendorski 14the IGCC, 1995



Surface Subsidence Zone

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[Reference: National Coal Board, Subsidence Engineers Handbook, 1975]

Figure 4 – Transverse Subsidence Profile Over a Longwall Panel



Figure 5 – The Concept of Critical Extraction

[Reference: New South Wales Coal Association, 1989]





Figure 6 – Subsidence Profile for Inclined Seams

Photo 2 –Subsidence compression humps in pavement over a longwall panel in Illinois [reference: Bauer R.A. Illinois State Geological Survey circular 573, 2008]

[Reference: Bauer R.A. Illinois State Geological Survey circular 573, 2008] Photo 1 –Subsidence Tension Cracks Over a Longwall Panel in Illinois







Figure 7 – Estimated subsidence Profiles on a sloping ground surface with an angle of inclination of 30 degrees [reference: Shu & Bhattacharyya, 1992]

Photos 5 & 6 - Recent Examples of Precautionary Repairs to a Railway and to a Pipeline Over Longwall Panels in Illinois [Reference: Bauer R.A. Illinois State Geological Survey circular 573, 2008]



[reference: Bauer R.A. Illinois State

Geological Survey circular 573, 2008]

and Later Repaired

of a Road Subsided Over a Longwall Panel in Illinois

Photos 3 & 4 –Examples





Figure 14. This railroad grade was re-established a ence by increasing the vertical amount of crushed longwall panels crossed under the tracks. (Photogr
Energy]

Figure 8 – Finavera Wind Energy – Tumbler Ridge Project : Conceptual Layout of wind turbine [source: Finavera Wind



Photo 7 – Photo-Montage of how Finavera's Tumbler Ridge Wind Turbines will Look from Near HD Mining's Mine Site

Viewpoint from Murray Forest 5



Figure 9 – HD Mining International – Murray River Project: Conceptual Mine Layou [Source: HD Mining International]

file images]

Figure 10 - Super-Imposition of the Wind Turbine Layout and Conceptual Mine Plan at Tumbler Ridge [Source: AECOM





Figure 11 -- Photo-Montage of Views of HD Mining Murray River Mine Site (June 28, 2012)

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Figure 12 – Site Visit Location June 28, 2012





Annex 1

Site Visit Photographs June 26, 2012



ANNEX 1 – Site Visit Photographs June 26, 2012









Appendix 1

Agreement

GENERAL SERVICE AGREEMENT



Ministry Contract No.: CS13MMR011	Financial Information	
Requisition No.:		
Solicitation No.(if applicable):	Client:	057
Commodity Code: AJ.AJ04	Responsibility Centre:	27620
	Service Line:	26135
Contractor Information	STOB:	6001/6002
-	Project:	2700000
Supplier Name: AECOM Canada Ltd		
Supplier No.: 2117577	Template version: Febru	uary 8, 2012
Telephone No.: 902-595-6000		
E-mail Address: david.forrester@AECOM.com		
Website: www.AECOM.com		

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SCHEDULE A – SERVICES

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SCHEDULE B – FEES AND EXPENSES

Part 1 - Maximum Amount Payable Part 2 - Fees Part 3 - Expenses Part 4 - Statements of Account Part 5 - Payments Due

SCHEDULE C – APPROVED SUBCONTRACTOR(S)

SCHEDULE D – INSURANCE

SCHEDULE E – PRIVACY PROTECTION SCHEDULE

SCHEDULE F - ADDITIONAL TERMS

SCHEDULE G – SECURITY SCHEDULE

THIS AGREEMENT is dated for reference the 1st day of April, 2012.

BETWEEN:

<u>AECOM Canada Ltd</u> (the "Contractor") with the following specified address and fax number: 164 Charlotte Street, Suite 2B, Sydney, Nova Scotia B1P 1C3 Fax 902-595-6020

AND:

HER MAJESTY THE QUEEN IN RIGHT OF THE PROVINCE OF BRITISH COLUMBIA, as represented by the Minister of Energy and Mines (the "Province") with the following specified address and fax number: Mines and Mineral Resources Division 6th Floor - 1810 Blanshard Street PO Box 9320 Victoria, British Columbia V8W 9N3 Fax: 250-952-0491

The Province wishes to retain the Contractor to provide the services specified in Schedule A and, in consideration for the remuneration set out in Schedule B, the Contractor has agreed to provide those services, on the terms and conditions set out in this Agreement.

As a result, the Province and the Contractor agree as follows:

1 DEFINITIONS

General

- 1.1 In this Agreement, unless the context otherwise requires:
 - (a) "Business Day" means a day, other than a Saturday or Sunday, on which Provincial government offices are open for normal business in British Columbia;
 - (b) "Incorporated Material" means any material in existence prior to the start of the Term or developed independently of this Agreement, and that is incorporated or embedded in the Produced Material by the Contractor or a Subcontractor;
 - (c) "Material" means the Produced Material and the Received Material;
 - (d) "Produced Material" means records, software and other material, whether complete or not, that, as a result of this Agreement, are produced by the Contractor or a Subcontractor and includes the Incorporated Material;
 - (e) "Received Material" means records, software and other material, whether complete or not, that, as a result of this Agreement, are received by the Contractor or a Subcontractor from the Province or any other person;
 - (f) "Services" means the services described in Part 2 of Schedule A;
 - (g) "Subcontractor" means a person described in paragraph (a) or (b) of section 13.4; and
 - (h) "Term" means the term of the Agreement described in Part 1 of Schedule A subject to that term ending earlier in accordance with this Agreement.

Meaning of "record"

1.2 The definition of "record" in the *Interpretation Act* is incorporated into this Agreement and "records" will bear a corresponding meaning.

2 SERVICES

Provision of services

2.1 The Contractor must provide the Services in accordance with this Agreement.

Term

2.2 Regardless of the date of execution or delivery of this Agreement, the Contractor must provide the Services during the Term.

Supply of various items

2.3 Unless the parties otherwise agree in writing, the Contractor must supply and pay for all labour, materials, equipment, tools, facilities, approvals and licenses necessary or advisable to perform the Contractor's obligations under this Agreement, including the license under section 6.4.

Standard of care

2.4 Unless otherwise specified in this Agreement, the Contractor must perform the Services to a standard of care, skill and diligence maintained by persons providing, on a commercial basis, services similar to the Services.

Standards in relation to persons performing Services

2.5 The Contractor must ensure that all persons employed or retained to perform the Services are qualified and competent to perform them and are properly trained, instructed and supervised.

Instructions by Province

2.6 The Province may from time to time give the Contractor reasonable instructions (in writing or otherwise) as to the performance of the Services. The Contractor must comply with those instructions but, unless otherwise specified in this Agreement, the Contractor may determine the manner in which the instructions are carried out.

Confirmation of non-written instructions

2.7 If the Province provides an instruction under section 2.6 other than in writing, the Contractor may request that the instruction be confirmed by the Province in writing, which request the Province must comply with as soon as it is reasonably practicable to do so.

Effectiveness of non-written instructions

2.8 Requesting written confirmation of an instruction under section 2.7 does not relieve the Contractor from complying with the instruction at the time the instruction was given.

Applicable laws

2.9 In the performance of the Contractor's obligations under this Agreement, the Contractor must comply with all applicable laws.

3 PAYMENT

Fees and expenses

- 3.1 If the Contractor complies with this Agreement, then the Province must pay to the Contractor at the times and on the conditions set out in Schedule B:
 - (a) the fees described in that Schedule;

- (b) the expenses, if any, described in that Schedule if they are supported, where applicable, by proper receipts and, in the Province's opinion, are necessarily incurred by the Contractor in providing the Services; and
- (c) any applicable taxes payable by the Province under law or agreement with the relevant taxation authorities on the fees and expenses described in paragraphs (a) and (b).

The Province is not obliged to pay to the Contractor more than the "Maximum Amount" specified in Schedule B on account of fees and expenses.

Statements of accounts

3.2 In order to obtain payment of any fees and expenses under this Agreement, the Contractor must submit to the Province a written statement of account in a form satisfactory to the Province upon completion of the Services or at other times described in Schedule B.

Withholding of amounts

3.3 Without limiting section 9.1, the Province may withhold from any payment due to the Contractor an amount sufficient to indemnify, in whole or in part, the Province and its employees and agents against any liens or other third-party claims that have arisen or could arise in connection with the provision of the Services. An amount withheld under this section must be promptly paid by the Province to the Contractor upon the basis for withholding the amount having been fully resolved to the satisfaction of the Province.

Appropriation

3.4 The Province's obligation to pay money to the Contractor is subject to the *Financial Administration Act*, which makes that obligation subject to an appropriation being available in the fiscal year of the Province during which payment becomes due.

Currency

3.5 Unless otherwise specified in this Agreement, all references to money are to Canadian dollars.

Non-resident income tax

3.6 If the Contractor is not a resident in Canada, the Contractor acknowledges that the Province may be required by law to withhold income tax from the fees described in Schedule B and then to remit that tax to the Receiver General of Canada on the Contractor's behalf.

Prohibition against committing money

3.7 Without limiting section 13.10(a), the Contractor must not in relation to performing the Contractor's obligations under this Agreement commit or purport to commit the Province to pay any money except as may be expressly provided for in this Agreement.

Refunds of taxes

- 3.8 The Contractor must:
 - (a) apply for, and use reasonable efforts to obtain, any available refund, credit, rebate or remission of federal, provincial or other tax or duty imposed on the Contractor as a result of this Agreement that the Province has paid or reimbursed to the Contractor or agreed to pay or reimburse to the Contractor under this Agreement; and
 - (b) immediately on receiving, or being credited with, any amount applied for under paragraph (a), remit that amount to the Province.

4 **REPRESENTATIONS AND WARRANTIES**

- 4.1 As at the date this Agreement is executed and delivered by, or on behalf of, the parties, the Contractor represents and warrants to the Province as follows:
 - (a) except to the extent the Contractor has previously disclosed otherwise in writing to the Province,
 - (i) all information, statements, documents and reports furnished or submitted by the Contractor to the Province in connection with this Agreement (including as part of any competitive process resulting in this Agreement being entered into) are in all material respects true and correct,
 - (ii) the Contractor has sufficient trained staff, facilities, materials, appropriate equipment and approved subcontractual agreements in place and available to enable the Contractor to fully perform the Services, and
 - (iii) the Contractor holds all permits, licenses, approvals and statutory authorities issued by any government or government agency that are necessary for the performance of the Contractor's obligations under this Agreement; and
 - (b) if the Contractor is not an individual,
 - the Contractor has the power and capacity to enter into this Agreement and to observe, perform and comply with the terms of this Agreement and all necessary corporate or other proceedings have been taken and done to authorize the execution and delivery of this Agreement by, or on behalf of, the Contractor, and
 - (ii) this Agreement has been legally and properly executed by, or on behalf of, the Contractor and is legally binding upon and enforceable against the Contractor in accordance with its terms except as enforcement may be limited by bankruptcy, insolvency or other laws affecting the rights of creditors generally and except that equitable remedies may be granted only in the discretion of a court of competent jurisdiction.

5 PRIVACY, SECURITY AND CONFIDENTIALITY

Privacy

5.1 The Contractor must comply with the Privacy Protection Schedule attached as Schedule E.

Security

- 5.2 The Contractor must:
 - (a) make reasonable security arrangements to protect the Material from unauthorized access, collection, use, disclosure, alteration or disposal; and
 - (b) comply with the Security Schedule attached as Schedule G.

Confidentiality

- 5.3 The Contractor must treat as confidential all information in the Material and all other information accessed or obtained by the Contractor or a Subcontractor (whether verbally, electronically or otherwise) as a result of this Agreement, and not permit its disclosure or use without the Province's prior written consent except:
 - (a) as required to perform the Contractor's obligations under this Agreement or to comply with applicable laws;
 - (b) if it is information that is generally known to the public other than as result of a breach of this Agreement; or
 - (c) if it is information in any Incorporated Material.

Public announcements

5.4 Any public announcement relating to this Agreement will be arranged by the Province and, if such consultation is reasonably practicable, after consultation with the Contractor.

Restrictions on promotion

5.5 The Contractor must not, without the prior written approval of the Province, refer for promotional purposes to the Province being a customer of the Contractor or the Province having entered into this Agreement.

6 MATERIAL AND INTELLECTUAL PROPERTY

Access to Material

6.1 If the Contractor receives a request for access to any of the Material from a person other than the Province, and this Agreement does not require or authorize the Contractor to provide that access, the Contractor must promptly advise the person to make the request to the Province.

Ownership and delivery of Material

6.2 The Province exclusively owns all property rights in the Material which are not intellectual property rights. The Contractor must deliver any Material to the Province immediately upon the Province's request.

Matters respecting intellectual property

- 6.3 The Province exclusively owns all intellectual property rights, including copyright, in:
 - (a) Received Material that the Contractor receives from the Province; and
 - (b) Produced Material, other than any Incorporated Material.

Upon the Province's request, the Contractor must deliver to the Province documents satisfactory to the Province that irrevocably waive in the Province's favour any moral rights which the Contractor (or employees of the Contractor) or a Subcontractor (or employees of a Subcontractor) may have in the Produced Material and that confirm the vesting in the Province of the copyright in the Produced Material, other than any Incorporated Material.

Rights in relation to Incorporated Material

- 6.4 Upon any Incorporated Material being embedded or incorporated in the Produced Material and to the extent that it remains so embedded or incorporated, the Contractor grants to the Province:
 - (a) a non-exclusive, perpetual, irrevocable, royalty-free, worldwide license to use, reproduce, modify and distribute that Incorporated Material; and
 - (b) the right to sublicense to third-parties the right to use, reproduce, modify and distribute that Incorporated Material.

7 RECORDS AND REPORTS

Work reporting

7.1 Upon the Province's request, the Contractor must fully inform the Province of all work done by the Contractor or a Subcontractor in connection with providing the Services.

Time and expense records

7.2 If Schedule B provides for the Contractor to be paid fees at a daily or hourly rate or for the Contractor to be paid or reimbursed for expenses, the Contractor must maintain time records and books of account, invoices, receipts and vouchers of expenses in support of those payments, in form and content satisfactory to the Province. Unless otherwise specified in this Agreement, the Contractor must retain such documents for a period of not less than seven years after this Agreement ends.

8 AUDIT

8.1 In addition to any other rights of inspection the Province may have under statute or otherwise, the Province may at any reasonable time and on reasonable notice to the Contractor, enter on the Contractor's premises to inspect and, at the Province's discretion, copy any of the Material and the Contractor must permit, and provide reasonable assistance to, the exercise by the Province of the Province's rights under this section.

9 INDEMNITY AND INSURANCE

Indemnity

9.1 The Contractor hereby agrees to indemnify and save harmless the Province, its successors, assigns and authorized representatives and each of them from and against losses, claims, damages, actions and causes of action (collectively referred to as "Claims") that the Province may sustain, incur, suffer or be put to at any time either before or after the expiration or termination of this Agreement, that arise out of errors, omissions or negligent acts of the Contractor or their subcontractors, servants, agents or employees under this Agreement, excepting always that this indemnity does not apply to the extent, if any, to which the Claims are caused by errors, omissions or the negligent acts of the Province, its other contractors, assigns and authorized representatives or any other person.

