APPENDIX D

AGENCY CERTIFICATE ISSUES TRACKING SUMMARY – REVIEW OF THE ADDITIONAL INFORMATION REPORT AND ADDENDUM REPORT

Appendix D - Agency Certificate Issues Tracking Summary - Review of the Additional Information Report and Addendum Report					
Issues Tracking Document - Compiled Agency Comments & Proponent Response					
# ID	**Issues Raised**	**Submitted by**	**Proponent Response**	**Review Status**	**Responsible Agency**
EPD Environmental Quality Section Comments on the Information Requirements for permitting the Wolverine Mir					
1	3.4-12: The use of non-phosphorus cleaning products in the truck wash is requested. The Wolverine River is, and Perry Creek will eventually become, phosphorus limited. Control of phosphorus at all mine site operations (truck washing, sewage treatment, reclamation fertilizing) and restricting its discharge to receiving streams has the potential to minimise visual and aquatic life impacts. Commitment item.	B. Carmichael	LORAX: PAG/PML materials are considered to be all rock sources which are either moved (waste rock) or exposes (pit), as well as process plant products (tailings, CCR and coal stockpiles). The only wastes not included within the PAG/PML category are excavated or exposed overburden and soils (diversion ditches, soil stockpiles, roads). Within the context of impacts associated with releases of nitrogen compounds, sulphate, selenium and metals, the use of PAG/PML contact waters is appropriate. From a TSS perspective, predictions of TSS are based on site-flows, and not on "contact" flows. Within this framework, it is assumed that the sedimentation ponds and erosion control measures will result in discharges which meet TSS and turbidity objectives.	Response Satisfactory. Issue addressed.	MWLAP
2	3.5-18: Spills inside the plant - Will the emergency pond be discharged to the tailings pond? Clarification item.	B. Carmichael	COCHRANE - Spills within the plant are all contained within sloped concrete sumps in the plant. Any spills or operational upsets that fill the plant sumps overflow into the emergency dump pond. All spills going to the emergency dump pond are reclaimed and pumped back into the coal process. Any coal solids remaining in the pond are removed by backhoe, recycled back into the plant or discarded in the tailings pond.	Response Satisfactory. Issue addressed.	MWLAP

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3	3.8-4, Table 3.8-2: Is it assumed that sedimen pond discharge volumes are to be estimated as the difference between mean annual inflow and estimated exfiltration rate? Discharge estimates are necessary as, for example, SP14 will discharge for half the year. What are its estimated mean and maximum discharge volumes? Clarification item.	B. Carmichael	PITEAU attn:: The estimated mean annual discharge is the difference between the mean annual inflow and the estimated exfiltration rate. This will be reported as a mean annual discharge in the Water Licence Application report. The maximum discharge volumes are the 1:200 year and 1:10 year flow scenarios. We have reported the peak storm flow inflow rates and the 1:10 year storm volume on Table 3.8-2 in the Additional Information Report, but have not looked at other accumulation intervals or storm events.	Response Satisfactory. Issue addressed.	MWLAP
4	3.8-10/13: SP6 and SP4 a & b ponds will discharge during wet periods. Make use of swales (or perhaps oxbows) if WQO on Wolverine are exceeded and if selenium in not an issue (in the case of directing flows to oxbows). Commitment item.	B. Carmichael	PITEAU/ALAN attn:: Discharge from these two structures will also route through a temporally wet oxbow area located immediately east of the CN Rail embankment.	Response Satisfactory. Issue addressed.	MWLAP
5	3.8-17: The sediment management plans for mine site diversions appear adequate. EPD will want to request a general commitment tha diversion channel points of discharge will meet sediment pond discharge criteria for turbidity and TSS. Commitment item.	B. Carmichael	PITEAU The intent of the design will be to meet the receding water quality criteria. It is expected that some leeway would be granted during the initial commissioning period, and that any discharge criteria that are applied would reflect background quality, not effluent quality from treatment systems.	Response Satisfactory. Issue addressed.	MWLAP
6	3-10: When will the Construction Environmental Management Plan be available for review? Clarification item.	B. Carmichael	WCC - The draft Construction Environmental Management Plan will be available for review in conjunction with the Construction Phase Effluent Permit Application - Technical Assessment Report. The plan will be revised as permits are granted and further conditions specified.	Response Satisfactory. Issue addressed.	MWLAP

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7	3.14-7: WCC is applying an assumption to most (or all) discharge quality modelling that "contaminant source waters" are only waters that come into contact with PAG and/or PML materials. What percent of total waste water does this fraction comprise? Is this an appropriate modelling approach (question to Kim B) for all parameters? It may be suitable for metals, but does not appear reasonable for sediment loading, which may be sourced from any disturbed soils.	B. Carmichael	LORAX: PAG/PML materials are considered to be all rock sources which are either moved (waste rock) or exposes (pit), as well as process plant products (tailings, CCR and coal stockpiles). The only wastes not included within the PAG/PML category are excavated or exposed overburden and soils (diversion ditches, soil stockpiles, roads). Within the context of impacts associated with releases of nitrogen compounds, sulphate, selenium and metals, the use of PAG/PML contact waters is appropriate. From a TSS perspective, predictions of TSS are based on site-flows, and not on "contact" flows. Within this framework, it is assumed that the sedimentation ponds and erosion control measures will result in discharges which meet TSS and turbidity objectives.	Response Satisfactory. Issue addressed.	MWLAP
8	3.14-7 "All materials are considered to have equal PAG and PML characteristics". In what way are they considered to be and to what percent of total waste is this assumption to apply? Clarification item.	B. Carmichael	LORAX: This point applies to contaminants associated with the leaching of rock components (selenium, sulphate, metals) and does not apply to TSS or nitrogen. Given the uncertainty associated with the relative contaminant release rates of the various waste units, it was conservatively assumed that all units would exhibit the same level of chemical instability. A wide range in contact-water values was used to cover the range in leaching potential for the waste units.	Response Satisfactory. Issue addressed.	MWLAP
9	3.14-8: Can WCC confirm the ANFO to ANFO as N calculation , specifically for 24,000 kg versus 7,920 kg? Is the NH3 to NO3 ratio 1:1. I suspect it is not. What is the ratio of ammonium to nitrate in ANFO and how does this affect the loading estimates? Clarification item.	B. Carmichael	LORAX: ANFO is 94% ammonium nitrate (NH_4NO_3), with remaining 6% as fuel oil. Ammonium and nitrate are present in ANFO in a 1:1 molar ratio. A total ANFO use of 24,000 kg translates to 22,560 Kg of ammonium nitrate (94% of ANFO). The formula weight of ammonium nitrate is 79 g/mol, with nitrogen comprising 35.1%. This translates to ~7,920 kg N. Although the ratio of NH4 to NO3 is 1:1, the N-loadings to the environment (based on the Ferguson and Leask model) are heavily biased towards the nitrate end, given the instability of ammonia in oxygenated environments (e.g., waste dumps).	Response Satisfactory. Issue addressed.	MWLAP

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10	3.14-8: Section 3.14.4.2 needs to be explained, with examples of the calculations. I can see the mean annual N load, but how were other flow periods calculated? Clarification item.	B. Carmichael	LORAX: A spreadsheet was forwarded to Bruce Carmichael on August 4th to explain the nitrogen loading estimates. Requires follow-up one-on-one discussion.	Requires follow-up one-on-one discussion.	MWLAP
11	3.14-9: Does using the monthly proportional Wolverine River flow reflect the types of monthly on-site surface and groundwater flows that will actually be washing nitrate off the mine site? (i.e. is the use of river flow acceptable)? Clarification item.	B. Carmichael	LORAX: This is a valid point, as subsurface flow through a waste dump may not mirror the seasonal flow in the receiving environment. However, it should be noted that the Ferguson and Leask equations were based on the Kootney Coal field. In these equations, they only go as far to recommend that the annual load be divided into 4 quarters (Jan-Mar: 12.5%, Apr-Jun 45%, July-Sept 25% and Oct-Dec 17.5%), and that at a first approximation, this quarterly loading can be allocated according to flow in the receiver. This highlights the limitations of the model. The model also recommends that for areas not within the Kootney Coal fields, flow in the receiver be used to quantify the seasonal loading distribution. In summary, there are obvious limitations of the model, including the fact that the model assumes that all nitrogen released from explosives in a given year leaches from the waste rock spoil during that year.	Response Satisfactory. Issue addressed.	MWLAP
12	3.14-12: Figure 12.8.2-2 suggests that if Se follows nitrate, we could expect much higher Mesa Creek concentrations in March than the fall concentration of 20 ug/L. Although the use of modelling extremes 40 and 80 ug/L should cover this possibility, does WCC have an estimate of the March Se concentration in Mesa Creek?	B. Carmichael	LORAX: There are no data for Mesa Creek in March. Such sampling could be done by the Quintette Operating Corporating or MWLAP to assess the possible maximum of selenium concentrations in this drainage. It is agreed that modelling maxima of 80 ppb would almost certainly cover the possible range in Mesa Creek.	Response Satisfactory. Issue addressed.	MWLAP
13	3.14-17-22: Is WCC actually using these predicted concentrations in decant from sediment ponds? In the case of SP6/SP4 the maximum may be 145 mg/L, not the 125 used. Clarification item.	B. Carmichael	LORAX: The maximum value of 125 mg/L is based on mean annual dilution of 1.2. I am not clear how you derive the 145 mg/L. Follow up item for discussion, if needed, at Certificate level.		MWLAP