Insurance

9.2 The Contractor must comply with the Insurance Schedule attached as Schedule D.

Workers compensation

9.3 Without limiting the generality of section 2.9, the Contractor must comply with, and must ensure that any Subcontractors comply with, all applicable occupational health and safety laws in relation to the performance of the Contractor's obligations under this Agreement, including the *Workers Compensation Act* in British Columbia or similar laws in other jurisdictions.

Personal optional protection

- 9.4 The Contractor must apply for and maintain personal optional protection insurance (consisting of income replacement and medical care coverage) during the Term at the Contractor's expense if:
 - (a) the Contractor is an individual or a partnership of individuals and does not have the benefit of mandatory workers compensation coverage under the *Workers Compensation Act* or similar laws in other jurisdictions; and
 - (b) such personal optional protection insurance is available for the Contractor from WorkSafeBC or other sources.

Evidence of coverage

9.5 Within 10 Business Days of being requested to do so by the Province, the Contractor must provide the Province with evidence of the Contractor's compliance with sections 9.3 and 9.4.

10 FORCE MAJEURE

Definitions relating to force majeure

- 10.1 In this section and sections 10.2 and 10.3:
 - (a) "Event of Force Majeure" means one of the following events:
 - (i) a natural disaster, fire, flood, storm, epidemic or power failure,
 - (ii) a war (declared and undeclared), insurrection or act of terrorism or piracy,
 - (iii) a strike (including illegal work stoppage or slowdown) or lockout, or
 - (iv) a freight embargo

if the event prevents a party from performing the party's obligations in accordance with this Agreement and is beyond the reasonable control of that party; and

(b) "Affected Party" means a party prevented from performing the party's obligations in accordance with this Agreement by an Event of Force Majeure.

Consequence of Event of Force Majeure

10.2 An Affected Party is not liable to the other party for any failure or delay in the performance of the Affected Party's obligations under this Agreement resulting from an Event of Force Majeure and any time periods for the performance of such obligations are automatically extended for the duration of the Event of Force Majeure provided that the Affected Party complies with the requirements of section 10.3.

Duties of Affected Party

10.3 An Affected Party must promptly notify the other party in writing upon the occurrence of the Event of Force Majeure and make all reasonable efforts to prevent, control or limit the effect of the Event of Force Majeure so as to resume compliance with the Affected Party's obligations under this Agreement as soon as possible.

11 DEFAULT AND TERMINATION

Definitions relating to default and termination

- 11.1 In this section and sections 11.2 to 11.4:
 - (a) "Event of Default" means any of the following:
 - (i) an Insolvency Event,
 - (ii) the Contractor fails to perform any of the Contractor's obligations under this Agreement, or
 - (iii) any representation or warranty made by the Contractor in this Agreement is untrue or incorrect; and
 - (b) "Insolvency Event" means any of the following:
 - (i) an order is made, a resolution is passed or a petition is filed, for the Contractor's liquidation or winding up,
 - (ii) the Contractor commits an act of bankruptcy, makes an assignment for the benefit of the Contractor's creditors or otherwise acknowledges the Contractor's insolvency,
 - (iii) a bankruptcy petition is filed or presented against the Contractor or a proposal under the *Bankruptcy and Insolvency Act* (Canada) is made by the Contractor,
 - (iv) a compromise or arrangement is proposed in respect of the Contractor under the *Companies' Creditors Arrangement Act* (Canada),
 - (v) a receiver or receiver-manager is appointed for any of the Contractor's property, or

(vi) the Contractor ceases, in the Province's reasonable opinion, to carry on business as a going concern.

Province's options on default

- 11.2 On the happening of an Event of Default, or at any time thereafter, the Province may, at its option, elect to do any one or more of the following:
 - (a) by written notice to the Contractor, require that the Event of Default be remedied within a time period specified in the notice;
 - (b) pursue any remedy or take any other action available to it at law or in equity; or
 - (c) by written notice to the Contractor, terminate this Agreement with immediate effect or on a future date specified in the notice, subject to the expiration of any time period specified under section 11.2(a).

Delay not a waiver

11.3 No failure or delay on the part of the Province to exercise its rights in relation to an Event of Default will constitute a waiver by the Province of such rights.

Province's right to terminate other than for default

11.4 In addition to the Province's right to terminate this Agreement under section 11.2(c) on the happening of an Event of Default, the Province may terminate this Agreement for any reason by giving at least 10 days' written notice of termination to the Contractor.

Payment consequences of termination

- 11.5 Unless Schedule B otherwise provides, if the Province terminates this Agreement under section 11.4:
 - (a) the Province must, within 30 days of such termination, pay to the Contractor any unpaid portion of the fees and expenses described in Schedule B which corresponds with the portion of the Services that was completed to the Province's satisfaction before termination of this Agreement; and
 - (b) the Contractor must, within 30 days of such termination, repay to the Province any paid portion of the fees and expenses described in Schedule B which corresponds with the portion of the Services that the Province has notified the Contractor in writing was not completed to the Province's satisfaction before termination of this Agreement.

Discharge of liability

11.6 The payment by the Province of the amount described in section 11.5(a) discharges the Province from all liability to make payments to the Contractor under this Agreement.

Notice in relation to Events of Default

11.7 If the Contractor becomes aware that an Event of Default has occurred or anticipates that an Event of Default is likely to occur, the Contractor must promptly notify the Province of the particulars of the Event of Default or anticipated Event of Default. A notice under this section as to the occurrence of an Event of Default must also specify the steps the Contractor proposes to take to address, or prevent recurrence of, the Event of Default. A notice under this section as to an anticipated Event of Default must specify the steps the Contractor proposes to an anticipated Event of Default must specify the steps the contractor proposes to take to address, or Default must specify the steps the Contractor proposes to take to prevent the occurrence of the anticipated Event of Default.

12 DISPUTE RESOLUTION

Dispute resolution process

- 12.1 In the event of any dispute between the parties arising out of or in connection with this Agreement, the following dispute resolution process will apply unless the parties otherwise agree in writing:
 - (a) the parties must initially attempt to resolve the dispute through collaborative negotiation;
 - (b) if the dispute is not resolved through collaborative negotiation within 15 Business Days of the dispute arising, the parties must then attempt to resolve the dispute through mediation under the rules of the British Columbia Mediator Roster Society; and
 - (c) if the dispute is not resolved through mediation within 30 Business Days of the commencement of mediation, the dispute must be referred to and finally resolved by arbitration under the *Commercial Arbitration Act*.

Location of arbitration or mediation

12.2 Unless the parties otherwise agree in writing, an arbitration or mediation under section 12.1 will be held in Victoria, British Columbia.

Costs of mediation or arbitration

12.3 Unless the parties otherwise agree in writing or, in the case of an arbitration, the arbitrator otherwise orders, the parties must share equally the costs of a mediation or arbitration under section 12.1 other than those costs relating to the production of expert evidence or representation by counsel.

13 MISCELLANEOUS

Delivery of notices

- 13.1 Any notice contemplated by this Agreement, to be effective, must be in writing and delivered as follows:
 - (a) by fax to the addressee's fax number specified on the first page of this Agreement, in which case it will be deemed to be received on the day of transmittal unless transmitted after the normal business hours of the addressee or on a day that is not a Business Day, in which cases it will be deemed to be received on the next following Business Day;
 - (b) by hand to the addressee's address specified on the first page of this Agreement, in which case it will be deemed to be received on the day of its delivery; or
 - (c) by prepaid post to the addressee's address specified on the first page of this Agreement, in which case if mailed during any period when normal postal services prevail, it will be deemed to be received on the fifth Business Day after its mailing.

Change of address or fax number

13.2 Either party may from time to time give notice to the other party of a substitute address or fax number, which from the date such notice is given will supersede for purposes of section 13.1 any previous address or fax number specified for the party giving the notice.

Assignment

13.3 The Contractor must not assign any of the Contractor's rights under this Agreement without the Province's prior written consent.

Subcontracting

- 13.4 The Contractor must not subcontract any of the Contractor's obligations under this Agreement to any person without the Province's prior written consent, excepting persons listed in the attached Schedule C. No subcontract, whether consented to or not, relieves the Contractor from any obligations under this Agreement. The Contractor must ensure that:
 - (a) any person retained by the Contractor to perform obligations under this Agreement; and
 - (b) any person retained by a person described in paragraph (a) to perform those obligations

fully complies with this Agreement in performing the subcontracted obligations.

Waiver

13.5 A waiver of any term or breach of this Agreement is effective only if it is in writing and signed by, or on behalf of, the waiving party and is not a waiver of any other term or breach.

Modifications

13.6 No modification of this Agreement is effective unless it is in writing and signed by, or on behalf of, the parties.

Entire agreement

13.7 This Agreement (including any modification of it) constitutes the entire agreement between the parties as to performance of the Services.

Survival of certain provisions

13.8 Sections 2.9, 3.1 to 3.4, 3.7, 3.8, 5.1 to 5.5, 6.1 to 6.4, 7.1, 7.2, 8.1, 9.1, 9.2, 9.5, 10.1 to 10.3, 11.2, 11.3, 11.5, 11.6, 12.1 to 12.3, 13.1, 13.2, 13.8, and 13.10, any accrued but unpaid payment obligations, and any other sections of this Agreement (including schedules) which, by their terms or nature, are intended to survive the completion of the Services or termination of this Agreement, will continue in force indefinitely, even after this Agreement ends.

Schedules

13.9 The schedules to this Agreement (including any appendices or other documents attached to, or incorporated by reference into, those schedules) are part of this Agreement.

Independent contractor

- 13.10 In relation to the performance of the Contractor's obligations under this Agreement, the Contractor is an independent contractor and not:
 - (a) an employee or partner of the Province; or
 - (b) an agent of the Province except as may be expressly provided for in this Agreement.

The Contractor must not act or purport to act contrary to this section.

Personnel not to be employees of Province

13.11 The Contractor must not do anything that would result in personnel hired or used by the Contractor or a Subcontractor in relation to providing the Services being considered employees of the Province.

Key Personnel

13.12 If one or more individuals are specified as "Key Personnel" of the Contractor in Part 4 of Schedule A, the Contractor must cause those individuals to perform the Services on the Contractor's behalf, unless the Province otherwise approves in writing, which approval must not be unreasonably withheld.

Pertinent information

13.13 The Province must make available to the Contractor all information in the Province's possession which the Province considers pertinent to the performance of the Services.

Conflict of interest

13.14 The Contractor must not provide any services to any person in circumstances which, in the Province's reasonable opinion, could give rise to a conflict of interest between the Contractor's duties to that person and the Contractor's duties to the Province under this Agreement.

Time

13.15 Time is of the essence in this Agreement and, without limitation, will remain of the essence after any modification or extension of this Agreement, whether or not expressly restated in the document effecting the modification or extension.

Conflicts among provisions

- 13.16 Conflicts among provisions of this Agreement will be resolved as follows:
 - (a) a provision in the body of this Agreement will prevail over any conflicting provision in, attached to or incorporated by reference into a schedule, unless that conflicting provision expressly states otherwise; and
 - (b) a provision in a schedule will prevail over any conflicting provision in a document attached to or incorporated by reference into a schedule, unless the schedule expressly states otherwise.

Agreement not permit nor fetter

13.17 This Agreement does not operate as a permit, license, approval or other statutory authority which the Contractor may be required to obtain from the Province or any of its agencies in order to provide the Services. Nothing in this Agreement is to be construed as interfering with, or fettering in any manner, the exercise by the Province or its agencies of any statutory, prerogative, executive or legislative power or duty.

Remainder not affected by invalidity

13.18 If any provision of this Agreement or the application of it to any person or circumstance is invalid or unenforceable to any extent, the remainder of this Agreement and the application of such provision to any other person or circumstance will not be affected or impaired and will be valid and enforceable to the extent permitted by law.

Further assurances

13.19 Each party must perform the acts, execute and deliver the writings, and give the assurances as may be reasonably necessary to give full effect to this Agreement.

Additional terms

13.20 Any additional terms set out in the attached Schedule F apply to this Agreement.

Governing law

13.21 This Agreement is governed by, and is to be interpreted and construed in accordance with, the laws applicable in British Columbia.

14 INTERPRETATION

- 14.1 In this Agreement:
 - (a) "includes" and "including" are not intended to be limiting;
 - (b) unless the context otherwise requires, references to sections by number are to sections of this Agreement;
 - (c) the Contractor and the Province are referred to as "the parties" and each of them as a "party";
 - (d) "attached" means attached to this Agreement when used in relation to a schedule;
 - (e) unless otherwise specified, a reference to a statute by name means the statute of British Columbia by that name, as amended or replaced from time to time;
 - (f) the headings have been inserted for convenience of reference only and are not intended to describe, enlarge or restrict the scope or meaning of this Agreement or any provision of it;
 - (g) "person" includes an individual, partnership, corporation or legal entity of any nature; and
 - (h) unless the context otherwise requires, words expressed in the singular include the plural and *vice versa*.

15 EXECUTION AND DELIVERY OF AGREEMENT

15.1 This Agreement may be entered into by a separate copy of this Agreement being executed by, or on behalf of, each party and that executed copy being delivered to the other party by a method provided for in section 13.1 or any other method agreed to by the parties.

The parties have executed this Agreement as follows:

SIGNED on the <u>22</u> day of <u>JUN0</u> , 2012 by the Contractor (or, if not an individual, on its behalf by its authorized signatory or signatories):	SIGNED on the <u>9</u> day of <u>JUNE</u> , 2010 on behalf of the Province by its duly authorized representative:
Signature(s)	Signature David More
Print Name(s)	Print Name
Print Title(s)	Print Title

PART 1. TERM:

1. The term of this Agreement commences on June 18, 2012 and ends on September 7, 2012.

PART 2. SERVICES:

The following services provided through but not limited by this contract are subject to oversight by MEM:

Outputs

The Contractor must provide the following Services:

- A complete study reviewing potential conflicts, particularly mining subsidence, and other relevant points relating to overlapping underground (deep long wall coal) mines and wind farms, including options for hazard mitigation.
- An overview giving preliminary subsidence estimates based on conceptual mine plan and conceptual wind farm design research. The results from the review will inform future statutory decisions regarding overlapping tenures for proposed underground mining and wind power projects.

A discussion paper consisting of research and discussions with stakeholders to review potential conflicts applicable to the Province, including conceptual impacts, subsidence model, review of the Subsidence Engineer's Handbook, influence of depth, conceptual wind farm and wind mill design, and the type and range of impacts.

Inputs

The Contractor must provide all necessary personnel and materials to deliver the required Services.

Outcomes

Through the delivery of the Services the Province wishes to realize the following outcomes and, without limiting the obligation of the Contractor to comply with other provisions of this Part, the Contractor must use commercially reasonable efforts to achieve them:

A discussion paper that outlines potential conflicts applicable to the Province.

The parties acknowledge that the Contractor does not warrant that these outcomes will be achieved.

Reporting requirements

The report will be accepted electronically at the end of the contract term, but a hardcopy must be provided upon request.

PART 3. RELATED DOCUMENTATION:

Not applicable

PART 4. KEY PERSONNEL:

- 1. The Key Personnel of the Contractor are as follows:
 - (a) David Forrester

Schedule B – Fees and Expenses

1. MAXIMUM AMOUNT PAYABLE:

Maximum Amount: Despite sections 2 and 3 of this Schedule, \$25,000 is the maximum amount which the Province is obliged to pay to the Contractor for fees and expenses under this Agreement (exclusive of any applicable taxes described in section 3.1(c) of this Agreement).

2. FEES:

<u>Fees</u>: Based on a hourly rate of \$140.00 per hour for those hours during the Term when the Contractor provides the Services.

3. EXPENSES:

Expenses:

- a. Travel, accommodation and meal expenses for travel greater than 32 kilometers away from Sydney, Nova Scotia, on the same basis as the Province pays its Group II employees when they are on travel status; and
- b. the Contractor's actual long distance telephone, fax, postage and other identifiable communication expenses; and
- c. Meals: for part day: Breakfast: \$22.00 Lunch: \$22.00 Dinner: \$28.50

Breakfast & Lunch only: \$30 Lunch & Dinner only: \$36.50 Breakfast & Dinner only: \$36.50

(all include \$14.00 incidental per diem amount)

for full day:Claim \$49.00 (includes \$14.00 incidental per diem amount)no meals:Claim incidental amount of \$14.00 per day (to cover miscellaneous out of
pocket expenses).

d. Accommodation: (receipts are required). Private accommodation: Claim \$30.00 per night (no receipts required).

e. Transportation: (<u>No first class travel reimbursed</u>).

Private vehicle mileage: \$0.50/km. Vehicle owners are responsible for adequate insurance to cover business use on behalf of the Province.

Rental vehicle: Use firms listed under government master standing offer to obtain rates negotiated for authorized government business. Actual receipts required. Separately purchased personal accident insurance (PAI), collision damage waiver (CDW), cargo insurance or personal effects insurance will not be reimbursed.

Parking:Receipts required.Bus and taxi:Receipts required for all fares.Ferry and train:Receipts required.Air:Travel should be by the most economical commercial route or by charter approved byDeputyMinister or delegate.Receipt and flight coupon required for reimbursement.

f. **Communication:** Long distance telephone, Telex, postage and other identifiable communication expenses: At cost. If total charges per invoice are under \$10.00, a list of expenditures only is required. If \$10.00 or above, receipts are required.

excluding Harmonized sales tax ("HST") or other applicable tax paid or payable by the Contractor on expenses described in (a) to (f) above to the extent that the Contractor is entitled to claim credits (including HST input tax credits), rebates, refunds or remissions of the tax from the relevant taxation authorities.

4. STATEMENTS OF ACCOUNT:

<u>Statements of Account</u>: In order to obtain payment of any fees and expenses under this Agreement for a period from and including the 1st day of a month to and including the last day of that month (each a "Billing Period"), the Contractor must deliver to the Province on a date after the Billing Period (each a "Billing Date"), a written statement of account in a form satisfactory to the Province containing:

- (a) the Contractor's legal name and address;
- (b) the date of the statement, and the Billing Period to which the statement pertains;
- (c) the Contractor's calculation of all fees claimed for that Billing Period, including a declaration by the Contractor of all hours worked during the Billing Period for which the Contractor claims fees and a description of the applicable fee rates;
- (d) a chronological listing, in reasonable detail, of any expenses claimed by the Contractor for the Billing Period with receipts attached, if applicable, and, if the Contractor is claiming reimbursement of any HST or other applicable taxes paid or payable by the Contractor in relation to those expenses, a description of any credits, rebates, refunds or remissions the Contractor is entitled to from the relevant taxation authorities in relation to those taxes;
- (e) the Contractor's calculation of any applicable taxes payable by the Province in relation to the Services for the Billing Period;
- (f) a description of this Agreement;
- (g) a statement number for identification; and
- (h) any other billing information reasonably requested by the Province.

5. PAYMENTS DUE:

Payments Due: Within 30 days of the Province's receipt of the Contractor's written statement of account delivered in accordance with this Schedule, the Province must pay the Contractor the fees and expenses (plus all applicable taxes) claimed in the statement if they are in accordance with this Schedule. Statements of account or contract invoices offering an early payment discount may be paid by the Province as required to obtain the discount.

Schedule C – Approved Subcontractor(s)

- 1. The Contractor must, without limiting the Contractor's obligations or liabilities and at the Contractor's own expense, purchase and maintain throughout the Term the following insurances with insurers licensed in Canada in forms and amounts acceptable to the Province:
 - (a) Commercial General Liability in an amount not less than \$2,000,000.00 inclusive per occurrence against bodily injury, personal injury and property damage and including liability assumed under this Agreement and this insurance must
 - (i) include the Province as an additional insured,
 - (ii) be endorsed to provide the Province with 30 days advance written notice of cancellation or material change, and
 - (iii) include a cross liability clause.
- 2. All insurance described in section 1 of this Schedule must:
 - (a) be primary; and
 - (b) not require the sharing of any loss by any insurer of the Province.
- 3. The Contractor must provide the Province with evidence of all required insurance as follows:
 - (a) within 10 Business Days of commencement of the Services, the Contractor must provide to the Province evidence of all required insurance in the form of a completed Province of British Columbia Certificate of Insurance;
 - (b) if any required insurance policy expires before the end of the Term, the Contractor must provide to the Province within 10 Business Days of the policy's expiration, evidence of a new or renewal policy meeting the requirements of the expired insurance in the form of a completed Province of British Columbia Certificate of Insurance; and
 - (c) despite paragraph (a) or (b) above, if requested by the Province at any time, the Contractor must provide to the Province certified copies of the required insurance policies.
- 4. The Contractor must obtain, maintain and pay for any additional insurance which the Contractor is required by law to carry, or which the Contractor considers necessary to cover risks not otherwise covered by insurance specified in this Schedule in the Contractor's sole discretion.

Schedule E – Privacy Protection Schedule

Schedule F – Additional Terms

Schedule G – Security Schedule
From:	Jody <jody.shimkus@hdminingintl.com></jody.shimkus@hdminingintl.com>	
Sent:	Monday, January 28, 2013 8:22 PM	
То:	McEwan, Tim JTST:EX; Stadel, Darren JTST:EX; Hewitt, Jeremy JTST:EX	
Subject: Fwd: News Release: Murray River Project Temporary Foreign Workers Retu		
	China	
Attachments:	HD Mining News Release_January 28, 2013.pdf; ATT00001.htm	

FYI

Sent from my iPhone

Begin forwarded message:

From: <<u>info@hdminingintl.com</u>> Date: January 28, 2013, 6:38:18 PM PST Subject: News Release: Murray River Project Temporary Foreign Workers Returning to China

Please see the attached News Release from HD Mining.

Thank you.

NEWS RELEASE – JANUARY 28, 2013

Murray River Project Temporary Foreign Workers Returning to China

FOR IMMEDIATE RELEASE

VANCOUVER, B.C. – HD Mining announced today that its 16 temporary foreign workers on the Murray River Project are returning to China. These workers would have undertaken underground preparatory work for the bulk sample phase of the project, which includes the extraction of a 100,000 tonne coal sample to determine the viability of full mine development and confirming that the coal is marketable.

"This was a difficult decision for us, but we are very concerned about the cost and disruption this litigation brought by the unions has caused to the planning of the project. We need reasonable certainty before initiating work on our underground bulk sample." said Jody Shimkus, Vice President, Environmental and Regulatory Affairs. "We have also decided to delay bringing any additional workers to Tumbler Ridge until we have reliable certainty."

HD Mining will continue with its worker housing development and with the environmental assessment process. It is also counting on federal and provincial regulators continuing to process environmental and mining related approvals in a timely manner.

"We are very committed to the community of Tumbler Ridge and we have shown our long-term interest by investing \$15 million in housing and other local initiatives." said Penggui Yan, Chair of HD Mining. "But we need to be able to rely on the Canadian legal system – and receive fair treatment from governments – when planning and developing projects. In the absence of being able to find Canadians qualified and interested to do this work, we need to know we can rely on the two-year temporary foreign worker authorizations we received."

The original project schedule was based on approvals received from Human Resources and Skills Development Canada in April 2012 for the use of 201 workers under the Temporary Foreign Worker Program. A delay in the project will have negative impacts on other work occurring in Tumbler Ridge, which provide jobs and other benefits to the community, such as the purchase of project-related goods and services.

"Even though we are disappointed with this development, we are encouraged by HD Mining's ongoing commitment to the Murray River Project, including continuing construction of housing in Tumbler Ridge, environmental assessment and developing a training program for Canadians to work in long-wall mining" said Darwin Wren, Mayor of Tumbler Ridge. "We look forward to welcoming the workers back very soon, and to full development of this project."

HD Mining remains committed to the Murray River Project and will continue to vigorously contest this matter in court.

From: Sent: To: Cc: Subject: JMS CONSULTING <jody.shimkus@hdminingintl.com> Monday, February 18, 2013 2:03 PM Bell, Pat JTST:EX; Parhar, TJ S JTST:EX McEwan, Tim JTST:EX Messages from HD Mining

Minister Bell

- We have been provided a copy of an affidavit that the unions are filing in court that contains some wrong information regarding the Murray River Project, which should be corrected
 - Their affidavit alleges that HD Mining is not using long-wall mining for its bulk sample stage of the Murray River Project
- The unions' affidavit relies on a Notice of Work application filed by Canadian Dehua in July 2011. Since that time, HD Mining has taken the lead on this project and has reinvented the method of coal sample collection in the bulk sampling stage – from the previous room and pillar coal extraction to collecting coal samples through driving in-seam roadways for the long-wall working face. This updated engineering method makes the bulk sampling a necessary stage of the full mine long-wall development, and is justified on the grounds of enhanced safety and improved transition to the full mine operation.
- The updated engineering proposal, together with the detailed engineering drawings, have been reviewed and signed off by a professional engineer. The Ministry of Energy, Mines and Natural Gas has been involved in the approval process.
- We do not know where or how the unions obtained the Notice of Work application, but it is an out-of-date document and does not reflect the proposal of HD Mining

From:	jody.shimkus <jody.shimkus@hdminingintl.com></jody.shimkus@hdminingintl.com>
Sent:	Friday, March 15, 2013 1:51 PM
То:	McEwan, Tim JTST:EX
Subject:	FW: Status update - proposed Murray River Project

Tim following our discussion last night here is EAO's response. It still provides no firm date for our public comment period nor any guarantees that the Federal agencies will review and provide comment on the draft AiR – which is a provincial document not a federal document.

From: Peterson, Mike EAO:EX [mailto:Mike.Peterson@gov.bc.ca]
Sent: Friday, March 15, 2013 12:47 PM
To: 'jody.shimkus'
Cc: Stadel, Darren JTST:EX; Griffiths, Felice EAO:EX; Peterson, Mike EAO:EX; 'Au,Vivian [CEAA]'; 'Anne Currie'
Subject: Status update - proposed Murray River Project

Good day,

I have recently had a conversation with Vivian Au of CEAA to discuss the proposed Murray River Project.

I queried CEAA about potential engagement of the Federal agencies in providing comment on the provincial draft Application Information Requirements (AIR). CEAA confirmed they would like, and will request Federal agencies to provide comment on the draft AIR but noted that they first need an accepted copy of the Federal Project Description (PD). CEAA is of the opinion that the Federal PD provides additional information and detail that is required such that meaningful comment can be made on the AIR. I concur with CEAA's opinion that the provision of Federal comment on the draft AIR will support coordination of the provincial and federal Environmental Assessment processes, which in turn will result in an effective and efficient EA.

CEAA will encourage the Federal agencies to review and provide comment on the draft AIR concurrently with their review of the Federal PD. The Federal agencies' review of the Federal PD will commence once CEAA has accepted the Federal PD. CEAA's decision to accept the Federal PD, or not, occurs within 10 days of the submission of the Federal PD.

Following my conversation with CEAA, my decision to wait for Federal comment on the draft AIR prior to initiating a public comment period stands.

Regards,

P. Michael Peterson Project Assessment Manager

Environmental Assessment Office

4051-18th Ave, Prince George, BC, V2N 1B3 Phone: (250) 561-5622 Fax: (250) 565-6940 Email: <u>Mike.Peterson@gov.bc.ca</u>



From:	jody.shimkus <jody.shimkus@hdminingintl.com></jody.shimkus@hdminingintl.com>	
Sent:	Tuesday, April 2, 2013 12:08 PM	
То:	Stadel, Darren JTST:EX; Hewitt, Jeremy JTST:EX	
Subject:	FW: APPLICATION AND EPNHD Mining -Murray River Bulk Sample Permit	

fyi

From: Eric OBryan [mailto:eobryan@edynamics.com] Sent: Tuesday, April 02, 2013 11:52 AM To: jody.shimkus Subject: RE: APPLICATION AND EPN...HD Mining -Murray River Bulk Sample Permit

March 18.

From: jody.shimkus [mailto:jody.shimkus@hdminingintl.com] Sent: April-02-13 11:51 AM To: 'Eric OBryan' Subject: RE: APPLICATION AND EPN...HD Mining -Murray River Bulk Sample Permit

Thanks Eric – remind me the date we first submitted?

From: Eric OBryan [mailto:eobryan@edynamics.com] Sent: Tuesday, April 02, 2013 11:30 AM To: Jody Shimkus; jin.zhang Cc: walter.buckley@hdminingintl.com Subject: FW: APPLICATION AND EPN...HD Mining -Murray River Bulk Sample Permit

Still waiting for Victoria to process the BSP Permit application. See Barbs note below.

Eric

From: Beyer, Barb ENV:EX [mailto:<u>Barb.Beyer@gov.bc.ca]</u> Sent: April-02-13 11:27 AM To: 'Eric OBryan' Subject: RE: APPLICATION AND EPN...HD Mining -Murray River Bulk Sample Permit

Hi Eric,

I just contacted Victoria office and they are out of the office this week. They will respond as soon as they are back next week.

From: Eric OBryan [mailto:eobryan@edynamics.com] Sent: Tuesday, April 2, 2013 11:08 AM To: Beyer, Barb ENV:EX Subject: APPLICATION AND EPN...HD Mining -Murray River Bulk Sample Permit

Hi Barb,

Here is a copy of the application sent to Victoria.

Thanks, Eric

From:	jody.shimkus <jody.shimkus@hdminingintl.com></jody.shimkus@hdminingintl.com>	
Sent:	Tuesday, April 2, 2013 12:11 PM	
То:	Hewitt, Jeremy JTST:EX; Stadel, Darren JTST:EX	
ubject: FW: HD Mining -Murray River Bulk Sample Permit Application and Envir		
	Protection Notice	

Looks like the application has been entered into the system.