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14	4.7-20: Provide written clarification on the location of WR2 relative to the W 11 Creek inflow from QOC. Figure 4.7.2-1 is not clear. How many metres separate the two? Is WCC confident that WR2 will capture the diluted effects of W11? This has implications with regard to the modelling of Chapter 12. Clarification item.	B. Carmichael	KEN LATREILLE: W9 is approximately 2.3 km upstream of WR2. W11 inflow is approximately 250 m upstream of the WR2 station. The water on the Wolverine flows moderately fast for the first 100 m then decelerates through to the bridge crossing and sampling point. I would suspect that there is good mixing from the inflow to the sample location. Recent sampling has been on the Left bank looking downstream as the Bridge has been removed.	Response Satisfactory. Issue addressed.	MWLAP
15	4.7-20: Note that WR-3 is upstream of Mast Creek. This has implications on modelling in Chapter 12, as the cumulative impacts of Mast Creek on the Wolverine River have not been predicted. Clarification item.	B. Carmichael	LORAX: This is true, the modelling in Chapter 12 does not included the Mast Creek input to the Wolverine River. This was solely due to the lack of data downstream of the Mast Creek input (data for WR-5 between Mast Creek and Bullmoose Creek were available for only three days). However, the limitations of this are minor. Specifically, the comparisons in Chapter 12 (Figure 12.8.3-7 for example) were conducted to illustrate the probable maximum increases in selenium, sulphate and nitrate we can expect from the Wolverine Project. Given that concentrations of selenium, sulphate and nitrate at WR-2 (upstream of Mast) are typically as high or higher than concentrations at WR-5 (downstream of Mast), does not change the conclusion that loading from the Wolverine Project will likely have a lesser effect on water quality in the Wolverine River .	Response Satisfactory. Issue addressed.	MWLAP

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16	4.7-30: The aquatic life guidelines for TSS and turbidity, used by WCC to identify a possible high flow exceedence in the Wolverine R and Perry Ck do not apply during freshet because the background levels are likely to be above the guideline background. So, it's not that these guidelines are exceeded What we would expect is listed in : http://MWLAPwww.gov.bc.ca/wat/wq/BCguidelines/approved.html#2, or a 25 mg/L increase if background is 25 to 250 , or 10 % if above 250 mg/L. Clarification item.	B. Carmichael	LORAX ath / Piteau: Freshet monitoring data to date are intended to document typical background concentrations, and are accepted as such. The intent of the statement was just to note that background TSS and turbidity concentrations are elevated during the freshet.	Response Satisfactory. Issue addressed.	MWLAP
17	4.7-32 Phosphorus guidelines in streams are based on a mass of chlorophyll per area. These will be applied to Wolverine and Perry Creeks as a means of determining nutrient (phosphorus and nitrate) impact. Clarification item.	B. Carmichael	LORAX: Periphyton monitoring scheduled for September 2004 will be used to establish baseline pe area chlorophyll conditions	Response Satisfactory. Issue addressed.	MWLAP
18	4.7-37: Table 4.7.2-6 presents metal exceedences in the Wolverine. Some conditions are not as negative as Table 4.7.2-6 reports. Table identifies exceedences of the 30-day mean that do not appear to actually exist. Clarification item.	B. Carmichael	LORAX: Yes, the range for dissolved aluminum does not exceed the 30-day or maximum BC Provincial guidelines.	Response Satisfactory. Issue addressed.	MWLAP
19	4.8-10 Can WCC comment on the 5 ug/L Se concentration in ground water well MW-4A. This is significantly higher than levels at other well sites. Are updates available and do they show any consistency? What is the mine plan for this area located between south dump and SP12? Clarification item.	B. Carmichael	PITEAU/LORAX attn: Bruce Mattson - The first sample suite indicated elevated Se concentrations. April and May samples showed progressively lower values for both dissolved and total concentrations, an the May concentrations were below 1 ppb (total and dissolved). The early concentrations were related to poor development in this very slow responding piezometer. The data have been summarized in a groundwater quality update memorandum prepared by Piteau and dated July 6, 2004. The Haulroad passes through this area and a soil dump will be located in the general vicinity of this monitoring well.	Response Satisfactory. Issue addressed.	MWLAP

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20	4.9-1 While development of the water quality baseline is progressing well at the Wolverine Mine proposal, the aquatic resources baseline is very limited for the majority of biological components. Successful discussions have been held recently between WCC and EPD in order to develop a reliable baseline program that will remedy this situation. I am concerned however, that the requested Wolverine Mine certification and construction targets may leave this project with a limited biological baseline. EPD will request certification level commitments: 1) that WCC make every effort to acquire a suitable baseline prior to construction and 2) that WCC repeat this monitoring during 2005. It is hoped that construction impacts will be minimal and that the 2005 data base can, in effect, be considered as a second year of baseline. Acquiring a dependable baseline is in the proponent's interest. Commitment issue.	B. Carmichael	WCC: WCC has committed to acquire a suitable baseline data set prior to construction. A comprehensive sediment survey was completed in August 2004, and periphyton/benthos programs are being conducted in September 2004. These programs have been designed with input from EPD. WCC will review results of these programs with EPD after certification, at which time decisions will be made on what, if any, additional aquatic baseline work is warranted. If needed, further work can be conducted in September 2005.	Response Satisfactory. Issue addressed.	MWLAP
21	**Flow and Mass balance calculations** Clarification is sought on how some components of the mass balancing were calculated. Lorax's Alan Martin has made himself available to address these issues. Refer to 10.4-15 to 10.4.35, below.	B. Carmichael	LORAX: An email was sent from Alan Martin to Bruce Carmichael on August 4th which explains the mass balance calculations.	Requires follow up discussion	MWLAP
22	**Mine site dilution in Perry Creek** I am concerned with the limited dilution provided to EB waste water by Perry Creek. Refer to 10.5-4 below.	B. Carmichael	LORAX: Yes, the low Perry Creek dilutions include groundwater flow. The potentially small mine-derived loading to Perry Creek from the East Dump was not included in the impact assessment. Given the low flow (0.5 L/s) and point of entry in Perry Creek (very near PC-3 where significant dilution can be expected) the impact to Perry Creek will likely be negligible. Operational groundwater monitoring downstream of the East Dump will provide more definitive data for assessing these potential impacts, during permitting o the EB Pit area.		MWLAP

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			WCC: Permitting for EB will not be required for at least 8 years, at which time the data related to prediction of expected discharges will be significantly enhanced by operational monitoring as well as field and lab testing. Based on available information to date, WCC prefers the proposed effluent disposal option for EB of piping to the Wolverine River. If, at the time of permitting, the predicted maximum selenium concentrations in Perry Creek exceed acceptable limits, WCC commits to do one or both of the following, as appropriate and as agreed with EPD either assess the biological impacts of tissue Se levels; and/or implement selenium treatment options. WCC recognizes the requirement for a mutually acceptable effluent management option.		
23	**Selenium mitigation at the source** Little attention appears to have been given to mitigation options at the mine site (selective mining, segregation, capping). Refer to 10.5-2 below.	B. Carmichael	WCC: The Selenium Management Plan as presented in the referenced sections summarizes the incremental management measures to be carried out in addition to on-site waste management. Minimizing surface flows in contact with waste rock, and selective handling of PAG and high selenium waste rock are important cornerstones of the waste management plan. The placement of CCR into the CCR Dump and tailings pond takes into account potential for ARD and selenium leaching. LORAX: Details of the Selenium Management Plan as it relates to waste management were presented in Section 3.7 of the Additional Information Report. An Addendum Report, submitted in July 2004 used more recent kinetic and static test data to make further recommendations with respect to the management of waste materials. These two sections of the Additional Information Report provide specific management strategies with respect to wasterock, tailings and CCR segregation.	Response Satisfactory. Issue addressed.	MWLAP

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			Section 10.5-2 provides contingencies for Se management downstream of the sedimentation ponds, with respect to detection of impact (i.e., monitoring) and contingency measures to enhance controls of surface discharges, or groundwater seepage if needed. WCC: Section 10.5.2 also provides a commitment to establish an artificial cover on all or part of the tailings dam as a contingency measure. Follow-up item for discussion with Bruce Carmichael to clarify details of operational segregation plans and contingency commitments.		
24	**Fall construction start** As per page 10.5-16, the expectation of "a high risk of runoff erosion in the spring" is telling. The impact of a fall versus spring construction window should be considered.	B. Carmichael	WCC: The exact timing of various construction activities will be dependent on the timing of approvals of the EA Certificate and various permits and approvals required prior to construction. Delays from the proposed October/November construction start will result in shifts in the overall schedule due to constraints, including weather. WCC will be targeting site development as soon as practical, and some activities will be ongoing during the spring when erosion risk is higher. We are committed to employing erosion prevention and sediment control (EP&SC) measures as required to provide for water quality protection during construction activity. The proposed use of a mulching machine is expected to contribute to stabilizing potentially erodible surfaces. EP & SC measures will be outlined for approval as part of the Technical Assessment report for the Construction Effluent Permit.	Response Satisfactory. Issue addressed.	MWLAP