From: Eric OBryan [mailto:eobryan@edynamics.com]
Sent: Tuesday, April 02, 2013 12:08 PM
To: Jody Shimkus; jin.zhang
Cc: walter.buckley@hdminingintl.com
Subject: FW: HD Mining -Murray River Bulk Sample Permit Application and Environmental Protection Notice

From: Beyer, Barb ENV:EX [mailto:<u>Barb.Beyer@gov.bc.ca]</u> Sent: April-02-13 12:07 PM To: 'Eric OBryan' Subject: FW: HD Mining -Murray River Bulk Sample Permit Application and Environmental Protection Notice

Hi Eric, just heard from our Victoria office (had an out of office message before). The application is entered onto the system. You can use the highlighted number before as the reference number for referrals and consultation. This number will be the same as the permit number when done.

From: Victoria EPD Permit Administration ENV:EX Sent: Tuesday, April 2, 2013 11:38 AM To: Beyer, Barb ENV:EX Subject: RE: HD Mining -Murray River Bulk Sample Permit Application and Environmental Protection Notice

Hi Barb,

This job was submitted to AMS on March 25, 2013 – pre-auth no. 106666, tracking 286963.

Cheers.

Allison

From: Beyer, Barb ENV:EX Sent: Tuesday, April 2, 2013 11:24 AM To: Victoria EPD Permit Administration ENV:EX Subject: FW: HD Mining -Murray River Bulk Sample Permit Application and Environmental Protection Notice

Hello, just following up on this application and wondering if you have had a chance to enter it onto AMS?

Thanks, Barb From: Eric OBryan [mailto:eobryan@edynamics.com] Sent: Tuesday, April 2, 2013 11:08 AM To: Beyer, Barb ENV:EX Subject: FW: HD Mining -Murray River Bulk Sample Permit Application and Environmental Protection Notice

Hi Barb,

Here is a copy of the application sent to Victoria.

Thanks, Eric

From: Eric OBryan [mailto:<u>eobryan@edynamics.com</u>] Sent: March-18-13 11:34 AM To: 'Jensen, Fern ENV:EX' Subject: HD Mining -Murray River Bulk Sample Permit Application and Environmental Protection Notice

Hi Fern,

Here is a copy of the Application and EPN that will be faxed to Victoria shortly.

Regards, Eric

From: Jensen, Fern ENV:EX [mailto:Fern.Jensen@gov.bc.ca] Sent: March-15-13 4:20 PM To: 'Eric OBryan' Subject: RE: HD Mining -Murray River Bulk Sample Permit Application and Environmental Protection Notice

Hi Eric

I consulted with Barb and it was decided you can leave the maximum rate of discharge in the EPN as it is. And then submit Rescan's information to us when you get it. If you want you could change the units to cubic meter/seconds in the EPN.

The duration of bulk sampling or size of bulk sampling does need to be included in the EPN notice. That's just a minor additional.

Hope that address your concerns. I am in Monday if you have any other questions.

Fern

Fern Jensen

Ministry of Enviroment Enviromental Protection Division 1011 Fourth Ave, Suite #325 Prince George, BC V2L 3H9 Phone: 250-565-4234 Fax: 250-565-6629

From: Eric OBryan [mailto:eobryan@edynamics.com] Sent: Friday, March 15, 2013 3:21 PM To: Jensen, Fern ENV:EX

Subject: RE: HD Mining -Murray River Bulk Sample Permit Application and Environmental Protection Notice

Hi Fern,

Thanks for the feedback. I can appreciate that if the ponds are meeting TSS 50mg/L for the 1:10 year event that we should be providing that discharge rate.

Rescan was responsible for pond design and discharge calculations and I have requested this info, however I am concerned that this task could delay submission longer than we want. I wonder if there is any other way to present the available discharge rate information.

If you have time for a quick call that would be appreciated. I'm in the office till 430 today and Monday morning, but out in the field the rest of the week.

Can try my cell as well s22

Thanks Eric

From: Jensen, Fern ENV:EX [mailto:<u>Fern.Jensen@gov.bc.ca]</u> Sent: March-15-13 12:38 PM To: 'Eric OBryan' Subject: RE: HD Mining -Murray River Bulk Sample Permit Application and Environmental Protection Notice

Hi Eric,

The application mostly looks good. However, could the 1-10 year design flow rate for each pond be provided.

With respect to the EPN, it would be an improvement if it were indicated that the discharge rates will be variable depending on precipitation rates (instead of the max levels indicated in the current EPN). Also that the ponds will be designed to treat TSS up to the 1-10 year, 24 hour discharge rates of xx m3/s.

We want to keep consistency between the permit and EPN notice.

Hope this helps. If you would like me to take a quick look before you submit to Victoria, let me know.

Have a good day Fern

Fern Jensen

Ministry of Enviroment Enviromental Protection Division 1011 Fourth Ave, Suite #325 Prince George, BC V2L 3H9 Phone: 250-565-4234 Fax: 250-565-6629

From: Eric OBryan [mailto:eobryan@edynamics.com]
Sent: Thursday, March 14, 2013 4:33 PM
To: Jensen, Fern ENV:EX; Beyer, Barb ENV:EX
Cc: Randy Morris; walter.buckley@hdminingintl.com; Jody Shimkus
Subject: RE: HD Mining -Murray River Bulk Sample Permit Application and Environmental Protection Notice

Ok thanks Fern. Will you be providing comment on the latest version of the application and EPN or do you feel it is suitable to send to Victoria now?

Thank you Eric

From: Jensen, Fern ENV:EX [mailto:Fern.Jensen@gov.bc.ca]
Sent: March-14-13 4:29 PM
To: 'Eric OBryan'; Beyer, Barb ENV:EX
Cc: 'Randy Morris'; 'walter.buckley@hdminingintl.com'; 'Jody Shimkus'
Subject: RE: HD Mining -Murray River Bulk Sample Permit Application and Environmental Protection Notice

Hi Eric

I will wait for the authorization number from Victoria before sending out instructions as you will need it to proceed with the consultation process.

Any questions, please let me know.

+ern Vensen

Ministry of Enviroment Enviromental Protection Division 1011 Fourth Ave, Suite #325 Prince George, BC V2L 3H9 Phone: 250-565-4234 Fax: 250-565-6629

From: Eric OBryan [mailto:eobryan@edynamics.com]
Sent: Thursday, March 14, 2013 1:12 PM
To: Beyer, Barb ENV:EX; Jensen, Fern ENV:EX
Cc: Randy Morris; walter.buckley@hdminingintl.com; Jody Shimkus
Subject: HD Mining -Murray River Bulk Sample Permit Application and Environmental Protection Notice

Hi Fern,

I've attached the Permit Application and Environmental Protection Notice incorporating comments and recommendations from our last meeting. Please have a quick review and let me know if I can ship it off to Victoria to get the file started.

As we discussed in the meeting are you still going to email out formal requirements for consultation including list of places MoE requires EPN circulation?

Regards, Eric

Eric O'Bryan, R.P.Bio. Biologist



EDI Environmental Dynamics Inc. 301 George Street - Prince George V21, 1R4 Ph: 250-552-5412 • Fax: 250-562-5413



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Please consider the environment before printing this email.

From: Sent: To: Subject: jody.shimkus <jody.shimkus@hdminingintl.com> Monday, April 8, 2013 1:48 PM Stadel, Darren JTST:EX RE: Fed PD

Yes, EAO was copied

From: Stadel, Darren JTST:EX [mailto:Darren.Stadel@gov.bc.ca] Sent: Monday, April 08, 2013 1:18 PM To: 'jody.shimkus' Subject: Fed PD

Hi Jody - just curious if the Fed PD has been re-submitted to CEAA?

Regards Darren

From: Sent: To: Cc: Subject: Danshin, Tamara JTST:EX Friday, May 3, 2013 2:29 PM 'jody.shimkus@hdminingintl.com' Stadel, Darren JTST:EX Update: ug mining task force project

Hi Jodi,

As requested. Here is an update re: BC Mining HR Taskforce.

Thanks Tammy

From: Westran, Joan JTST:EX
Sent: Monday, April 22, 2013 2:42 PM
To: Hewitt, Jeremy JTST:EX; Danshin, Tamara JTST:EX
Cc: 'David Bazowski'; Hazemi, Leila JTST:EX; 'Barbara Kirby'
Subject: Update: ug mining task force project

As promised ...

- The mining HR task force met in Vancouver on April 18; Barb Kirby (MiHR) attended and presented an update on the ug labour market/training initiative
- - s13
- Barb Kirby was scheduled to speak with Jody Shimkus (HD) today about various aspects of MiHR's ug labour market/training project
- The report and recommendations will be complete by the end of June

Joan Westran | Program Manager | Certified Executive Coach | Engagement Practitioner *Diversity exists. Inclusion is created.* Ministry of Jobs, Tourism and Skills Training Labour Market Programs Branch Victoria BC V8W 9T6 250.953.4116 | Joan.Westran@gov.bc.ca Labour Market Partnerships Programs

From:	Jody <jody.shimkus@hdminingintl.com></jody.shimkus@hdminingintl.com>	
Sent:	Tuesday, June 4, 2013 10:24 PM	
То:	Stadel, Darren JTST:EX	
Cc:	Hewitt, Jeremy JTST:EX	
Subject:	Re: Call tomorrow	

No I think we can work with it

Sent from my iPhone

On Jun 4, 2013, at 10:22 PM, "Stadel, Darren JTST:EX" <<u>Darren.Stadel@gov.bc.ca</u>> wrote:

> Ok - no problem.

>

> Quick question - any serious concerns with the electrical compliance letter/conditions received from MEM last week?

- >
- > Rgds
- > Darren
- >

> On 2013-06-04, at 10:19 PM, "Jody" <<u>jody.shimkus@hdminingintl.com</u>> wrote:

>

>> Need to cancel - will be on the road to Tumbler

>>

>> Sent from my iPhone

From:	JMS CONSULTING <jody.shimkus@hdminingintl.com></jody.shimkus@hdminingintl.com>	
Sent:	Wednesday, June 26, 2013 12:53 PM	
То:	Stadel, Darren JTST:EX	
Subject:	FW: new draft AIR TOC and guidance to proponents - based on draft VC Guideline	

I would like to discuss on our call tomorrow

Jody Shimkus VP Environmental & Regulatory Affairs

HD Mining International #2288-1177 West Hastings Street Vancouver, BC w. 604-689-8669 c. s22

From: Jason Rempel <Jason.Rempel@erm.com>
Date: Wednesday, 26 June, 2013 12:48 PM
To: "Mike.Peterson@gov.bc.ca" <Mike.Peterson@gov.bc.ca>
Cc: "Gerrard, Anna EAO:EX" <<u>Anna.Gerrard@gov.bc.ca</u>>, JMS CONSULTING <<u>jody.shimkus@hdminingintl.com</u>>, Anne
Currie <<u>Anne.Currie@erm.com</u>>
Subject: RE: new draft AIR TOC and guidance to proponents - based on draft VC Guideline

Hi Mike,

Thank you for providing the draft guidance document relating to the preparation of the Application Information Requirements (AIR) for EA Applications. We have discussed your request with HD Mining. Based on this discussion, HD Mining is concerned that they are being asked to revise the draft AIR for the following reasons:

- The draft AIR incorporates two rounds of comments from the Murray River Project EA Working Group. The first draft was provided to the Working Group in October 2012 so the draft AIR have been under development for the past nine months.
- The public comment period on the draft AIR has been held, ending on June 20, 2013.
- The draft guidance documents are still under development and have not yet been formally finalized by the BC EAO.

Based on the reasons above, HD Mining does not support making adjustments to the AIR. Jason

From: Peterson, Mike EAO:EX [mailto:Mike.Peterson@gov.bc.ca]
Sent: Monday, June 24, 2013 12:09 PM
To: Jason Rempel
Cc: Gerrard, Anna EAO:EX; Peterson, Mike EAO:EX
Subject: new draft AIR TOC and guidance to proponents - based on draft VC Guideline
Jason,
As discussed last week – I have attached the ToC from the draft guidance as well as more specific information on the Assessment
Methodology and Environmental Effects Components sections.
I look forward to working with you to keep the MR dAIR aligned with the direction provided above.
I am available to discuss at your convenience.
Kind regards,
Mike

P. Michael Peterson, R.P.Bio., P.Ag.

Project Assessment Manager

Environmental Assessment Office

4051-18th Ave, Prince George, BC, V2N 1B3 Phone: (250) 561-5622 Fax: (250) 565-6940 Email: <u>Mike.Peterson@gov.bc.ca</u>



From:	jody.shimkus <jody.shimkus@hdminingintl.com></jody.shimkus@hdminingintl.com>	
Sent:	Thursday, June 27, 2013 10:16 AM	
То:	Hewitt, Jeremy JTST:EX	
Subject:	FW: new draft AIR TOC and guidance to proponents - based on draft VC Guideline	
Attachments:	dair_toc.docx; Initial draft revised AIR assessment methodology and VC sections.docx	

As discussed on phone

In particular please note the comment on p.2

The methodological approach may be refined from time to time, and the approach taken in the Application must be consistent with EAO's best practices, at the time the Application is submitted. The approach presented in this AIR is representative of EAO's best practices at the time of approving the AIR.

Jody Shimkus VP Environment & Regulatory Affairs

HD Mining Intl. #2288-1177 West Hastings St. Vancouver, B.C. V6E 2K3 w. 604-689-8669 c. s22 www.HDminingintl.com

From: Jason Rempel [mailto:Jason.Rempel@erm.com] Sent: Thursday, June 27, 2013 9:42 AM To: Jody.shimkus@hdminingintl.com Subject: FW: new draft AIR TOC and guidance to proponents - based on draft VC Guideline

HI Jody,

See below and attached from Mike.

Jason

From: Peterson, Mike EAO:EX [mailto:Mike.Peterson@gov.bc.ca]
Sent: Monday, June 24, 2013 12:09 PM
To: Jason Rempel
Cc: Gerrard, Anna EAO:EX; Peterson, Mike EAO:EX
Subject: new draft AIR TOC and guidance to proponents - based on draft VC Guideline

Jason,

As discussed last week – I have attached the ToC from the draft guidance as well as more specific information on the Assessment Methodology and Environmental Effects Components sections.

I look forward to working with you to keep the MR dAIR aligned with the direction provided above.

I am available to discuss at your convenience.

Kind regards,

Mike

P. Michael Peterson, R.P.Bio., P.Ag. Project Assessment Manager

Environmental Assessment Office

4051-18th Ave, Prince George, BC, V2N 1B3 Phone: (250) 561-5622 Fax: (250) 565-6940 Email: Mike.Peterson@gov.bc.ca



Preface

Proponent must include in the AIR:

- State the purpose of the AIR;
- Briefly describe the proposed Project and the trigger(s) for the BC environmental assessment (EA) and federal EA, if applicable. Provide the link to the most upto-date project description posted on the electronic Project Information Center (ePIC).
- State that the completion of the EA process(es) are required prior to construction of the proposed Project;
- For projects requiring both federal and provincial EAs, state whether a substituted, coordinated, or other type of review process is being undertaken by Canada and BC or being contemplated;
- Identify the agencies, Aboriginal Groups¹, and other parties involved in the development of the AIR and the process for incorporating their comments, including a description of any consultation plans and reporting requirements; and,
- Identify the next steps in the EA process.