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25	10.2-17: Regarding the 5 L/s deficit for the tailings pond water balance, can this makeup be provided by pumping surface water from SP12? WCC should make use of this option prior to drilling specific interception wells. As per Chapter 3.	B. Carmichael	PITEAU- The current water management plan does provide for diversion from SP12 to supply dust control water (estimated peak day demand 24 L/s). Water will be diverted from this pond under normal flow conditions. In order to minimize discharge during storm events, the pond level will be drawn down between storms. After some experience is gained with this pond, levels could be maintained between storm events to provide dust control water during drought periods. A water balance being prepared for the water management report that will accompany the water licence application indicates that the SP12 pond could sustain dust control requirements for an 18 day drought period, if it starts at a relatively full stage. Pit sump water is another source of water identified for dust control.	Response Satisfactory. Issue addressed.	MWLAP
			The current preference for the plant make-up water is still the seepage interception trench and an interception well, as these are necessary to control tailings seepage. Due to seepage from SP12 towards the interception system, SP12 will provide some process water year round. However, if seepage from SP!2 overwhelms the interception system when it is maintained at a high stage, this may dictate the stage range over which SP12 is managed.		
26	10.2-20: EPD needs to confirm the lotic virus lentic nature of the Wolverine R, because one mitigation plan is to discharge high Se waste water directly to the Wolverine, where it is assumed that Se will not be converted to the organic form. Helicopter time required as part of this review. Clarification item for EPD.	B. Carmichael	LORAX: A helicopter reconnaissance survey of the Wolverine River was conducted on August 12, 2003 in order to identify and sample lentic habitat adjacent to and adjoining the main stem of the river. Such monitoring will be used to establish baseline conditions in the identified lentic habitats, and allow fo refinements to selenium management plans	Response Satisfactory. Issue addressed.	MWLAP

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27	10.2-26: This page presents the scenario of potential failure of the CCR foundation, due to liquefaction. The resulting environmental impacts, considered as negligible, appear to be understated. Could a failure cross the BCR line and enter the riparian environment of Wolverine River? This could be considered a substantial impact. The same question also applies to foundation failure at the east and north dumps (p. 10.2-32). Clarification item.	B. Carmichael	NORWEST: CCR Pile: The Coarse Coal Reject Pile has been specifically engineered to mitigate the risk of flow liquefaction by adopting the following design practices: • the coarse coal reject pile is designed as an engineered compacted fill and will be placed in lifts compacted to at least 90% of Standard Proctor density as monitored by a qualified geotechnical person. This type of engineered fill material may deform due to failure, but will not liquefy. • a foundation drain has been incorporated in the design to avoid pore-water pressure build up in the fill. • the slopes have been engineered to an adequate factor of safety as per BC guidelines	MEM is satisfied at a certificate level. Additional information on stability to be provided at permitting.	MEM
			(continued) To avoid the issue of potential liquefaction of the loose silty sand layer immediately beneath the gravel in the floodplain, the toe of the CCR Pile is being moved farther westward – to a position that will avoid loading of the floodplain sediments. This work is being done presently as part of the more detailed permit level design, which has benefited from additional site investigation work. A slope monitoring program is also being written into the dump OMS manual to further reduce this risk. East Dump: The East Dump is located on a broad terrace that provides a good dump foundation in terms of material strength and underdrainage. The competent, well drained foundation conditions, relatively flat foundatio grades (less than 10°) and relatively low lift heights (50m) are factors that will reduce the probability of flow failure to very low levels.		

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			(Continued) In addition, there is a significant buffer around the toe of the dump (greater than 100m) that provides an additional margin of safety against potential impacts to the Perry Creek access road and the Perry Creek drainage course. Factor of safety values meet BC criteria for waste dumps. A slope monitoring program is being written into the dump OMS manual to further reduce the risk of slope failure. North Dump: The North Dump will be constructed in three main lifts (at the 1100/1125m, 1150m and 1200m elevations). Re-sloping of the dump during construction is an integral part of the design in order to improve stability during mine operations. Details of the lift construction and re-sloping sequence that is planned to maximize dump stability will be provided as part of the permit level design. Run-out evaluations will also be carried out during the permit level design to evaluate potentia impacts from flow failures resulting from adverse combinations of poor drainage and low quality dump material.		
			(Continued) The current dumping schedule and mine operations plan are integrated such that no personnel will be working in the pit area below the North Dump while dumping is occurring along the southern slopes where potential run-outs could impact the pit. A slope monitoring program is being written into the dump OMS manual to further reduce risk of slope failure.		

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28	10.3-7: EPD and WCC need to resolve our recent discussions over the use of a company staff member versus an Independent Environmental Monitor in assessing construction related impacts. It is important to identify who will be reporting to EPD and on what time frame. The environmental monitor must have independence and must retain the authority to stop mine construction in the even of heavy rain storms or other conditions that have caused or could cause impact to receiving waters. What is the "timely manner" of reporting referred on page 10.3-7? The EM or staff person must report environmental incidents to the Provincial Emergency Program and to regional EPD immediately. WCC should provide a flow chart of chain of responsibility and timing for notification of non-compliance. Clarification or commitment item.	B. Carmichael	WCC has employed an Environmental Superintendent who will be responsible for implementing environmental protection and monitorin plans at the site. Direction on overall design and scope of monitoring programs will be provided by the VP, Environmental and Regulatory until otherwise defined. The ES will be responsible for implementation of environmental protection plans. He will work proactively with staff and contractors to anticipate and prevent environmental incidents, and will monitor operational performance. The Environmental Superintendent will report to EPD on operational matters, including environmental incidents and day-to-day issues related to construction and operations. Timing and frequency of reporting to EPD will vary with type of report. The ES, or another on-site staff person, will report environmental incidents directly to the Provincial Emergency Program and to regional EPD immediately.	Response Satisfactory. Issue addressed. Details at permitting.	MWLAP
			On-site readings of turbidity will be reported daily during initial periods of construction until agreed otherwise by EPD. Frequency and timing of other reporting will be as specified by EPD (within the limits of reasonable lab turnaround and report preparation times, including review by the ES and VP, Environmental & Regulatory. WCC will provide a flow chart for responsibility and timing for notification of non-compliance in the Construction Effluent Permit Application. The Mine Manager, the Environmental Superintendent, Construction Manager, and other superintendents will have the authority to shut down mine construction activities that have caused or are likely to cause impact to receiving waters.		

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29	10.5-12: As a component of Best Management Practices (BMPs) for sediment source control, WCC is encouraged to maximise the ground water portion of the site discharge as a means of reducing sediment loads to surface waters.	B. Carmichael	PITEAU- ath: The current designs for SP14 and SP18 will temporally flood large areas outside of these ponds during storm events. For the SP14 pond the additional area is about 40%, for the SP18 Pond it will be about 400% larger. This will increase the infiltration area, and impound water for a longer period of time to promote infiltration beneath the Plant site area. Infiltration cannot be promoted in the SP12 area, as it would increase seepage to the tailings interception system. Infiltration opportunities will be exploited when constructing the other settling ponds, but only where it would not compromise embankment stability or selenium management plans.	Response Satisfactory. Issue addressed.	MWLAP
30	10.4-15: Is it reasonable not to include seepage from the tailings in the mine site water balance? Volumes may be small after seepage interception, but the chemical load in the remaining seepage may result in a considerable load to streams. Clarification item.	B. Carmichael	PITEAU The seepage is included in the post closure water balance, as it will not be intercepted in the closure period. It will be intercepted during operations, so will not convey any metals loading to receiving waters.	Response Satisfactory. Issue addressed.	MWLAP
31	10.4-17: Mine site water balances seem to have been calculated only for mine water in contact with PAG/PML. The 39:1 dilution (page 10.4-25 for Perry Ck) reflects this condition. Have the overall 1:10 year dilutions (e.g.14:1) been used? Can WCC determine the limitation of using only the PAG/PML materials? The same occurs on 10.4-33; mine area discharge flows are for source waters that contact PAG/PML, not the overall site discharge. How much confidence can be placed on this assumption? Clarification item.	B. Carmichael	PITEAU/ALAN - ath: The assessment was based on source concentrations derived from the site test work, field leach tests and QOC data. These concentrations were at source, not overall diluted mine site concentrations. It was therefore necessary to split out the non PAG/PML source waters from the other waters in the water balance, so that dilution numbers would be meaningful. If entire site flows were used, a dilution number would have to be applied to the source concentrations to reflect dilution with other site waters, prior to discharge to the receiving waters.	Response Satisfactory. Issue addressed.	MWLAP
32	10.4-18: “Leachate from the CCR is does not represent a significant component of the water balance”. Might it not be a notable part of the chemical balance, causing a significant overall load? Clarification item.	B. Carmichael	LORAX: Flows in contact with CCR are included for flows in contact with PAG/PML materials. The range of model input values is suggested to cover the range of possible leachate values emanating from this facility.	Response Satisfactory. Issue addressed.	MWLAP

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33	Table 10.4.4-2: how are individual flows used to calculate total mine area discharge? WCC indicates that DF is expressed as a ratio of non contact flow to contact flow. So, DF = (V1 + V2)/ V2, so 29 + 69 / 69 = 1.4, but I don't see this. instead WCC is calculating DF of total flow in contact with PAG/PML (say 208) as Wolverine flow (6048 L/s) over total PAG/PML flow (29.1 L/s), simply Wolv flow/PAG/PML flow. Is WCC considering the Wolverine as non-contact flow. The change in flow is minor for the mean annual, but progressively greater for lower flows and a 25 % difference for the 7-day low flow. I note that the lower values (Table 12.8.1-1) were carried forward in loading calculations. Clarification items.	B. Carmichael	LORAX: The dilutions presented in Table 10.4.4-2 are presented as the ratio of non-contact flow to clean flow. The DFs used in the impact predictions in Table 12.8.1-1 are expressed as DF = (V1 + V2)/ V2. For example, in Table 10.4.4-2 the ratio of non-contact flow (6048) to contact flow (29.1) = 208. In table 12.8.1-1 DF = (6048+29.1)/29.1 = 210.	Follow up discussion with EPD required. Issue not considered critical to certificate decision.	MWLAP
34	10.4-26: For EB Pit, the total surface and total groundwater PAG/PML do not add up to the reported totals. Clarification item.	B. Carmichael	PITEAU - The groundwater from storage was mistakenly included in the total flow in contact with PAG/PML in the Mid Phase 2 calculation on Table 10.4.4-4. Dilutions for this case improve about 10% from those reported in the Additional Information Report. Post closure numbers on this table remain unchanged. Cell references in Table 10.4.4-5 were changed and some are incorrect. Piteau has checked all cell references and will provide the updated table. Dilutions for the mean annual, freshet and November cases are reduced by about 20%. February low flow dilutions increase by factors ranging from 2 to 3.	Response Satisfactory. Issue addressed.	MWLAP

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35	10.4-34: This project will apply the newer BC sediment and turbidity guidelines. We may also apply the sediment depositional guidelines, as per http://wlapwww.gov.bc.ca/wat/wq/BCguidelines/approved.html#2 10.4-35: Is the reported 30:1 dilution based on waters in contact with PAG/PML materials? At least for turbidity and TSS, this would not be appropriate. Dilution ranges should be provided for all waters that leave the mine site, not just for PAG/PML, as is reported in tables 10.4.5-1 and 2. Also, on page 12.8-3, WCC defines the range in concentrations for waters in contact with PAG or PML material, but appears to be limiting the modelling to PAG/PML water volumes. For example, if only 30 % of waters are in contact with either PAG or PML, only 30 % of the overall mine water volume is being modelled. Is this reasonable? All waters will be in contact with rock, silt, etc and could be a potential concern. Clarification item.	B. Carmichael	PITEAU/LORAX ath: The 30:1 minimum dilution is for total mine site runoff in the Wolverine River during high runoff events, not just PAG/PML waters. TSS will only be a problem in high runoff conditions. Lowe runoff flows will not generate appreciable fines, and sedimentation facilities are extremely over designed for non storm runoff. Dilution for TSS should not be an issue outside of storm events; hence, the storm event dilution has been cited. The PAG/PML quantities and dilutions are reasonable for the chronic metals loading, as they are the source waters.	Response Satisfactory. Issue addressed.	WLAP
36	10.4-37: If the PAG/PML dilution into the wetlands is < 3:1 and if PAG/PML water is the minority of mine site runoff, what is the dilution of all mine site groundwater into the wetlands? Do we need to consider this total dilution? Section 12.9 may address this.	B. Carmichael	ALAN/PITEAU ath: The 3:1 dilution of PML waters is for loadings in seepage waters only. Dilution of surface water in wetlands along the flow path to the River would be essentially none. If selenium become a problem, it has to be piped directly to the River, except during storm events, when this would not be possible. Selenium concentrations in high flow runoff waters would be more dilute and wetlands could be flushed after with either W14 flow or possibly deep artesian groundwater flow from wells. The current drainage plan directs some of the W14 flow towards the SP12 discharge and this could be used to flush the surface flow path from SP12 during the post closure period, if necessary. Surface discharge from the SP6 Pond avoids all but one temporal wetland area, so wetland water quality should not be an issue.	Response Satisfactory. Issue addressed.	MWLAP

# ID	Issues Raised	Submitted by	Proponent Response	Review Status	Responsible Agency
37	Appendix M: A review of proposed sediment quality objectives for both Wolverine and Perry: I'm not opposed to minor increases of the existing guidelines in order to account for baseline conditions, however, the existing data base is too small to allow rigorous guidelines to be developed. More data required and applicable grain size is to be discussed. Clarification or commitment item.	B. Carmichael	LORAX: A comprehensive sediment collection program was completed in August 2004. Some additional sampling has been agreed to in conjunction with the September aquatic biology base line program. As agreed to in discussions with WLAP, selenium analysis will also be conducted on the sub 63 micron fraction to assess baseline conditions, as well as to assess the potential utility of selenium accumulation in sediments as a monitoring tool.	Response Satisfactory. Issue addressed.	MWLAP
38	10.5-2 and 12.8-22: I believe the Selenium Management Plan is lacking. There appears to be no discussion of actual selenium management options on the mine site. The text jumps from operational Se monitoring directly to the final contingency of direct piped discharge to the Wolverine from the Perry. I cannot see that detailed consideration has been given to options such as selenium avoidance (J2), segregation, capping, etc? Page 13-18 refers to Section 10.9.1, to the application of covers as a means of mitigating the effects of selenium, but I could not find mention of covers in 10.9.1. What is the strategy with regard to covers, segregation, etc? This information should be included in the assessment document, at least at a conceptual level. Commitment item.	B. Carmichael	WCC: The Selenium Management Plan as presented in the referenced sections summarizes the incremental selenium management measures to be carried out in addition to on-site waste management. Minimizing surface flows in contact with waste rock, and selective handling of PAG and high selenium waste rock are important cornerstones of the waste management plan. The placement of CCR into the CCR Dump and tailings pond takes into account potential for ARD and selenium leaching. LORAX: Details of the Selenium Management Plan as it relates to waste management were presented in Section 3.7 of the Additional Information Report. An addendum report, submitted in July 2004 used more recent kinetic and static test data to make further recommendations with respect to the management of waste materials. nal segregation plans and contingency commitments.	Response Satisfactory. Issue addressed.	MWLAP

# ID	Issues Raised	Submitted by	Proponent Response	Review Status	Responsible Agency
			These two sections of the Additional Information Report provide specific management strategies with respect to waste rock, tailings and CCR segregation. Section 10.5-2 provides contingencies for Se management downstream of the sedimentation ponds, with respect to detection of impact (i.e., monitoring) and contingency measures to enhance controls of surface discharges, or groundwater seepage if needed. WCC: Section 10.5.2 also provides a commitment to establish an artificial cover on all or part of the tailings dam as a contingency measure. Follow-up item for discussion with Bruce Carmichael to clarify details of operation	Response Satisfactory. Issue addressed.	
39	10.5-4: Do the low Perry Creek dilutions (3-4 fold) include groundwater flow? Is this the total potential mine water loading to Perry Creek? Does this include groundwater flow from the Wolverine East dump 16 ha? Clarification item.	B. Carmichael	LORAX: Yes, the low Perry Creek dilutions include groundwater flow. The potentially small mine-derived loading to Perry Creek from the East Dump was not included in the impact assessment. Given the low flow (0.5 L/s) and point of entry in Perry Creek (very near PC-3 where significant dilution can be expected) the impact to Perry Creek will likely be negligible. Operational groundwater monitoring downstream of the East Dump will provide more definitive data for assessing these potential impacts, during permitting o the EB Pit area.	Response Satisfactory. Issue addressed.	MWLAP

# ID	Issues Raised	Submitted by	Proponent Response	Review Status	Responsible Agency
40	10.5-4: With regard to the EP Pit, given the low dilutions (3-4 fold) that Perry Ck provides runoff from the EP Pit operation, given the predicted Se concentrations in Perry Ck (10-30 ug/L) and the uncertain impact this may have on Perry Creek biota, and finally given what may be learned about Se in the Wolverine system over the next few years, we need to consider management options: 1) WCC commitment to enhanced management (treatment) at EB, if necessary; 2) EPD acceptance of the proposed piping of EB drainage directly to the Wolverine River; 3) EAO certificate approval for the EB pit at a later date. At the least, certification level commitment is required that site effluents will be collected and treated if necessary. An additional commitment will be required to assess the biological impacts of tissue Se concentrations that exceed an agreed to objective (and/or to collect and treat sites effluents). Certification and commitment item.	B. Carmichael	WCC: Permitting for EB will not be required for at least 8 years, at which time the data related to prediction of expected discharges will be significantly enhanced by operational monitoring as well as field and lab testing. Based on available information to date, WCC prefers the proposed effluent disposal option for EB of piping to the Wolverine River. If, at the time of permitting, the predicted maximum selenium concentrations in Perry Creek exceed acceptable limits, WCC commits to do one or both of the following, as appropriate and as agreed with EPD either assess the biological impacts of tissue Se levels; and demonstrate that efficient quality will be acceptable; implement selenium treatment options. WCC recognizes the requirement for a mutually acceptable effluent management option.	Response Satisfactory. Issue addressed.	MWLAP
41	10.5-7: With regard to wetland water sampling for Se, twice per year sampling is mentioned (spring and fall) here. I don't recall this sampling frequency mentioned in our recent conference calls. This sampling will need to be completed for the spring of 2005. Commitment item.	B. Carmichael	LORAX: WQ monitoring of the wetland areas (oxbows and wetland on Terry Ranch) will occur in Spring of 2005.	Response Satisfactory. Issue addressed.	MWLAP
42	10.5-17: Because the Perry Creek road will be relocated below all the mine sedimentation control facilities, EPD will request sediment control planning for the road. Commitment item.	B. Carmichael	WCC commits to conducting sediment control planning for the Perry Creek Road Realignment.	Details at permitting	MWLAP