¹ Aboriginal Groups includes First Nations with asserted or proven rights or title, Treaty 8 Nations, or any other Nation with a Treaty.

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1 Assessment Methodology

Proponent Guidance – delete for a project AIR: The Environmental Assessment Act requires that an environmental assessment consider the potential significant adverse environmental, economic, social, heritage and health effects of a reviewable project. These five pillars (environment, economy, social, heritage and health) encompass the broad values held by the people and government of BC. The EAO uses a values-based framework to promote a comprehensive, yet focused, understandable and accessible assessment of potential effects, while making the most effective and efficient use of resources. This framework relies on the use of valued components (VCs) as a foundation for the assessment.

The methodology to be applied in the Application must be based on an environmental assessment framework as depicted in



Figure 1 below, and summarised in this section. In general, this framework includes:

- Initial issues scoping;
- Identification and selection of VCs;
- Establishment of boundaries for the assessment of VCs':
- Description of baseline conditions for each VC;
- Determination of the potential effects of the proposed Project on each VC;
- Identification of measures to mitigate potential adverse project effects;
- Determination of whether there are residual project effects (i.e., effects after mitigation), and an evaluation of any residual project effects;
- If there are residual project effects, conducting a cumulative effects assessment.



Figure 1 Environmental Assessment Framework

The methodological approach may be refined from time to time, and the approach taken in the Application must be consistent with EAO's best practices, at the time the Application is submitted. The approach presented in this AIR is representative of EAO's best practices at the time of approving the AIR.

1.1 Issues Scoping and Selection of Valued Components

Proponent Guidance – To be deleted in a Project dAIR: Issues scoping is a process of compiling and analyzing available information to identify environmental, economic, social, heritage, and health issues that may be related to a reviewable project. These project-specific issues are generally indicative of the local and regional values held by the public, Aboriginal groups, and other stakeholders in the area within which the project is proposed. They may also reflect issues of concern to the scientific community or to government. The issues identified through issues scoping are used to inform the selection of VCs for the assessment.

VCs provide the foundation for the assessment, so appropriate VC selection is one of the most important steps in ensuring high-quality environmental assessment. For the purpose of environmental assessment in BC, VCs are components of the natural and human environment that are considered by the proponent, public, Aboriginal groups, scientists and other technical specialists, and government agencies involved in the assessment process to have scientific, ecological, economic, social, cultural, archaeological, historical, or other importance.

VCs vary by project, sector and region to reflect the nature of the potential project effects and the environmental, economic, social, heritage and health context within which the proposed Project is undertaken.

Key indicators are metrics used to measure and report on the condition and trend of a VC and are identified to further focus and facilitate the analysis of interactions between a proposed Project and the selected VCs.

The Application must summarize the process and methodologies used to identify and select the VCs for assessment.

The following are the VCs that have been selected for assessment:

• **Proponent to include in the AIR:** A list of selected VCs.

If the VCs in the Application differ from those specified in this AIR, sufficient rationale for any such changes must be documented and found by EAO to be acceptable prior to submission of the Application.

1.2 Assessment Boundaries

Proponent Guidance – To be deleted in a Project dAIR: Assessment boundaries serve to define the scope or limits of the assessment. They encompass the areas within and times during which the project is expected to interact with the VCs (spatial and temporal boundaries), as well as constraints that may be placed on the assessment of those interactions due to political, social, and economic realities (administrative boundaries) and limitations in predicting or measuring changes (technical boundaries).

The Application must summarize the process and methodologies used to identify and select boundaries for the VCs.

1.2.1 Spatial Boundaries

Proponent Guidance – To be deleted in a Project dAIR: Spatial boundaries are determined by the distribution, movement patterns and potential zones of interaction between a VC and the proposed Project. The spatial boundary may be limited to the proposed Project footprint or extend beyond the physical boundaries of the area of the proposed Project component, since the distribution or movement of a VC can be local, regional, provincial or national in extent.

Proponent to provide in the AIR: A description of the methods or approach used to identify spatial boundaries.

For each VC, the Application must:

- Describe the spatial boundaries for each VC; and
- Summarize the types of spatial boundaries identified and discuss how they were determined.

If the spatial boundaries in the Application for a VC differ from those specified in this AIR, sufficient rationale for any such changes must be documented and found by EAO to be acceptable in the Application.

1.2.2 Temporal Boundaries

Proponent Guidance – To be deleted in a Project dAIR: The time frames used in the assessment of the proposed Project will be presented and discussed. These time frames will typically align with the project phases.

Proponent to provide in the AIR: A description of the methods or approach used to identify temporal boundaries.

For each VC, the Application must:

- Describe the temporal boundaries for each VC; and
- Summarize the types of temporal boundaries identified and discuss how they were determined.
- 1.2.3 Administrative Boundaries

Proponent Guidance – To be deleted in a Project dAIR: Administrative boundaries refer to the constraints imposed by data, political, economic, social, or related administrative boundaries. These may include existing datasets collected on the basis of regional or provincial boundaries that are not the same as the spatial boundaries of the selected VCs, and could affect the assessment VCs.

Administrative boundaries may not apply to every VC. However, where administrative boundaries may affect the identification and/or assessment of potential effects, the nature of the administrative boundaries and their effect on the assessment must be included in the Application.

Proponent to provide in the AIR: A description of the methods or approach used to identify administrative boundaries.

Individually established administrative boundaries for VC, as applicable, are described in the AIR in the sections below.

For each applicable VC, the Application must:

- Describe the administrative boundaries for each VC; and
- Summarize the types of administrative boundaries identified and discuss how they were determined.

If the administrative boundaries in the Application differ from those specified in this AIR, sufficient rationale for any such changes must be documented and found by EAO to be acceptable in the Application.

1.2.4 Technical Boundaries

Proponent Guidance – To be deleted in a Project dAIR: Technical boundaries refer to potential limitations in the Proponent's ability to predict effects of the proposed Project. These may arise due to data sampling, modelling, or related limitations.

Technical boundaries may not apply to every VC. However, where technical boundaries may affect the identification and/or assessment of potential effects, the nature of the technical boundaries and their effect on the assessment must be included in the Application.

Proponent to provide in the AIR: A description of the methods or approach used to identify technical boundaries.

Individually established technical boundaries for VC, as applicable, are described in the AIR in the sections below.

For each applicable VC, the Application must:

- Describe the technical boundaries for each VC; and
- Summarize the types of technical boundaries identified and discuss how they were determined.

If the technical boundaries in the Application differ from those specified in this AIR, sufficient rationale for any such changes must be documented and found by EAO to be acceptable in the Application.

1.3 Existing Conditions

Proponent Guidance – To be deleted in a Project dAIR: For each selected VC, the existing conditions within the study area should be described in sufficient detail to enable potential project-VC interactions to be identified, understood, and assessed. This may include not only a description of the characteristics of the VC itself, but also of other environmental components upon which the integrity of the VC relies.

The Application must summarize the overall process and methodologies used to identify and study the existing (baseline) conditions for VCs.

1.4 Potential Effects

Proponent Guidance – To be deleted in a Project dAIR: To support the identification of potential effects on VCs that may result from the construction, operation, and/or decommissioning of the project, it is useful to begin by identifying the potential

interactions between the various physical works and activities and the selected VCs. This is often achieved using a simple matrix.

Preliminary evaluation of identified project-VC interactions may also reveal key interactions that have greater potential to result in significant adverse residual effects or to be of particular concern to government, Aboriginal groups, or the public. This allows the assessment to be focused on these more important interactions.

For those project-VC interactions carried forward in the assessment, the potential effects, both adverse and beneficial (if any), arising from those interactions should be described in clear language and enough detail to enable a non-technical reviewer to understand the cause, type, and nature of potential effects.

The Application must summarize the overall process and methodologies used to identify and study the potential effects of the proposed Project on the identified VCs.

1.5 Mitigation Measures

Proponent Guidance – To be deleted in a Project dAIR: EAO considers mitigation to be any action taken to avoid, minimize, restore on-site, compensate, or offset the adverse effects of a project or activity.

The assessment must describe the suite of mitigation measures proposed to prevent significant adverse residual effects, including measures to mitigate potential adverse effects of the project on selected VCs. Decisions regarding the need for and scope of mitigation, including compensation and offset, should not pre-suppose the outcome of the assessment.

The Application must summarize the process and methodologies used to identify and select mitigation measures to address potential adverse effects of the proposed Project.

1.6 Characterization of Residual Effects

Proponent Guidance – To be deleted in a Project dAIR: Residual effects are those <u>adverse</u> effects remaining after the implementation of all mitigation measures, and, therefore are the expected consequences of the reviewable project for the selected VCs.

To inform the determination of the significance of a residual (adverse) effect, it is necessary to characterize the residual project effect.

The Application must summarize the process and methodology used to characterize any identified adverse effects of the proposed Project.

Residual effects must be described using standard residual effects criteria: context, magnitude, extent, duration, reversibility, and frequency, as summarized in the following table.

Where feasible, these criteria must be described quantitatively for each VC. When residual effects cannot be characterized quantitatively, they must be characterized qualitatively. Definitions must be provided when qualitative terms are used. For each VC, the characterization criteria must be defined in specific terms in the Application. A brief explanatory discussion must be included for the conclusion reached for each criterion used to characterize a residual effect.

Criterion	Definition	Assessment to be included in the
		Application
Context	Context refers to the current condition of the VC, particularly the current and future sensitivity and resilience of the VC to change caused by the project. Consideration of context draws heavily on the description of existing conditions of the VC, which reflect cumulative effects of other projects and activities that have been carried out, and especially on information about natural and/or human-caused trends in the condition of the VC.	The assessment will indicate the level of sensitivity and/or resilience (using qualitative terms, like 'low', 'medium', or 'high', clearly defined for each VC), and explain the key factors contributing to the ranking of sensitivity and/or resilience. Additional supporting narrative may be required to explain contextual factors that cannot adequately be communicated in a simple ranking.
Magnitude	Magnitude refers to the expected size or severity of the residual effect. When evaluating magnitude of residual effects, consider the proportion of the VC affected within the spatial boundary and the relative effect (e.g., relative to natural annual variation in the magnitude of the VC or other relevant characteristic).	Magnitude will be described quantitatively, where empirical data are available, or qualitatively, using terms such as 'low', 'moderate', and 'high' (clearly defined for each VC).
Extent	Extent refers to the spatial scale over which the residual effect is expected to occur.	Extent will be described using terms such as site-specific, local, sub-regional, regional, or greater in extent. It is important to define terms and the scale used for each VC.
Duration	Duration refers to the length of time the residual effect persists (which may be longer	The length of time (i.e., hours, days, weeks, months, or years) associated

Table 1: Summary of Criteria for Characterizing Residual Effects

	than the duration of the physical work or	with each duration ranking of a
	activity that gave rise to the residual effect).	reversible effect (i.e., short-term,
		medium-term, long-term) will be defined
		for each VC.
Reversibility	Reversibility pertains to whether or not the	A residual effect may be fully reversible,
	residual effect on the VC can be reversed	partially reversible, or irreversible. The
	once the physical work or activity causing	expected time of effect reversal will be
	the disturbance ceases.	estimated.
Frequency	Frequency refers to how often the residual	Frequency will be described, either in
	effect occurs and is usually closely related to	specific terms (e.g., number of
	the frequency of the physical work or activity	occurrences per unit of time) or general
	causing the residual effect.	terms (e.g., once, rare, infrequent,
		occasional, frequent, continuous) (clearly
		defined for each VC). The capacity of
		the VC to fully recover between recurrent
		disturbances, and the implication for
		residual effect significance will be noted.

1.7 Proponent's Determination of Significance

Proponent Guidance – To be deleted in a Project dAIR: The potential for significant residual (adverse) effects is the critical factor in determining whether a proposed project requires an environmental assessment and an Environmental Assessment Certificate in order to proceed.

It is therefore important to ensure the determination of significance is clearly documented and explained in the assessment. In particular, the assessment should clearly define how the term 'significance' has been used in relation to each VC. Clearly articulating the definition of significance for each VC, including any quantitative or qualitative threshold(s) or other factors used, provides a transparent and credible basis for the significance determination, and will support the conclusions of the assessment.

The characteristics of the residual effect should be considered in relation to the evaluation of significance. It is crucial for the assessment to clearly articulate whether or not the residual effect is expected to be significant, and provide the rationale for that determination in sufficient detail.

The Application must summarize the process and methodology used to define and evaluate the significance of residual effects.

1.8 Likelihood

Proponent Guidance – To be deleted in a Project dAIR: Likelihood refers to whether a residual effect is likely to occur. This may be influenced by a variety of factors, such as the likelihood of a causal disturbance occurring or the likelihood of mitigation being successful. Likelihood should be stated for all residual effects, after the significance determination has been made, as likelihood of occurrence is not a determinant of significance.

Likelihood must be stated for all residual effects after the significance determination has been made, and the Application must indicate the likelihood of the predicted residual effect using appropriate quantitative or qualitative terms, with sufficient description to understand how the conclusions were reached. Qualitative terms, such as 'low', 'moderate', or 'high' probability, must be as clearly defined as possible (e.g., X percent chance of occurring, or <X percent probability) to avoid varying interpretations by different readers. The basis for the likelihood determination must be described; where possible, the determination of likelihood should draw on available published data.

The Application must summarize the process and methodology used to evaluate the likelihood of residual effects.

1.9 Confidence and Risk

Proponent Guidance – To be deleted in a Project dAIR: The level of confidence is typically based on expert judgment, and should characterize the level of uncertainty associated with both the significance and likelihood determinations.

It is important to clearly describe the sources and nature of uncertainty associated with any residual effect prediction in the assessment to provide the basis for the stated level of confidence. In particular, the practitioner should articulate how any identified uncertainty may affect either the significance or the likelihood of the predicted residual effect.

In most cases, uncertainty (particularly low to moderate uncertainty) can be adequately addressed through monitoring or other follow-up programs that confirm actual residual effects are as predicted, that mitigation measures are implemented as described in the Application (and are required by conditions of the Environmental Assessment Certificate and/or other authorizations), and that mitigation measures are effective.

In certain situations, it may be appropriate to conduct additional risk analysis to more fully characterize the potential risk associated with uncertain outcomes, particularly if there is a low level of confidence coupled with the possibility of a significant residual adverse effect and follow-up programs are not considered sufficient to manage the potential risk. The focus of any additional risk analysis should be on the source of the uncertainty.

The need for and scope/methods of more detailed risk analysis should be determined in consultation between the proponent and EAO as early as possible. Additional risk analysis may be determined to be appropriate in the context of the environmental assessment, concurrent permitting, or permitting after certification.