# ID	Issues Raised	Submitted by	Proponent Response	Review Status	Responsible Agency
43	10.9-21: Regarding alternate water sources for the wetlands, if WCC is considering seasonal discharge from the sediment ponds to the Wolverine River, perhaps consider using local oxbows as polishing cells for turbidity until such time as Se is shown to increase in sediment pond waters or oxbow sediments. Careful consideration required.	B. Carmichael	PITEAU - Current discharge designs for all but SP4a direct flow to temporal or permanent wetlands in the floodplain. This will continue unless Se issues dictate direct conveyance to the Wolverine River required.	Response Satisfactory. Issue addressed.	MWLAP
44	10.9-35-36: conditions for additional baseline monitoring for sediments, periphyton, benthic invertebrates, fish, etc have been negotiated and will be used during the 2004 summer/fall period. For at least the present time, the collection of benthic invertebrates and periphyton for Se analysis in each of the eight locations where sculpin were collected for whole body Se analysis will be withdrawn from the baseline program. Consideration needs to be given to establishing a lentic environmen baseline for the Perry Creek watershed? Time exists for this, given the six years prior to start-up of that pit.	B. Carmichael	LORAX: Acknowledged. Presence/absence of lentic environments in Perry Creek will be confirmed. It should be noted that no lentic environments in the Perry Creek watershed have been identified, except for a small lake in the alpine which is situated adjacer to the EB West Dump. This pond is not predicted to incur significant environmental impact. Perry Creek is dissimilar to the Wolverine River in this regards, as th vast majority of Perry Creek is steep and fast flowing (no meanders, oxbows or backwaters).	Response Satisfactory. Issue addressed.	MWLAP
45	I understand that MWF tissue data exist for the Elk valley and request that the data be provided to EPD for the benefit of this review. Concentrations were relatively low (how far below the 7.9 ug/g dry guideline)? This information is from Appendix 2 of the Addendum.	B. Carmichael	PETER CHAPMAN: Permission from Elk Valley to provide the raw data was denied	Response Satisfactory. Issue addressed.	MWLAP
46	10.9-37: Where will Se speciation be undertaken? The Additional Information Report indicates this will be done at each of the eight site where sculpin were collected.	B. Carmichael	PETER CHAPMAN: "Discussed with Bruce Carmichael and resolved" - decisions were made regarding Selenium speciation	Response Satisfactory. Issue addressed.	MWLAP

# ID	Issues Raised	Submitted by	Proponent Response	Review Status	Responsible Agency
47	**Perry Creek predicted water quality**: Given the predicted minimal dilution that Perry Creek will provide to mine discharge, modelling that includes all potential sources should be done at this time. See comment under 12.8-5, below.	B. Carmichael	PITEAU: Monitoring wells will be constructed during the first year of mining in the Perry Creek Open Pit. Adequate data will be available by Year 6 to calibrate and validate a model of the loading along this pathway. As the groundwater flow quantity is estimated to be 0.5 L/s, this pathway would not be an issue unless it were augmented by other loadings from the EB Pit area. Total loadings to Perry Creek, and management of these impacts, will be addressed during Permitting for the EB Pit.	Response Satisfactory. Issue addressed. Details at permitting.	MWLAP
48	**Cumulative Impacts downstream from Mast Creek**: Water quality in the Wolverine River downstream from Mast Creek has not been modelled. Refer to comments under page 12.8-27, below.	B. Carmichael	LORAX: This is true, the modelling in Chapter 12 does not included the Mast Creek input to the Wolverine River. This was solely due to the lack of data downstream of the Mast Creek input (data for WR-5 between Mast Creek and Bullmoose Creek were available for only three days). However, the limitations of this are minor. Specifically, the comparisons in Chapter 12 (Figure 12.8.3-7 for example) were conducted to illustrate the probable maximum increases in selenium, sulphate and nitrate we can expect from the Wolverine Project. Given that concentrations of selenium, sulphate and nitrate at WR-2 (upstream of Mast) are typically as high or higher than concentrations at WR-5 (downstream of Mast), does not change the conclusion that loading from the Wolverine Project will likely have a lesser effect on water quality in the Wolverine River .		MWLAP
49	12.84: As a general comment, I note a discrepancy between figures 4.7.2-1 and 4.9.2 1 in terms of site identifiers. The shifting of PC 2, one place for water sampling, another for some other media, is confusing and should be avoided.	B. Carmichael	LORAX: Agreed, biological monitoring stations (4.9.2-1) will be changed to avoid confusion with WQ stations.	Response Satisfactory. Issue addressed.	MWLAP

# ID	Issues Raised	Submitted by	Proponent Response	Review Status	Responsible Agency
50	12.8-5: With respect to ground truthing and the use of only PAG/PML contact materials for comparison to Quintette operations. Is WCC comparing total waste volume at QOC to PAG/PML volume at Wolverine, for example, in table 12.8.1-2? Again, how much of a reduction from total material volume does this represent? If additional Wolverine non-PAG/PML material is found to be a metal contaminant source, the comparison may not accurate. Clarification item.	B. Carmichael	LORAX: The comparison between Wolverine and QOC is essentially a comparison of total waste rock volumes, waste rock being the dominant contributor to the total waste (>95% of the total) at both sites. For purposes of water quality prediction in the model, all waste rock is classified as PAG/PML> Tailings and CCR are also included in the waste volume for Wolverine, although these components represent a minor component. The comparison is reasonable, as metal loadings to the environment will be overwhelmingly be dominated by leachates from wasterock, tailings and CCR (i.e., negligible contributions from soil stockpiles, exposed overburde in diversion ditches, etc.)	Response Satisfactory. Issue addressed.	MWLAP
51	12.8-6: QOC waste volume is ~ 7.6 that of Wolverine. What part does water volume play? Are flows at the two projects assumed to be similar? Will the 7.6 factor substantially lessened by any differences in flow between the two mine sites?	B. Carmichael	LORAX: Differences in flows regimes, as well as the differences in the surface area: volume ratio of the dumps, will influence the path length, contact time, and composition of seepage waters. The effects of these cannot be quantified with certainty. The major difference between the two sites are: 1) the volume and footprint of wastes at QOC are much larger than at Wolverine; and 2) the wastes at Wolverine will be actively managed to minimize loadings to the receiver (Section 3.7 of Addtional Information Report and Addendum Report). Waste management strategies were not employed at QOC. WCC: Of note, the waste dumps at Wolverine have been located to avoid contact with water flows in small tributary streams, which was not the case at QOC.	Response Satisfactory. Issue addressed.	MWLAP

# ID	Issues Raised	Submitted by	Proponent Response	Review Status	Responsible Agency
52	12.8-9: Algal productivity in Perry Creek is not P limited. Appendix I (limited data however) indicates that PC1 and PC2 water sites in September 2001 contained nitrate to TP ratios of roughly 1:1. Anything less than 5:1 is N limited. 5:1 to 15:1 suggests co-limitation or no limitation. We may see an algal response because of groundwater loading from the Perry east dump to lower Perry Creek. This chemical load should be modelled as part of the Perry mass balance, for a point downstream of Perry Creek at the falls. Might this raise predicted nitrate concentrations in Perry Ck to above the 40 mg/L aquatic life guideline? Page 12.8-20: given the expected periphyton response, Ecological Context and Residual Env Effect Rating may be higher than LOW values listed. concerns.	B. Carmichael	LORAX: This is a good point, and that the assumptior of P limitation in Perry Creek may not apply. There are a few things worth mentioning here. First, the notion of P limitation is based on the MOLAR SUPPLY RATIO of N and P, where the supply flow will be the composition of run-off and groundwater inputs to Perry Creek. In other words, the ambient N:P ratio in the creek may differ from the supply N:P ratio due to the removal of P, for example. However, given the relatively-short residence time of water in Perry Creek, I would agree that the ambient N:P ratio can be used as a measure of P limitation. Based on molar N:P ratios, I calculated a mean N:P molar ratio of 8 (range of 0.2 to 39). When you use ortho-P, the N:P ratio increases to 10. This would imply co-limitation of N and P. One other point to consider is that nitrate values in Perry Creek are very low, and only a slight increase in nitrate levels above background will result in permanent P-limitation.	Response Satisfactory. Issue addressed.	MWLAP

# ID	Issues Raised	Submitted by	Proponent Response	Review Status	Responsible Agency
			continued: Therefore, nitrogen loadings to Perry Creek will have a limited influence in potentially increasing stream productivity. With respect to the potential groundwater loading of nitrogen to Perry Creek from the East Dump, ~0.5 L/s can be expected. Assuming that nitrate behaves conservatively in groundwater, and using the maximum input concentration of 150 mg/L, yields an impact of 4.2 mg/L to Perry Creek for the 1 in 10 year low flow. This loading is ~ an order of magnitude lower that the loading expected from EB. With respect to the potential influence on productivity, nitrate loadings will only have a potential impact durin the spring/summer, when flows are >470 L/s. During these periods, the groundwater input from the East Dump will impart <0.2 mg/L to Perry Creek. Accordingly, there is support for the "low" residual environmental effect rating.		
	WCC will need to assess this fertilising impac during mine life. (which also requires a good periphyton baseline to be established prior to construction). As per page 12.8-15, yes, WCC may need to post Perry Creek as non-potable due to expected nitrate levels. These waters should not be consumed anyway, without disinfection, due to bacterial and parasites		With respect to the potential groundwater loading of nitrogen to Perry Creek from the East Dump, ~0.5 L/s can be expected. Assuming that nitrate behaves conservatively in groundwater, and using the maximum input concentration of 150 mg/L, yields an impact of 4.2 mg/L to Perry Creek for the 1 in 10 year low flow. This loading is ~ an order of magnitude lower that the loading expected from EB. With respect to the potential influence on productivity, nitrate loadings will only have a potential impact durin the spring/summer, when flows are >470 L/s. During these periods, the groundwater input from the East Dump will impart <0.2 mg/L to Perry Creek. Accordingly, there is support for the "low" residual environmental effect rating.	Response Satisfactory. Issue addressed.	

# ID	Issues Raised	Submitted by	Proponent Response	Review Status	Responsible Agency
53	On page 12.8-22, The predicted biological response to the Valued Ecosystem Component aquatic biota will likely be greater than “none”. Clarification item.	B. Carmichael	LORAX: Given that nitrate levels have increased by <1 mg/L in the Wolverine River associated with QOC, which is far below the aquatic guideline of 40 mg/L, cumulative effects associated with nitrogen loadings to the Wolverine Project are predicted to be negligible.	Response Satisfactory. Issue addressed.	MWLAP
54	12.8-14-16: My calculations of nitrate modelling into receiving waters result in predictions 5-10 % higher than those presented here. Compare methods for mass loading with Al Martin. My calculation is highe (1:10 year 7-day low flow, with 80 mg/L input gives 5.07 mg/L versus 3.36 mg/L). What equation did Al use for Wolverine d/s of Perry? Clarification item.	B. Carmichael		Follow up discussion with EPD required at permitting.	MWLAP
55	12.8-14: Why, for nitrate and selenium modelling, are the same baseline concentrations used for each dilution scenario (i.e. 0.70 mg/L for nitrate)? Is this the highest measured baseline concentration? Nitrate at WR1 is typically 10 % of this concentration at all times, while at WR2 nitrate is typically twice the value used during winter low flow. Clarification item.	B. Carmichael	LORAX: 0.7 mg/L is the mean "background" concentration at WR-2. This value essentially represents the mean baseline condition downstream of the Project.	Response Satisfactory. Issue addressed.	MWLAP
56	12.8-21: The unavoidable increase in nitrate in Perry and Wolverine systems indicates the need for good phosphorus management on the mine site to prevent impacts to river aesthetics and aquatic life via the developmen of excessive periphyton biomass. Guidelines do exist for periphyton chlorophyll. Sewage, grey water, truck wash detergents, reclamation fertilizers, etc all need to be effectively managed. Detergents are to be phosphorus free and fertilizers should contain only the minimum required phosphorus concentrations.	B. Carmichael	WCC agrees that diligent phosphorus management is essential, and has committed to eliminate/minimize P use where ever possible	Response Satisfactory. Issue addressed.	MWLAP

# ID	Issues Raised	Submitted by	Proponent Response	Review Status	Responsible Agency
57	12.8-23: As per figure 12.8.2-2, highest nitrate concentrations generated from QOC are recorded during March. WCC collected Mesa slide selenium data in October. Consider whether Se will correlate with nitrate and if so, what concentrations might be expected from the Mast/Mesa system in March. Mesa slide must be sampled March 2005 (likely by QOC). Clarification item.	B. Carmichael	LORAX: There are no data for Mesa Creek in March. Such sampling could be done by the Quintette Operating Corporating or MWLAP to assess the possible maximum of selenium concentrations in this drainage. It is agreed that modelling maxima of 80 ppb would almost certainly cover the possible range i Mesa Creek.	Response Satisfactory. Issue addressed.	MWLAP
58	12.8-25: Given the mode of Se toxicity, a summer growth period (May 1 to Sept 30) may have more relevance than either mean annual or 7-day low flow. Compare selenium concentrations for each period and make use of the greater. Also, refer to 12.8-30. Clarification item.	B. Carmichael	LORAX: True, the predicted Se concentration during the summer growth period may have most relevance to impact predictions. The selenium impact during the summer growth period will fall between Mean Annual and Freshet conditions (see Table 12.8.3-2 on page 12.8-25). Accordingly, Mean Annual predictions provide a conservative estimate of impact.	Response Satisfactory. Issue addressed.	MWLAP
59	12.8-27: The constraining of impact magnitude modelled for the Wolverine does not include impacts caused by Mast Creek because that creek is downstream of WR3, as per 4.7-20. This may have implications to the modelling process. As part of cumulative effect, WCC should model impacts to the Wolverine between Mast Ck and Bullmoose Ck, using data from WR5 and/or WR6. This further dilution explains why figure 12.8.3-1 shows a reduction from WR2 to WR3 and why incremental change was greatest between WR1 and WR2. Similarly, on page 12.8-44, an estimate of a 20 mg/L sulphate increase may apply between WR1 and WR2, but similar estimates are required for downstream of WR3. Or, does WCC have more data for figure 12.8.4.-2, indicating that Mast Creek does not have a large impact on sulphate in Wolverine? Clarification item.	B. Carmichael	LORAX: This is true, the modelling in Chapter 12 does not included the Mast Creek input to the Wolverine River. This was solely due to the lack of data downstream of the Mast Creek input (data for WR-5 between Mast Creek and Bullmoose Creek were available for only three days). However, the limitations of this are minor. Specifically, the comparisons in Chapter 12 (Figure 12.8.3-7 for example) were conducted to illustrate the probable maximum increases in selenium, sulphate and nitrate we can expect from the Wolverine Project. Given that concentrations of selenium, sulphate and nitrate at WR-2 (upstream of Mast) are typically as high or higher than concentrations at WR-5 (downstream of Mast), does not change the conclusion that loading from the Wolverine Project will likely have a lesser effect on water quality in the Wolverine River .	Response Satisfactory. Issue addressed. Additional information to be provided at permitting and during the development of the selenium management plan.	MWLAP

# ID	Issues Raised	Submitted by	Proponent Response	Review Status	Responsible Agency
60	12.8-33: Natural selenium attenuation mechanisms in the sediment ponds, tailings ponds and CCR (that will limit its loss the receiving environment), might also produce bio available Se within those structures. Waterfowl in the sediment ponds appear to be the main risk here. How large a risk exists and what management is planned? Clarification item.	B. Carmichael	LORAX: The potential for the creation of potential harmful environments to waterfowl is limited to the sedimentations ponds, where periodic lentic conditions may result in bio-transformations of selenium and accumulation in potential food sources (algae, benthos, vegetation). Given that the sed ponds will be removed post-closure, the risk to waterfowl will be limited to the operational period. KEYSTONE: In order to minimize the risk associated with waterfowl exposure to selenium in the sedimentation ponds, it will be important to minimize the cover and forage potential of these areas.	Response Satisfactory. Issue addressed.	MWLAP
			Continued: This implies that vegetation growth should controlled around the perimeter of the ponds. This wi reduce cover, as well as minimize potential food sources (e.g., seeds from grasses and sedges). If it is shown that these systems are used to a great extent by waterfowl, other measures will be take as appropriate. Options include a monitoring program to monitor selenium in available food sources, or other measures to discourage use of these sites.		

# ID	Issues Raised	Submitted by	Proponent Response	Review Status	Responsible Agency
61	12.8-40: Again, is it acceptable to limit concentrations to flow in contact with PAG/PML material? Clarification item.	B. Carmichael	LORAX: PAG/PML materials are considered to be all rock sources which are either moved (waste rock) or exposes (pit), as well as process plant products (tailings, CCR and coal stockpiles). The only wastes not included within the PAG/PML category are excavated or exposed overburden and soils (diversion ditches, soil stockpiles, roads). Within the context of impacts associated with releases of nitrogen compounds, sulphate, selenium and metals, the use of PAG/PML contact waters is appropriate. From a TSS perspective, predictions of TSS are based on site-flows, and not on "contact" flows. Within this framework, it is assumed that the sedimentation ponds and erosion control measures will result in discharges which meet TSS and turbidity objectives.	Response Satisfactory. Issue addressed. Details at permitting.	MWLAP / MEM
62	12.8-44: Frequency of impact will be greater than Low to Moderate. If exceedence is predicted for November, this can be expected to last through April and during summer lows. Half the year may see similar flows to November, so exceedences could be common. Clarification item.	B. Carmichael	LORAX: The frequency rating for "moderate" as defined on Page 12.8-8 is: effects occur frequently; seasonal and/or for several days per month. A "high" frequency rating means that effects occur continuously. Therefore, no frequency ratings warran a high ranking, as exceedences are predicted to occu infrequently associated with periods of low flow. The frequency rating for sulphate during closure could be low to moderate.	Response Satisfactory. Issue addressed.	MWLAP
63	12.8-47: Referring to Figure 12.8.4-2, are more recent data available that confirm the lack of increase in sulphate caused by Mast Creek and Bullmoose Creek? This would be a useful update. Clarification item.	B. Carmichael	Data from the cumulative effects stations (i.e. WR5, WR6, MR1) were collected in May of 2004, and are being collected again in August 2004. Alan Martin to provide summary to Bruce Carmichael.	Data Review Pending	MWLAP

# ID	Issues Raised	Submitted by	Proponent Response	Review Status	Responsible Agency
64	12.8-55: The predicted metal concentrations for Perry Ck and Wolverine R have been derived for the dissolved fraction. Appendix M presents water quality objectives in the receiving water for total metals. While the proposed objectives appear reasonable, is WCC confident that they can actually be met with full mixing in receiving waters? WCC is advised to recalculate the metal predictions using the total metal fraction. Page 2.8-52: Can WCC explain why dissolved and total are expected to be similar? Clarification item.	B. Carmichael	LORAX: This is a good point, although there is some support for the use of dissolved metals in this case. First, the data available for input into the metal prediction model were predominantly dissolved values. They were used as they are reperesenative o the region, and as well, the large number of values permitted a fairly robust statistical assessment. Second, metals leached from wasterock will be predominantly in a dissolved form. Third, since all wasterock runoff will be managed through sedimentation ponds, it is likely that the particulate metal load will be minimized. Fourth, the use of the "mean" metal concentrations in the predicted range for contact flows imparts a level of conservatism into the predictions, as the mean values include extreme values and outliers. The total:dissolved ratio for receiving waters will not necessary reflect the total:dissolved ratio in sedimentation pond effluents. See #4		MWLAP
65	12.8-62: WCC is requested to provide more detail on the seepage collection system. How well will this work without the benefits of a confining watershed? Clarification item.	B. Carmichael	PITEAU ath: The seepage interception system for the tailings impoundment consists of a long trench located between the tailings impoundment and the CN Rail embankment. A sump and pump at the north end will control the heads in this trench, to remove the seepage gradient from this point out beneath the flood plain. The system will be tuned by monitoring water levels in MW-3 and monitoring wells included in the SP12 design. The pump will be controlled to hold the trench level within a set range. Seepage quantities beyond this trench will therefore be largely controlled. Intercepted water will be one of the principal sources of process make-up.	Response Satisfactory. Issue addressed.	MWLAP