If more detailed risk analysis is deemed to be necessary in relation to uncertain and potentially significant residual adverse effect predictions, the assessment should describe the range of likely, plausible, and possible outcomes in terms of potential significance and likelihood. Additional risk analysis may also identify the need for additional mitigation to manage identified risk and uncertainty. The residual effect predictions, including significance and likelihood determinations, and any additional mitigation or follow-up arising from the risk analysis should be documented in the assessment.

To be clear, additional risk analysis is not likely to be required for most residual effect predictions.

The Application must summarize the process and methodology used to evaluate the levels of confidence associated with the significance and likelihood determinations.

The Application must summarize the process and methodology used to determine whether or not additional risk analysis was required.

If additional risk analysis is required the Application must summarize the process and methodology used for the risk analysis.

1.10 Cumulative Effects Assessment

Proponent Guidance – To be deleted in a Project dAIR: If a reviewable project is expected to result in any residual adverse effects on the selected VCs, the need for a cumulative effects assessment must be considered. It is important to note that this consideration must be made for all residual adverse effects, not only those predicted to be significant.

The assessment of cumulative effects should adhere to the <u>Cumulative Effects</u> <u>Assessment Practitioners' Guide (Hegmann et al. 1999)</u>, evolving best practice in cumulative effects assessment, and direction from EAO.

If the proposed Project is expected to result in any residual effects on VCs, the Application must follow the following steps for determining residual project effects and the subsequent cumulative effects assessment:



Figure 2. Steps to Determine Residual Project Effects and Cumulative Effects

1.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities

The Application must describe the methodology for identifying potential interactions between residual project effects and the effects of other projects and activities.

Proponent Guidance – To be deleted in a Project dAIR: Before identifying potential cumulative effects, the following approach will be taken:

- define the spatial boundaries for the cumulative effects assessment for each VCs, including provision of maps;
- define the spatial and temporal boundaries of other developments;
- identify the potential for interaction (spatial and temporal) linkages (overlap) of VCs with other developments.

The following development categories must be considered:

- projects or activities that have already been built or conducted in the vicinity of the proposed Project (i.e., certain); and,
- projects that are either proposed (public disclosure) or have been approved to be built, but is not yet built, in the vicinity of the proposed Project (i.e., reasonably foreseeable).

The Application must include:

- a table of projects and activities, including all past, present and reasonably foreseeable future developments, that will be included in the cumulative effects assessment; and,
- a map of known project locations.

Proponent to provide in the dAIR: a Project Inclusion List that identifies the past, present and reasonably foreseeable future developments that will, at a minimum, be included in the cumulative effects assessment.

Should a new reasonably foreseeable future development be proposed between the time that the AIR is finalized and the submission of the Application, the Proponent must seek direction from the EAO regarding the potential for including that development as soon as practicable.

The Application must provide an assessment of the adequacy of existing data in conducting the cumulative effects assessment.

1.10.2 Determining the Need for a Cumulative Effects Assessment

The Application must summarize the process and methodology used to determine the need for a cumulative effects assessment.

1.10.3 Cumulative Effects Assessment

The Application must summarize the process and methodology used to conduct the cumulative effects assessment, including the identification of potential cumulative effects, identification of additional mitigation measures, and evaluation of any (residual) cumulative effects.

1.11 Follow-up Strategy

The Application must describe the approach to identifying and developing any proposed follow-up strategies.

2 Environmental Effects Assessment

Proponent Guidance – To be deleted in a Project dAIR: VCs can be grouped under sub-heading to as to assist in document organization. Repeat the content of this section for each VC group.

Proponent Guidance – delete in a Project AIR: In relation to species at risk, in the appropriate VC sections of the Application, include of any change that the proposed Project may cause to a listed wildlife species, its critical habitat or the residences of

individuals of that species, as those terms are defined in subsection 2(1) of the federal Species at Risk Act. In the event that species at risk have been described previously in other sections of the report, it is acceptable to simply refer back to the appropriate subsections.

Proponent to include in the AIR:

2.1 <u>Valued Component or Group Valued Component (e.g. Wildlife) – (repeat for</u> <u>VC or VC group)</u>

In the AIR, include the specific VCs and key indicators that will be assessed for the VC group

2.1.1 Context and Boundaries

In the AIR, describe the study area boundaries including spatial, temporal, administrative and technical, as applicable for the VC.

In the AIR, describe the approach to collect baseline information including any planned field programs, desktop studies or modelling and reference any applicable standards or methods.

The Application must:

- Describe the relevant spatial, temporal, administrative and technical boundaries for the VC, as discussed in the AIR;
- Summarize the regulatory or government context for the management of the VC; and,
- Summarize approach to collect baseline information including any planned field programs, desktop studies or modelling and reference any applicable standards or methods.

The Proponent must seek approval from EAO before filing the Application if study area boundaries are changed from what is shown in the AIR.

2.1.2 Existing Conditions

The Application must:

• Describe the existing (or baseline) conditions within the study area must be described in sufficient detail to enable potential project-VC interactions to be identified, understood, and assessed;
- Describe the quality and reliability of the baseline data and their applicability for the purpose used, including any gaps, insufficiencies and uncertainties, particularly for the purpose of monitoring activities;
- Include natural and/or human-caused trends that may alter the environmental, economic, social, heritage and health setting, irrespective of the changes that may occur as a result of the proposed Project or other project and/or activities in the area;
- Explain if and how other past and present projects and activities in the study area have affected or are affecting each VC;
- Document the methods and data sources used to compile information on existing conditions, including any standards or guidelines followed;
- Where additional project and VC-specific field studies are conducted, the scope and methods to be used should follow existing published documents pertaining to data collection and analysis methods, where these are available. Where methods used for the assessment deviate from applicable published guidance, the rationale for the variance must be provided in the Application; and
- Consider the use of Traditional Ecological Knowledge (TEK), including Aboriginal Traditional Knowledge, if available, and document whether and how this information was used.

The Application must contain the technical reports in the Appendices and must summarize key findings contained in these technical reports directly in the Application, in a manner that allows the reader to sufficiently understand the VC's effects assessment. Where information is prepared by qualified professionals, the relevant studies (Technical Reports and Memoranda) must be appended to the Application, and the qualifications of their author(s) must be identified.

Baseline information will be compiled in the following technical reports:

 Proponent to provide in the AIR: List technical reports that will be provided with Application

2.1.3 Potential Effects

In the AIR, state that the Application must:

 Identify and analyse potential adverse effects resulting from the phases of the proposed Project.

In the AIR, describe anticipated VC interactions with project components or activities.

For each VC the Application must:

- Identify, describe and present an analysis of the potential adverse effects resulting from the proposed Project;
- Identify the potential interactions of the proposed Project and the selected VCs;
- Identify potential adverse effects using a combination of existing knowledge of potential effects identified through the literature review, and knowledge of previous projects in a similar geographical and cultural context; and,
- Incorporate feedback from Aboriginal Groups, the public, stakeholders and government agencies, as appropriate.

If a project-VC interaction is omitted from further analysis, the methods, criteria, maps and rationale for this determination must be documented in the Application. The Proponent must seek approval from EAO on removing specific project-VC interactions from the analysis, before filing the Application.

2.1.4 Mitigation Measures

The Application must:

- Describe the approach to identify and analyze mitigation measures, including any management and compensation plans proposed by the Proponent, which will be implemented to address potential effects;
- Describe the mitigation measures incorporated into the project, including site and route selection, project scheduling, project design (e.g., equipment selection, placement, emissions abatement measures), and construction and operation procedures and practices;
- Describe any standard mitigation assumed or proposed to be implemented, including consideration of best management practices (BMPs), environmental management plans, environmental protection plans, contingency plans, emergency response plans, and other general practices;
- Clearly indicate how the mitigation measures will mitigate the potential adverse effects on the VC;
- Provide the rationale for the proposed suite of mitigation, including why further avoidance or reduction measures may not be feasible, and the need for and scope of any proposed compensation or offset;

- Evaluate the anticipated success of each mitigation measure and describe rationale and analysis for these evaluations;
- Include the time required for mitigation to become effective, to enable understanding of the duration of residual effects and the temporal characteristics of reversibility; and
- Summarize the mitigation measures for potential Project effects by project phase and identify any mitigation measures that will be in management or compensation plans.

2.1.5 Residual Effects and their Significance

Consistent with the defined methodological approach, the Application must:

- Clearly identify and define any residual effects;
- Characterize all identified residual effects, including VC-specific qualitative and/or quantitative descriptions of the criteria used;
- Include a table summary of the residual effects characterization, with rankings and brief descriptive text;
- Articulate the definition of significance for each VC, including any quantitative or qualitative threshold(s) or other factors used;
- Determine whether or not the residual effect is expected to be significant, and provide the rationale for that determination in sufficient detail;
- Indicate the likelihood of the predicted residual effect using appropriate quantitative or qualitative terms, with sufficient description to understand how the conclusions were reached.
- Define any qualitative terms used for the assessment of likelihood, such as 'low', 'moderate', or 'high' probability, as clearly defined as possible (e.g., X percent chance of occurring, or <X percent probability);
- Specify the levels of confidence associated with both the significance and likelihood determinations to better evaluate the risk associated with the proposed Project;
- Discuss the levels of confidence associated with the success and implementation of mitigation measures;

- Identify whether or not any additional risk analysis was required to more fully characterize the potential risk associated with uncertain outcomes;
- Any additional risk analysis undertake must be discussed with, and approved by, EAO prior to the submission of the Application [*Proponent Guidance – delete in a Project AIR:* Alternatively, the Proponent may identify any known risk analysis that will be undertaken in the AIR]; and,
- If more detailed risk analysis is deemed to be necessary in relation to uncertain and potentially significant residual effect predictions, the risk analysis must describe the range of likely, plausible, and possible outcomes in terms of potential significance and likelihood.
- 2.1.6 Cumulative Effects and their Significance

If a residual effect is identified, unless otherwise indicated by EAO, the Application must:

- Determine whether any cumulative interactions between residual effects of the proposed Project and the potential residual effects of other projects or activities are likely to occur, which must include whether the residual effect could:
 - o result in a measurable change in a cumulative effect; or,
 - o alter the characteristics of a cumulative effect.
- Articulate any rationale for not conducting a cumulative effects assessment on any identified residual project effects.

The Application's cumulative effects assessment must:

- Be completed based on the proposed Project Inclusion List [Proponent to provide reference to list in AIR];
- Determine the potential cumulative effects;
- Identify any additional mitigation measures; and,
- Evaluate any residual cumulative effects, including the characterization of any residual cumulative effects, the determination of significance, the determination of likelihood, and discussion of confidence and risk.
- 2.1.7 Follow-up Strategy

Where a residual effect and/or cumulative effect has been identified, the Application must include a description of a follow-up strategy that:

- Identifies the measures to evaluate the accuracy of original prediction of effects;
- Identifies the measures to evaluate the effectiveness of proposed mitigation measures;
- Proposes an appropriate strategy to apply in the event that original predictions of effects and mitigation effectiveness are not as expected. This includes references to further mitigation, involvement of key stakeholders, government agencies and any other measures deemed necessary to manage the issue.

From:Danshin, Tamara JTST:EXSent:Wednesday, July 3, 2013 2:54 PMTo:Stadel, Darren JTST:EX; 'Jody'Subject:Update: BC HR Mining Taskforce for July 6 conf call

Good Afternoon

The BC HR Mining Taskforce met on June 19. The subcommittee for the ug report met the day before. The ug report due the end of June has not yet been given to govt. The report is expected next week. Once recd, govt will review and circulate internally before the report becomes public. s13

s13

In addition, speaking with the JTST liaison to the BC HR Mining Taskforce – Northern Lights College in conjunction with the Immigrant Employer Council of BC is working together to recognize foreign credentials for ug mining.

I will be on the conf call tomorrow.

Thanks Tammy

Tamara Danshin

Regional Economic Development Manager - NortheastRegional Economic OperationsEconomic Development DivisionMinistry of Jobs, Tourism and Skills TrainingTamara.Danshin@gov.bc.ca250 787 3351

From:	Stadel, Darren JTST:EX
Sent:	Friday, July 5, 2013 3:15 PM
То:	jody.shimkus; Hewitt, Jeremy JTST:EX; Peterson, Mike EAO:EX; Christie, Karen L EAO:EX
Subject:	RE: Response: Murray River Coal Project - new draft AIR TOC and guidance to
-	proponents - based on draft VC Guideline

Jody

I will defer to my EAO colleagues to address the first three questions below.

In regards to a meeting with Doug Caul, last we spoke you had indicated you were going to wait – please let me know if that has changed, and we will work with EAO to try and arrange a meeting with Doug.

Regards Darren

From: jody.shimkus [mailto:jody.shimkus@hdminingintl.com] Sent: Friday, July 5, 2013 2:01 PM To: Stadel, Darren JTST:EX; Hewitt, Jeremy JTST:EX Subject: RE: Response: Murray River Coal Project - new draft AIR TOC and guidance to proponents - based on draft VC Guideline

Darren I would like a written response to each of my questions below.

Thanks

From: jody.shimkus [mailto:jody.shimkus@hdminingintl.com]
Sent: Thursday, June 27, 2013 4:35 PM
To: Stadel, Darren JTI:EX; Hewitt, Jeremy JTI:EX
Subject: FW: Response: Murray River Coal Project - new draft AIR TOC and guidance to proponents - based on draft VC Guideline

Again why is the DAIR being changed when we have gone out to public comment? How can direction guidance be provided for a draft document? What consultation was done with Industry? Can JTI facilitate a meeting with Doug Caul to discuss.

Jody Shimkus VP Environment & Regulatory Affairs

HD Mining Intl. #2288-1177 West Hastings St. Vancouver, B.C. V6E 2K3 w. 604-689-8669 c. s22 www.HDminingintl.com From: Peterson, Mike EAO:EX [mailto:Mike.Peterson@gov.bc.ca]
Sent: Thursday, June 27, 2013 4:29 PM
To: 'Jason Rempel'
Cc: 'jody.shimkus'; 'Anne.Currie@erm.com'; Gerrard, Anna EAO:EX; Peterson, Mike EAO:EX; 'McLean,Robyn [CEAA]'
Subject: Response: Murray River Coal Project - new draft AIR TOC and guidance to proponents - based on draft VC Guideline

Thank you for the note Jason,

I apologize, I should have been clearer in my email. The direction guidance I have provided for the dAIR is a requirement. Although the guidance is draft, approval in principle has been given. As a result, EAO's Executive Director of Policy and Quality Assurance has approved sharing these sections of the revised AIR template with proponents. The expectation is that this important guidance will be incorporated in AIRs that are under development, and reflected in Applications going forward.

I look forward to the opportunity to review the updated dAIR, which incorporates the guidance provided in addition to any modifications made to address the comments gleaned from discussions held during the public comment periods. EAO will not require an additional public comment period or round of comments from the Working Group with respect to the incorporation of this guidance in the dAIR.

Please contact me at your convenience if you have any further comments or questions.