# ID	Issues Raised	Submitted by	Proponent Response	Review Status	Responsible Agency
66	12.8-65 Diversions may require treatment for sediment. Flocculent testing to develop protocols for flocculent adaptation must be in place prior to construction. Commitment item.	B. Carmichael	There is no plan to use flocculents in diversion ditches as there are no large settling ponds along the diversions. We propose to commission upper diversion segments when they can be directed to the major settling ponds, and only connect them to the lower diversion segments after they have experienced some flow. Diversions channels will be vegetated as they are constructed, and sections that require armou wil be armoured. A settling pond will also be site along the Upper Diversion upstream of where it will decant into a natural channel, but this would only provide about 1000m3 of detention capacity. Initial flows will cause some erosion, but this should be within the bounds of normal background levels. It should be noted that there are some unstable natural channels leading down to Perry Creek that are currently a source of sediments, and that the Wolverine Project will be diverting a component of the natural flow from some of these channels.	Response Satisfactory. Issue addressed.	MWLAP
67	13-19: How successful is ARD treatment at reducing Se? Can Se be treated in a non-acid environment, given the concentration range predicted for Wolverine? Is treatment a realistic option that the concentrations predicted from this mine site? Clarification item.	B. Carmichael	LORAX: Selenium doesn't respond to conventional ARD treatment technologies (*e.g.* , lime). Selenium removal to <5 ppb requires bioplant technology, which has been validated as acceptable technology by the USEPA. These systems use bacterial reactors to precipitate elemental selenium, which can be collected and sold. Therefore, if selenium is associated with ARD, it is likely that two-stage treatment would be necessary (neutralization followed by bioremediation).	Response Satisfactory. Issue addressed.	MWLAP

# ID	Issues Raised	Submitted by	Proponent Response	Review Status	Responsible Agency
68	13-21: Natural Se attenuation mechanisms (sorption, precipitation) will act to reduce the Se loading associated with seepage from the sediment ponds, tailings pond and CCR. What will happen to Se in these locations if sediments become anaerobic? Will this promote formation of organic Se? Is the coal available as total organic carbon?	B. Carmichael	Anaerobic conditions in saturated zones in or under the tailings pond and CCR will favour the removal of selenium via sorption/precipitation and limit the migration of Se in groundwaters. The benefits of these processes will out weigh the low risk of organic selenium formation and potential introduction to surface waters. However, for the sedimentation ponds, there is a higher risk of organic selenium introduction to the food chain, given that biotransformations at the sediment-water interface may result in the direct input of selenium back into surface waters. Se introduction to waterfowl represents the biggest risk associated with the sed ponds. Risk management associated with the sedimentation pond is addressed in ID#92.	Response Satisfactory. Issue addressed.	MWLAP
69	**Mountain whitefish tissue concentrations:** Mountain whitefish concentrations in Wolverin River exceed BC and USEPA selenium tissue guidelines. We have no understanding of whether these are regionally normal concentrations or elevated by Quintette operations.	B. Carmichael	PETER CHAPMAN: "Discussed with Bruce Carmichael and resolved" - no response needed as these are statements not questions	Response Satisfactory. Issue addressed.	MWLAP
70	**Slimy sculpin home ranges** Slimy sculpin home ranges are not well understood. In our efforts to develop a Wolverine specific tissue based guideline, we will be assuming that the tissue levels of fish captured upstream of QOC have not been modified by QOC. Proceeding with this tissue based guidelines carries some risk of inadequately protecting the Wolverine.	B. Carmichael	PETER CHAPMAN: "Discussed with Bruce Carmichael and resolved" - no response needed as these are statements not questions	Response Satisfactory. Issue addressed.	MWLAP
71	**Assumed stability of the QOC influence:** We are also assuming that the maximum influence of QOC based selenium is currently being realized by the exposed sculpins. Tissue concentrations may in fact be either increasing or decreasing as a result of QOC mining and/or closure. If further baseline sampling shows that current interpretation to be incorrect, biological assessment of effects may be required.	B. Carmichael	PETER CHAPMAN: "Discussed with Bruce Carmichael and resolved" - no response needed as these are statements not questions	Response Satisfactory. Issue addressed.	MWLAP

# ID	Issues Raised	Submitted by	Proponent Response	Review Status	Responsible Agency
72	**Selenium management planning** Uncertainty over the existing selenium baselin focuses more attention on WCC's selenium management plan. The most current plan is contained within the Additional Information Report. The plan must be thoroughly reviewed in with respect to the above risks. Deficiencies have been noted (10.5-2).	B. Carmichael	PETER- BRUCE - PITEAU. The most current version with respect to some aspects of the plan is included in the Addendum Report.	Response Satisfactory. Issue addressed.	MWLAP
73	**Assessment of biological effects** None of the current baseline development can be considered as an assessment of the effects or selenium on the biological community. This assessment may be necessary depending on the results of ongoing characterisation of tissue Se concentrations.	B. Carmichael	PETER CHAPMAN: "Discussed with Bruce Carmichael and resolved" - no response needed as these are statements not questions	Response Satisfactory. Issue addressed.	MWLAP
74	We have a poorer understanding of the selenium levels in mountain whitefish. 6 of 7 Wolverine River samples collected this spring exceeded established USEPA tissue guidelines. All samples exceeded the BC guideline. The initial study of this species has not yet given any suggestion that their concentrations are at background levels. Note also that these MWF whole body samples from the Wolverine exceeded roughly 60 tissue-equivalent samples collected from the Fraser River watershed. We face the same questions now with MWF that we did in April with sculpin. Are these typical regional concentrations?	B. Carmichael	PETER CHAPMAN: "Discussed with Bruce Carmichael and resolved" - no response needed as this is rhetorical question	Response Satisfactory. Issue addressed.	MWLAP

# ID	Issues Raised	Submitted by	Proponent Response	Review Status	Responsible Agency
75	The question for now is “are more sculpin data required at this time?” Is further sculpin monitoring necessary to determine the degree of existing impact and the suitability of additional mine development in the Wolverine? WCC has agreed to increase the slimy sculpin data base in the Wolverine drainage (main stem, Perry and Mast/Mesa) this summer, to allow development of a sculpin tissue based guideline for the Wolverine Mine. EDP would then request that the Wolverine mine cause no significant degradation of that guideline and that management would be by “monitor and review”. This baseline should be developed downstream of untouched coal deposits, but upstream Quintette Mine (QOC). Given that mining is not predicted to discharge Se to receiving waters for many years, adequate time exists to confirm the tissue baseline. Baseline may be hard to confirm, however, due to possible migration of fish into the QOC zone of influence. Our understanding of slimy sculpin home ranges is limited.	B. Carmichael	EPD and WCC have agreed to a monitoring program to enhance the fish tissue metals baseline for sculpin.	Response Satisfactory. Issue addressed.	MWLAP
76	In addition to establishing a watershed specific tissue based objective, further work is recommended to add to the data base for the three site types (undeveloped non-coal bearing, undeveloped coal bearing, and developed coal bearing).	B. Carmichael	PETER CHAPMAN: "Discussed with Bruce Carmichael and resolved" - program ongoing	Response Satisfactory. Issue addressed.	MWLAP
77	**TSS Predictions** - Were RUSLE factors used to predict sediment loading to settling ponds.	John Clark	PITEAU: RUSLE factors were considered, but we decided that there would be a low level of confidence in the selection of the site characteristic factors, and that the overall resolution of the predictions would be poor. The approach adopted was to assess the settling pond sediment storage capacity relative to a conservative (i.e. high) estimate of influent sediment loading.	Response Satisfactory. Issue addressed.	MWLAP

# ID	Issues Raised	Submitted by	Proponent Response	Review Status	Responsible Agency
78	**Settling Pond Sizing** - Pond sizes should be based on area (i.e. 1m detention depth), not retention times, and the ponds appear to be undersized.	John Clark	PITEAU: The 1:10 year flow shown in the calculation tables in the comments was the peak inflow rate. The average inflow rate is much lower, and the cumulative 10 hour storm volume is shown on Tables 3.8-1 and 3.8-2. The required depths to store this flow in the pond footprint are also shown on Table 3.8-1. We normally base pond dimension on a 1m depth, but have had to allow for more than 1m depth in some ponds where we have space constraints. This will not be an issue for SP14 and SP18, as they will actually flood outside of their footprints during storm events, and impounding areas will increase by between 40 and 300%. Decant will still have to be via the pond decant structures, due to containment provided by natural topography. The areas of temporal flooding surrounding these ponds will be shown on the design drawings.	Response Satisfactory. Issue addressed. Details at permitting	MWLAP
			To compensate for limited area in some ponds (primarily SP6), all ponds will be drawn down about 1.2m below their 1:10 year operating levels between storms. They will therefore just start to decant at the end of the storm period, and would only approach the design discharge rate for a maximum of a few hours, unless the storm exceeds the 1:10 year intensity. The ponds, as designed, will therefore provide a minimum 10 hour detention time for the design storm.		
79	**Settling Pond Infiltration**- Regarding seepage loss rates and possible decreases over time.	John Clark	PITEAU: It is expected that seepage rates will reduce over time, but significant seepage losses will be sustained for lengthy periods, due to the large pond areas. SP12 seepage may not reduce very much over time, as the calculations assume this pond is underlain by a blanket of low permeability silt. Seepage losses were not considered in the pond sizing calculations, so reductions in the rate of seepage over time will not affect the pond design assumptions.	Response Satisfactory. Issue addressed.	MWLAP