Kind regards,

Mike

P. Michael Peterson, R.P.Bio., P.Ag. Project Assessment Manager

Environmental Assessment Office

4051-18th Ave, Prince George, BC, V2N 1B3 Phone: (250) 561-5622 Fax: (250) 565-6940 Email: <u>Mike.Peterson@gov.bc.ca</u>



From: Jason Rempel [mailto:Jason.Rempel@erm.com]
Sent: Wednesday, June 26, 2013 12:48 PM
To: Peterson, Mike EAO:EX
Cc: Gerrard, Anna EAO:EX; Jody.shimkus@hdminingintl.com; Anne Currie
Subject: RE: new draft AIR TOC and guidance to proponents - based on draft VC Guideline

Hi Mike,

Thank you for providing the draft guidance document relating to the preparation of the Application Information Requirements (AIR) for EA Applications. We have discussed your request with HD Mining.

Based on this discussion, HD Mining is concerned that they are being asked to revise the draft AIR for the following reasons:

- The draft AIR incorporates two rounds of comments from the Murray River Project EA Working Group. The first draft was provided to the Working Group in October 2012 so the draft AIR have been under development for the past nine months.
- The public comment period on the draft AIR has been held, ending on June 20, 2013.
- The draft guidance documents are still under development and have not yet been formally finalized by the BC EAO.

Based on the reasons above, HD Mining does not support making adjustments to the AIR.

Jason

From: Peterson, Mike EAO:EX [mailto:Mike.Peterson@gov.bc.ca]
Sent: Monday, June 24, 2013 12:09 PM
To: Jason Rempel
Cc: Gerrard, Anna EAO:EX; Peterson, Mike EAO:EX
Subject: new draft AIR TOC and guidance to proponents - based on draft VC Guideline

Jason,

As discussed last week – I have attached the ToC from the draft guidance as well as more specific information on the Assessment Methodology and Environmental Effects Components sections.

I look forward to working with you to keep the MR dAIR aligned with the direction provided above.

I am available to discuss at your convenience.

Kind regards,

Mike

P. Michael Peterson, R.P.Bio., P.Ag.

Project Assessment Manager

Environmental Assessment Office

4051-18th Ave, Prince George, BC, V2N 1B3 Phone: (250) 561-5622 Fax: (250) 565-6940 Email: <u>Mike.Peterson@gov.bc.ca</u>



From:	JMS CONSULTING <jody.shimkus@hdminingintl.com></jody.shimkus@hdminingintl.com>
Sent:	Wednesday, July 17, 2013 7:19 PM
То:	Hewitt, Jeremy JTST:EX
Subject:	FW: Equipment Approval for Murray River Coal Project
Attachments:	Letter to Al Hoffman re equipment_PY_ July 17_2013.pdf; Letter to Al Hoffman_WB_ re
	equipment variance_ July_17_2013.pdf

Jody Shimkus VP Environmental & Regulatory Affairs

HD Mining International #2288-1177 West Hastings Street Vancouver, BC w. 604-689-8669 c. \$22

From: <<u>info@hdminingintl.com</u>> Date: Wednesday, 17 July, 2013 3:32 PM

To: <AL.Hoffman@gov.bc.ca>

Cc: "<u>Victor.Koyanagi@gov.bc.ca</u>" <<u>Victor.Koyanagi@gov.bc.ca</u>>, "Stadel, Darren JTI:EX" <<u>Darren.Stadel@gov.bc.ca</u>>, <<u>Terry.Paterson@gov.bc.ca</u>>, "MacDonald, Garry EMNG:EX" <<u>Garry.MacDonald@gov.bc.ca</u>>, Walter Buckley <<u>walter.buckley@hdminingintl.com</u>>, Michael Xiao <<u>michael.xiao@hdminingintl.com</u>>, "<u>rfkinginc@shaw.ca</u>" <<u>rfkinginc@shaw.ca</u>>, JMS CONSULTING <<u>jody.shimkus@hdminingintl.com</u>>, "<u>greg.mclean@gov.bc.ca</u>" <<u>greg.mclean@gov.bc.ca</u>>, Richard Booth <<u>Richard.Booth@gov.bc.ca</u>>, <<u>emmanuel.padley@gov.bc.ca</u>>, Heather Cullen <<u>Heather.Cullen@gov.bc.ca</u>>, <<u>ed.taje@gov.bc.ca</u>>, <<u>caroline.nakatsuka@gov.bc.ca</u>>, penggui Yan <<u>penggui.yan@hdminingintl.com</u>>

Subject: Equipment Approval for Murray River Coal Project

Dear Mr. Hoffman,

Attached please find two letters from HD Mining International Ltd. regarding:

1. Electrical equipment variance request; and

2. Electrical equipment note on equipment approval in the long run.

The original hard copies will be submitted to you at tomorrow's meeting. Thanks for your attention.



July 17, 2013

Al Hoffman Chief Inspector of Mines Reclamation and Permitting Ministry of Energy and Mines PO Box 9320, Stn Prov Govt Victoria BC V8W 9N3

Re: Electrical Equipment Approval for the Murray River Coal Project

Dear Mr. Hoffman

As you know, HD Mining International Ltd, (HD Mining) is planning to develop the Murray River Project, an underground coal mine in the district of Tumbler Ridge. HD Mining will be using a long wall mining method not currently used in Canada and is therefore needing to source its equipment needs outside of Canada.

The Chief Inspector's Directive dated February 14, 2012 acknowledges that the requirements of the *Health, Safety and Reclamation Code for British Columbia* (Code) (Section 5.2.3) "do not reflect the global advances in underground coal mining electrical requirements and technology".

Since February 2012, HD Mining has been working with the Ministry of Energy Mines (Ministry) to outline the unique requirements of this underground project and to address the limited scope of the current Code for Mines with respect to underground coal mining.

On May 29th, 2013 the Chief Inspector confirmed approval of the underground electrical equipment required for the decline development at the Murray River Operation.

However, as outlined by HD Mining in our July 08th submission, acceptance of the underground electrical equipment does not allow the project to go forward as it does not include the surface supply systems and associated surface equipment required for the underground mine operations.

HD Mining has provided substantial evidence to demonstrate that this equipment is safe and that the integrated electrical distribution and protection systems are essential to the underground operation and cannot be replaced or substituted with equipment made in Canada as the protection systems are not compatible.

Page 1 of 3



Our recent report, submitted July 08th, 2013, by Ron King P. Eng., further demonstrates that the proposed equipment meets and exceeds the Section 7 requirements of CSA Standard M421-11 and confirms the proposed ground fault protection systems meet and exceed these requirements.

It is our understanding that it is the Ministry's preference that HD Mining requests a variance for the the surface supply systems and associated surface equipment. The Mine Manager for the Murray River Project has submitted this request for consideration by the Chief Inspector.

HD Mining remains committed to satisfying all of the requirements of the BC Code and the special requirements for underground coal operations and to operate the Murray River Project safely. To that end, HD Mining would like to work with the Ministry to address the current regulatory challenges posed by the *Code* not reflecting "global advances in underground coal mining electrical requirements and technology".

It is the objective of HD Mining that upon completion of the Environmental Assessment Process and receipt of an EA Certificate for a fully operational mine, that the Provincial Regulatory Framework clearly recognizes the benefits and safety of this technology.

We look forward to working with Ministry in that regard.

Sincerely,

Penggui Yan 42 Chairman

HD Mining International Ltd.

Cc: Penggui Yan, HD Mining

Richard Booth, A/Deputy Chief Inspector

Terry Paterson, Senior Inspector, Electrical

Emmanuel Padley, Senior Inspector, Electrical

Page 2 of 3

he www.HDminingintl.com Mining

Garry MacDonald, Senior Inspector, Mechanical Victor Koyanagi, Senior Inspector, permitting Darren Stadel, Major Investment Office Ron King P. Eng., R. F. King & Assoc. Greg Mclean, Inspector of Mines, Mechanical, Prince George, EMNG Heather Cullen, Regional Director, Prince George, EMNG Ed Taje, Senior Inspector of Mines, Coast and South Coast Area, EMNG Caroline Nakatsuka, Manager of Occupational Health, EMNG Walter Buckley, HD Mining Michael Xiao, HD Mining Jody Shimkus, HD Mining





July 17, 2013

Al Hoffman Chief Inspector of Mines Reclamation and Permitting Ministry of Energy and Mines PO Box 9320, Stn Prov Govt Victoria BC V8W 9N3

Re: Electrical Equipment Approval for the Murray River Coal Project

Dear Mr. Hoffman

As you know, HD Mining International Ltd, (HD Mining) is planning to develop the Murray River Project, an underground coal mine in the district of Tumbler Ridge. HD Mining will be using a long wall mining method not currently used in Canada and is therefore needing to source its equipment needs outside of Canada.

The Chief Inspector's Directive dated February 14, 2012 acknowledges that the requirements of the Code (Section 5.2.3) "do not reflect the global advances in underground coal mining electrical requirements and technology".

Section 5.1.1 of the Health, Safety and Reclamation Code for Mines in British Columbia (Code) states that:

"Unless modified by this code, all electrical equipment shall be installed, maintained and operated in accordance with CSA Standard M421-00. Use of Electricity in Mines, in conjunction with the Canadian Electrical Code, as amended from time to time."

Section 13 of the (Code) provides that:

"On receiving a written application from the manager, the occupational health and safety committee or the local union requesting the suspension or variance of a provision of the regulations or of the code, the chief inspector may suspend or vary the provision if the chief inspector is of the opinion that the provision does not operate in the best interest of, or is not necessary to, health and safety in an individual mine."

Pursuant to Section 13, HD Mining requests the following variances from the requirements of Section 5.1.1.:

Page 1 of 3



- 1. Approval to install, maintain and operate the surface supply system consisting of the three 1000KW generators and the 10.5KV electrical distribution board outlined in our July 08th memorandum and report.
- 2. Approval to install, maintain and operate the ground fault protection systems outlined in our July 08th memorandum and report.

Consistent with the Chief Inspector's Directive, dated February 14, 2012 and the submissions made by HD Mining regarding this matter, we request that the Chief Inspector approve these variance requests.

Your earliest attention to this request is appreciated.

Sincerely,

Buckley

Walter Buckley Mine Manager Murray River Project HD Mining International Ltd.

Cc: Penggui Yan, HD Mining

Richard Booth, A/Deputy Chief Inspector

Terry Paterson, Senior Inspector, Electrical

Emmanuel Padley, Senior Inspector, Electrical

Garry MacDonald, Senior Inspector, Mechanical

Victor Koyanagi, Senior Inspector, permitting

Darren Stadel, Major Investment Office

Ron King P. Eng., R. F. King & Assoc.

Greg Mclean, Inspector of Mines, Mechanical, Prince George, EMNG

Heather Cullen, Regional Director, Prince George, EMNG

Page 2 of 3



Ed Taje, Senior Inspector of Mines, Coast and South Coast Area, EMNG Caroline Nakatsuka, Manager of Occupational Health, EMNG Michael Xiao, HD Mining Jody Shimkus, HD Mining

From:	jody.shimkus@hdminingintl.com
Sent:	Thursday, July 25, 2013 3:58 PM
То:	Hewitt, Jeremy JTST:EX
Subject:	[FWD: July 18th Meeting Summary]
Attachments:	HD MINING MEETING SUMMARY JULY 18.docx

Sorry I forgot you on the distribution list

Jody Shimkus VP Environmental & Regulatory Affairs

HD Mining Intl. Add: #2288-1177 West Hastings St. Vancouver, B.C. V6E 2K3 w. 604-689-8669 c. s22

----- Original Message ------Subject: July 18th Meeting Summary From: "jody.shimkus" < jody.shimkus@hdminingintl.com> Date: Tue, July 23, 2013 9:22 am To: "Hoffman, AI MEM: EX" <AI. Hoffman@gov.bc.ca>, "Booth, Richard MEM: EX" <Richard.Booth@gov.bc.ca>, "Padley, Emmanuel MEM:EX" < Emmanuel.Padley@gov.bc.ca>, "MacDonald, Garry MEM: EX" <Garry.MacDonald@gov.bc.ca>, <walter.buckley@hdminingintl.com>, "Ron King" <rfkinginc@shaw.ca>, "'Michael Xiao'" <Michael.Xiao@hdminingintl.com> Cc: <jody.shimkus@hdminingintl.com>, "penggui Yan" <penggui.yan@hdminingintl.com>, "Janet Yan" <janet.yan@hdminingintl.com> Attached please find a draft meeting summary from our meeting/call last week. Please review and provide me with any required edits. Thank you. Jody Shimkus VP Environment & Regulatory Affairs HD Mining Intl. #2288-1177 West Hastings St. Vancouver, B.C. V6E 2K3 w. 604-689-8669 c. s22 www.HDminingintl.com

MEETING SUMMARY – JULY 18, 2013

RE: EQUIPMENT APPROVAL – HD MINING MURRAY RIVER PROJECT

ATTENDEES:

MINISTRY OF ENERGY & MINES (MEM): AL HOFFMAN RICHARD BOOTH EMMANUEL PADLEY GARY MCDONALD

JOBS, TOURISM & SKILLS TRAINING (JTST): JEREMY HEWITT

HD MINING: WALTER BUCKLEY RON KING MICHAEL XIAO JODY SHIMKUS

DISCUSSION:

A.) Presentation by Ron King

Ron King provided a power point presentation regarding the CSA Standard M421-11 and the requirements with regard to ground fault protection systems in underground coal mines. He also discussed the key differences between MSHA and IEC and the testing and operation of the equipment proposed by HD Mining for the Murray River Project.

The presentation highlighted the key components of the report submitted by HD Mining in their July 08th submission to the Ministry of Energy & Mines.

s21

Questions:

Q: MEM needs something that confirms the surface administrative buildings (mine draw/workshop) will be electrically energized by a CSA compatible generator.

ACTION: HD TO DRAFT LETTER FROM MINE MANAGER

Q: Does HD Mining have drawings showing surface distribution systems? A: YES. These have been provided to MEM, but will be resubmitted by HD Mining.

Q: How will you identify the two different systems on the surface?

A: They will be clearly labeled and kept isolated from each other. Electricians and persons authorized to operate the equipment and switchgear for the underground will undergo a familiarization/training/orientation process to ensure that there is no confusion about the fact that there are two distinct and different electrical systems that are not compatible with each other, and the reasons why this is the case.

B.) Variance Request

MEM confirmed that they had what they needed from HD Mining and would be reviewing the letter and will respond in a timely manner.

NOTE: VARIANCE REQUEST RECEIVED ON JULY 18, 2013.

C.) Bulk Sample

MEM requires drawings showing road header, stage loader, conveyor, and a description of the systems to be used for materials handling, manriding, electrical switchgear arrangement and trailing cable handling. HD to provide MEM with copies of safe work procedures, hazard assessments and codes of practice for the use and operation of the equipment during the decline drivage.

ACTION: HD TO PROVIDE INFORMATION IDENTIFIED ABOVE

D.) Conveyor Testing

HD Mining noted that they were having difficulty getting Carlton University to complete this work. HD noted that this process has taken over 12 months. HD has delivered four batches of samples and spent over \$11,000.

ACTION: GARRY MCDONALD WILL CALL CARLTON UNIVERSITY

E.) Ventilation Fans

MEM inquired as to whether they were Aluminum blades and HD confirmed they were steel.

F.) Updating the BC Health, Safety and Reclamation Code for Mines in British Columbia (*Code*)

HD noted that as outlined in its July 18th letter to MEM, it would like to work with the Ministry to address the current Regulatory challenges posed by the *Code* not reflecting *"global advances in underground coal mining electrical requirements and technology"*.

MEM noted that a recent initiative has started within the Ministry to review the *Code* and that MEM would invite HD Mining to sit on the Steering Committee working on this initative.

G.) Discussions with Hydro

MEM inquired as to whether HD Mining was in discussions with Hydro and HD Mining advised that yes, those discussions were underway.

ACTION: MEM to contact HD Mining re: process for *Code* review.

F.) Equipment Assembly

MEM would like a planned schedule for equipment assembly.

ACTION: HD MINING TO PROVIDE TIMELINE FOR EQUIPMENT ASSEMBLY AND PROPOSED INSPECTION TIMELINES.

From: Sent: To: Subject: Stadel, Darren JTST:EX Wednesday, August 14, 2013 1:24 PM 'jody.shimkus' EAO update

Hi Jody - talked to Mike and you will be receiving an update shortly on the status of the AIR

Regards Darren

From:	Stadel, Darren JTST:EX
Sent:	Friday, September 27, 2013 1:22 PM
То:	'jody.shimkus'
Cc:	Stuart, Dillon T FLNR:EX; Hewitt, Jeremy JTST:EX
Subject:	Discharge pemit

Was informed today that EP should be in a position to make a decision late next week.

Rgds Darren

From:	jody.shimkus <jody.shimkus@hdminingintl.com></jody.shimkus@hdminingintl.com>
Sent:	Thursday, May 8, 2014 1:11 PM
То:	Stadel, Darren JTST:EX; McEwan, Tim JTST:EX
Subject:	background
Attachments:	Extension.docx
Follow Up Flag:	Follow up
Flag Status:	Completed

As per our discussion

Jody Shimkus VP Environment & Regulatory Affairs

HD Mining Intl. #2288-1177 West Hastings St. Vancouver, B.C. V6E 2K3 w. 604-689-8669 c. s22 www.HDminingintl.com s13, s17

Rationale

HD Mining is currently operating in China with some of the most advanced technology in the world with workers skilled in underground long-wall mining.

HD Mining will be utilizing a mechanized long-wall mining construction method that is not currently used in Canada. There is only one other underground coal mine in B.C., and it utilizes a room-and-pillar method. The HD Mining underground team currently working on the bulk sample project is an integrated team, familiar with the equipment and deep underground gassy coal mines. The nature of the development of a new underground coal mining requires its workers to have the necessary experience to operate safely and efficiently.

HD Mining demonstrated through the LMO process that there were no qualified Canadians to do this specialized underground coal mine work. HD Mining received a positive LMO in April 2012. On May 21st, 2013 the Federal Court of Canada rejected an attempt by two labour unions to overturn federal decisions that authorized temporary use of 201 foreign workers at HD Mining's Murray River Project.

s13, s17

From: Sent: To: Cc: Subject: Godin, Keith JTST:EX Tuesday, May 27, 2014 8:35 AM 'jody.shimkus@hdminingintl.com' MacDonald, Scott D JTST:EX; McEwan, Tim JTST:EX; Stadel, Darren JTST:EX Follow-up re TFW

Jody,

Following up on our call the other week, you indicated that HD Mining had some concern and questions related to the immigration process under the stream HD Mining has chosen for trainers and professionals needed for installation of specialized equipment. While the BC Ministry of Jobs, Tourism and Skills Training is not an authorized representative able to provide immigration advice, we thought it would be helpful to have a direct contact in Ottawa to whom you can address your questions. Please see below contact information for Martin Mundel, Director of Temporary Resident Program Delivery Division.

Further, your team may wish to review the Temporary Foreign Worker Guidelines which are used to guide decisions related to TFW applications. You may find this useful as it applies to the specific situation with your employees in need of work visas and entry. It is available here: <u>http://www.cic.gc.ca/english/resources/manuals/fw/fw01-eng.pdf</u>

Martin Mündel

A/Director, Temporary Resident Program Delivery Division NHQ - Operational Management and Coordination Citizenship and Immigration Canada 365 Laurier Avenue West Ottawa ON K1A 1L1 Office | Bureau JETS D1482 <u>Martin.Mundel@cic.gc.ca<mailto:Martin.Mundel@cic.gc.ca</u>> Telephone 613-957-5890 Facsimile 613-952-5382 Government of Canada

Best Regards, Keith

From: Sent: To: Subject: Attachments: jody.shimkus <jody.shimkus@hdminingintl.com> Friday, May 30, 2014 9:52 AM Stadel, Darren JTST:EX FW: 20140530 s13, s17 20140530 s13, s17 Page 135 redacted for the following reason: s22

From:jody.shimkus <jody.shimkus@hdminingintl.com>Sent:Thursday, June 12, 2014 2:28 PMTo:Stadel, Darren JTST:EXSubject:Updated informationAttachments:20140612 Updatess13, s17

Update

Page 137 redacted for the following reason: s22

From: Sent: To: Cc: Subject: Penggui Yan <penggui.yan@hdminingintl.com> Friday, June 27, 2014 4:22 PM McEwan, Tim JTST:EX Yan Janet Your Phone Call: Project Update

Dear Tim,

Following up on our discussion, HD Mining is re-contextualizing the project schedule and its labour planning, once done, it will be submitted to your attention.

s13, s17

s13, s17

Best regards

Penggui Yan

From:	Stadel, Darren JTST:EX
Sent:	Wednesday, July 9, 2014 8:30 AM
То:	'jody.shimkus'
Cc:	Hewitt, Jeremy JTST:EX; Danshin, Tamara JTST:EX; Stuart, Dillon T FLNR:EX; Cullen, Heather J MEM:EX
Subject:	TFW information
Attachments:	s13

Jody

s13

Can discuss on our call today, and address your specific questions you had last week.

Cheers Darren Pages 141 through 142 redacted for the following reasons: s13, s17

From:	Jang, Monica JTST:EX on behalf of McEwan, Tim JTST:EX
Sent:	Wednesday, July 30, 2014 10:21 AM
То:	'Penggui.Yan@hdminingintl.com'
Cc:	'jody.shimkus@hdminingintl.com'; Stadel, Darren JTST:EX
Subject:	Letter from Associate Deputy Minister
Attachments:	105432 AssocDM to Yan HD Mining FINAL.pdf

Please find attached copy of letter from Associate Deputy Minister, Tim McEwan. Hard copy letter to follow.

Thank you,

Office of the Associate Deputy Minister Ministry of Jobs, Tourism and Skills Training and Minister Responsible for Labour



July 29, 2014

Ref: 105432

Mr. Penggui Yan HD Mining International Ltd. 2288 – 1177 West Hastings Street Vancouver, B.C. V6E 2K3

Dear Mr. Yan:

Thank you for your inquiry regarding the labour needs for the HD Mining Project in British Columbia. I understand your concerns about the uncertainty that the recent federal government changes to the Temporary Foreign Worker (TFW) Program announced on June 20, 2014 have brought to the investment environment.

I am aware that uncertainty related to labour supply is a pivotal consideration in major investment decisions. I wish to assure you that B.C. is analyzing the announced changes to determine the direct impacts and any unintended consequences that could hinder economic development in the Province. Any concerns will be communicated directly to the federal government.

At the same time, I encourage you to express your concerns and specific requests for changes directly to the Ministers of Employment and Social Development Canada and Citizenship and Immigration Canada.

As part of the June 20th announcement, the Federal government also issued a notice of termination of British Columbia's TFW Annex but in subsequent communication, committed to developing an alternative mechanism – a way to expedite TFWs into the province for large scale investments. s13, s16, s17

Further, B.C. has recently received assurances from the Federal government that temporary workers will be an available source of labour should Canadians not be available. This was established in March of this year through the signing of the *Intergovernmental Memorandum of Understanding between the Government of Canada and the Government of British Columbia on a Strong Resource Economy* (http://www.esdc.gc.ca/eng/news/memo.shtml).

..../2

Ministry of Jobs, Tourism and Skills Training and Minister Responsible for Labour Associate Deputy Minister Major Investments Office Location: 301-865 Hornby Street Vancouver, BC V6Z 2G3

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Page 2

With respect to your specific question about the Province's support for the HD Mining project, I again assure you that the initial and potential future investment in British Columbia is very important. As your longer-term labour market planning needs become clear, we remain open to discussing the detailed needs of the project and how the province can assist in helping your company fill these needs. Please feel free to contact Mr. Keith Godin, Acting Executive Director, Labour Market & Immigration Division. Ministry of Jobs. Tourism and Skills Training at 250 952-6567 or Keith.Godin@gov.bc.ca.

Thank you for taking time to write. Please don't hesitate to contact me if you have any further questions or concerns. Once you have had the opportunity to review this letter, I would also be pleased to arrange for a meeting or telephone call with Mr. Scott MacDonald, Assistant Deputy Minister, Labour Market and Immigration Division, Ministry of Jobs, Tourism and Skills Training and his program staff.

Sincerely,

Tim¹McEwan Associate Deputy Minister Major Investments Office

Pc: Scott MacDonald Assistant Deputy Minister, Labour Market & Immigration Division, JTST Keith Godin, Acting Executive Director, Labour Market & Immigration Division, JTST

1
Jang, Monica JTST:EX

Jody Shimkus <jody.shimkus@hdminingintl.com></jody.shimkus@hdminingintl.com>
Thursday, September 11, 2014 4:31 PM
Minister, JTST JTST:EX
McEwan, Tim JTST:EX
Meeting with Minister Bond

Following up on recent discussions with Associate Deputy Minister, Tim McEwan, HD Mining International is requesting a meeting with Minister Shirley Bond to discuss the Murray River Project, a proposed 6 million tonne per year underground metallurgical coal mine. The Project is located 12.5 km southwest of the town of Tumbler Ridge, British Columbia. The Murray River project is also a designated project in the Provincial Major Investment Office.

s13

Thank you for consideration of our request.

Jody Shimkus VP Environment & Regulatory Affairs

HD Mining Intl. #2288-1177 West Hastings St. Vancouver, B.C. V6E 2K3 w. 604-689-8669 c. s22 www.HDminingintl.com

Jang, Monica JTST:EX

From:JMS CONSULTING <jody.shimkus@hdminingintl.com>Sent:Monday, November 3, 2014 8:29 AMTo:Stadel, Darren JTST:EXSubject:FW: Variance 5.2.3Attachments:October 31 2014 Murray River.pdf

Darren I would like to discuss this on Wednesday's call.

Jody Shimkus VP Environment & Regulatory Affairs

HD Mining International #2288-1177 West Hastings Street Vancouver, BC w. 604-689-8669 c. s22



October 31, 2014

Mr. Norm Johnson Mine Manager Murray River HD Mining International, LTD 218, 235 Front Street Box 1150, Tumbler Ridge, BC Mine: 1640549 Ores: 14590-30

By email and post: norman.johnson@hdminingintl.com

Dear Mr. Johnson:

Re: Equipment Variance Part 5.2.3 of the Health, Safety and Reclamation Code for Mines in British Columbia – Murray River Project

I have reviewed your request of September 15, 2014 regarding Equipment Variance-Murray River Project.

The Ministry of Energy and Mines, (MEM) recognizes that all the electrical equipment to date has been approved by accredited Chinese approval bodies in accordance with the requirements of the China national versions of adopted IEC standards (GB-series of standards). MEM accepts the equipment is constructed to the requirements of universally-recognized IEC standards which represent best practices, but in our opinion due diligence dictates that verification through inspection must continue to take place.

The inspections carried out from time to time by MEM will follow a process similar to the process used by NRCan (CANMET) to assess equipment. Such inspections form part of the equipment approval process used by NRCan, regardless of the standards that originally were used to approve the equipment at the point of origin.

Going forward, MEM inspectors (and when required, consultants), will continue to inspect equipment prior to operation at the Murray River Mine. These inspections provide MEM Inspectors with conformation that the equipment and supplied documentation provide the necessary approvals.

Your request for a variance is approved subject to the following conditions:

.../2

Prior to the installation and operation of any new electrical equipment (model types that have not been reviewed previously), a declaration from a professional electrical engineer, a member in good standing of APEGBC, as to IEC Standards and an inventory of the equipment to be reviewed shall be provided to the Senior Electrical and Mechanical Inspectors. The inventory will include the information as shown in Appendix A in tabular form.

MEM must be notified no later than 30 days before the equipment is installed to provide MEM staff time to complete a site inspection at the Murray River site and review the inventory.

Sincerely,

Al Hoffman, P. Eng. Chief Inspector of Mines

- Ec: Mr. Richard Booth, A/Deputy Chief Inspector of Mines Health and Safety, MEM Mr. Rolly Thorpe, Deputy Chief Inspector of Mines, Health and Safety, MEM Mr. Emmanuel Padley, Inspector of Mines, Electrical, Kamloops, MEM Mr. Sandy Gillies, Inspector of Mines Mechanical, Kamloops, MEM Mr. Rory Cumming, Inspector on Mines, Electrical, Kamloops, MEM Mr. Laurie Meade, Inspector of Mines, Health and Safety, Prince George, MEM Mr. Al Day, Senior Inspector of Mines Health and Safety, Prince George, MEM Mr. Greg McLean, Inspector of Mines, Mechanical, Prince George, MEM Ms. Jody Shimkus, VP Environmental & Regulatory Affairs, HD Mining Mr. Darren Stadel, Executive Project Director, BC Government
 - Appendix A: Table appears on page three and four

Appendix A

Product name	
Model number	
Copy of product certification document issued by approval agency, listing the following information.	
Provide copy of original Chinese certification document as well as copy of English translation including:	
 Method(s) of explosion protection used. If intrinsically safe, the degree of protection, i.e. Ex(ia), 	
Ex(ib) or Ex(ic);	
 Name of approval agency; 	
 Approval number assigned by the approval agency to the certified product; 	
 List of Standard(s) used to assess the product (e.g. GB3836.1, GB 3836.2, etc.); 	
 Accreditation number (in China, the number assigned by CNAS to accredit the certification body that 	
issued the product approval or the accreditation number of the test lab that issued the test report);	
Drawings	
joints and cable entries;	
For Ex(ia), (ib) or (ic) a control drawing;	
Photos of the equipment;	
Instruction and operation manuals;	
Equipment safety inspection and test procedure checklist	

for in-service inspection to ensure continuing	
safe operation of the equipment;	
For a complete machine assembly such as a road header, roof drill, etc., a master list of Ex-protected	
components providing all of the above information for each component as well as an overall electrical	
one-line drawing.	