# ID	Issues Raised	Submitted by	Proponent Response	Review Status	Responsible Agency
80	From #3.1 in J. Clark Letter. Minor quantities of PAG material will be blended with typical (NAG) waste rock to produce a blended mixture which has an excess of NP/AP (blended wastes) providing a “blended” NP/AP which has a high safety factor (using the MEM guideline of NP/AP = 2.0). If the PAG materia in the blended mixture is generating acid, and being neutralized in-situ, what is the prognosis regarding “sterilizing” acid consuming wastes in close proximity to the PAG material in terms of sulphate coating of the acid consuming materials? Should this be verified by column testing? Is this an issue for the Wolverine wastes. Or, given the relatively low sulphide contents (even for the PAG materials) is sulphate coatings not considered prevalent enough to present an issue?	John Clark	B. MATTSON - LORAX: Secondary mineral coating of neutralizing minerals is most prevalent when infiltrating waters are highly acidic and contain high concentrations of dissolved metals. This scenario is highly unlikely given the low volume of waste rock tha is potentially acid generating and the low sulphide content of this material. In addition, the majority of waste rock has excess NP with NP/AP ratios significantly exceeding 2. Humidity cell testing currently indicates that in the absence of "sulphate sterilization" of NP/AP ratio required to neutralize acidity is closer to 1.0. Thus, even should secondary minerals coat the neutralizing minerals, there is still abundant NP available in the waste material to offset acidity.	Response Satisfactory. Issue addressed.	MWLAP
81	From #3.2 in J. Clark Letter. Since dryer ash contains significant amounts of “lime”, which is relatively soluble, should it be added to the tailings pond. Would this gain any advantage, given that there is PAG CCR material in the tailings pond?	John Clark	B. MATTSON - LORAX: The high solubility of lime in the dryer ash would be washed away rapidly by the process water if added to the tailings. The effectiveness of the dryer ash lime could be more effective in neutralizing acidity in the embankment of the CCR facility or in the CCR storage facility under unsaturated conditions where moisture would be limited to infiltrating waters.	Response Satisfactory. Issue addressed.	MWLAP

# ID	Issues Raised	Submitted by	Proponent Response	Review Status	Responsible Agency
82	From #12 in J. Clark Letter. ...the oxidation of/dissolution of oxides of ion to the ferrous form (Fe^{+2}) will subsequently yield the highly insoluble ferric ion (Fe^{+3}) and then $Fe(OH)^{-3}$ which will co-precipitate with selenium. In addition the iron precipitate will act also as an adsorption medium for Se. This necessitates the effective burial of the sed. pond sludges when they are cleaned out or reclaimed to prevent re-entry into receiving waters. This theoretical postulation merits some lab-scale verification once the operation is in progress to confirm this understanding. The mode of selenium removal is somewhat similar to the mechanisms used in water treatment using Fe/Al salts. This then begs the question, "Does the iron hydroxide precipitate settle out in the pond or discharge due to the low S.G. of these types of hydroxides?"	John Clark	A. MARTIN - LORAX: Secondary Fe oxides may form in the aerobic zones of the sediments in the sedimentation ponds, due to the remobilization of iron at depth in suboxic zones, and subsequent re-precipitation of Fe oxyhydroxides in oxic horizons Such secondary Fe-oxides will provide sorption sites for selenium. The mechanism of secondary Fe-oxide formation is predicted to be largely restricted to the sediments, and not to the water cover of the sed pond. Accordingly, such secondary phases will not likely require "settling", as they will form *in situ* within the sediments.	Response Satisfactory. Issue addressed.	MWLAP
83	From #12 in J. Clark Letter. Proposed ARD/ML testing relative to mining wastes which are "PAG", or which have a lower than desirable safety factor relative to ARD production, should be used to explore "For how long will Se be released from the site at the increased levels due to mining activity". For example, for the various wastes, define the Se release rates, the Se-content of the various wastes, the "available Se" (assuming that not all the Se content of the wastes is available) and then predict the time frame for the additional Se released at the site.	John Clark	B. MATTSON - LORAX: A detailed response is provided in the Kinetic update memo that will be submitted to EA in September	Response Satisfactory. Issue addressed.	MWLAP

# ID	Issues Raised	Submitted by	Proponent Response	Review Status	Responsible Agency
84	From #13 in J. Clark Letter. Proposed ARD/ML testing kinetic testing should be used to explore “For how long will sulphate will be released from the site at the increased levels due to mining activity?”. For example, for the various wastes, define the SO_4^{--}-release rates, the SO_4^{--}--content/release of the various wastes, the “available S” (assuming that not al the S content of the wastes is available) and then predict the time frame for the additional SO_4^{--}- released at the site.	John Clark	B. MATTSON - LORAX: A detailed response is provided in the kinetic update memo that will be submitted to EAO in September.	Response Satisfactory. Issue addressed.	MWLAP
85	From #14 in J. Clark Letter. It is suggested that multi-element scans be performed at some point and metal leach testing to provide an indication/prediction relative to metals. Where sulphides are present, the metal leaching testing should take the form of kinetic testing (would this be in the MEM permit?).	John Clark	B. MATTSON - LORAX: Multi-element scans are being conducted bi-monthly on 11 waste rock humidity cells. Additional humidity cells are being commissioned on both tailings and CCR material as well as additional waste rock material. Multi-element scans will also be conducted on leachate from these tests.	Response Satisfactory. Issue addressed. Details at Permitting.	MWLAP
AGENCY: METAL LEACHING / ACID ROCK DRAINAGE					
1	Provide detailed sampling locations for the C-Seam and the D-Seam; provide relationship between solid-phase zinc, lead and selenium concentrations; and clarification of the "bone coal" sample.	Kim Bellefontaine	Sample locations are provided with the updated memo results on Kinetic Testing in September	Response Satisfactory. Issue addressed.	MEM
2	There appears to be a good correlation between selenium leaching rates and finer materials, which has implications for the coarse coal reject. MEM asked what measured leaching rates translate into in terms of potential environmental concentrations.	Kim Bellefontaine	A conservative upper range for selenium in waters from waste rock would be up to 80 mg/L (based on site-specific and regional sampling, including work done at Quintette). Accounting for waste handling measures that occur during operation and dilution, discharge concentrations will be lower, probably much lower than a maximum of 80ppb. The highest potential for selenium leaching will be from the coarse coal reject. The most recent available leaching results from humidity cell testing has been provided to the EA in an update memo on Kinetic Testing in September, 2004.	Response Satisfactory. Issue addressed.	MEM
MWLAP - WILDLIFE					

# ID	Issues Raised	Submitted by	Proponent Response	Review Status	Responsible Agency
1	Lack of effort locating rare plants, no proposed mitigation	Pierre Johnstone MWLAP Aug 11,2004	KEYSTONE - Rare plants not identified as a specific study component by MWLAP when scope of impact assessment was defined. WCC is in the process of carrying out a study to identify potential rare plants.	Response Satisfactory. Issue addressed.	MWLAP
2	Lack of information for absence of the Northern Long-eared Myotis within the project area.	Pierre Johnstone MWLAP Aug 11,2004	KEYSTONE - Priority species for study area were set by MWLAP early in the project's history. Northern long-eared Myotis habitat requirements are little known, and the species has not been documented to occur in ESSF mw or SBSwk2.	Response Satisfactory. Issue addressed.	MWLAP
3	How will new information regarding Caribou be incorporated into the reports	Pierre Johnstone MWLAP Aug 11,2004	WCC - The information will not be incorporated in existing reports. Through the EAO Application Review Stage, the Wildlife Working group is reviewing this information, and decisions related to future actions will be made, depending on the results of that work.	Response Satisfactory. Issue addressed.	MWLAP
4	Caribou assessment focussed on the footprint of the mine.	Pierre Johnstone MWLAP Aug 11,2004	WCC - Cumulative effects analysis was performed across a larger area (944 km2; see section 12.6.2.3). Data on future use patterns of other industries, especially oil & gas, is tentative as plans evolve quickly in that sector. WCC is committed to on-going monitoring and participation in regional Caribou management planning.	Response Satisfactory. Issue addressed.	MWLAP
5	Grizzly mortality resulting from increased access	Pierre Johnstone MWLAP Aug 11,2004	KEYSTONE - The Wolverine Project does not significantly increase road access into the area (although traffic does increase). Project-specific mitigation measures are in place (Section 10.9.2.2.4).	Response Satisfactory. Issue addressed. Together with commitment to develop wildlife management plan.	MWLAP
6	Grizzly CEA to include oil & gas, and forestry.	Pierre Johnstone MWLAP Aug 11,2004	WCC - WCC would be willing to contribute to efforts related to grizzly management planning, in the contex of an overall strategy led by government for cumulative effects management, and commensurate with our level of impact on key factors affecting the population.	Response Satisfactory. Issue addressed.	MWLAP
MMWLAP - AIR QUALITY					

# ID	Issues Raised	Submitted by	Proponent Response	Review Status	Responsible Agency
1	The road dust seem to be estimated assuming water application of 1L/m2 per hour. Is there a guarantee that water will be applied every hour? At 1 L/m2 of water every hour, would there be a run off problem over time?	MWLAP	RWDI - The 1 L/m2/hr water application rate used in the analysis is an average. It not meant to imply that water is applied every hour. A water truck may apply more water in one pass and then not return to the roadway for several hours. The rate is based on one water truck with a 72,000 L capacity filling and emptying approximately every 90 minutes on some part of the haul roads during the driest conditions of the summer that create the highest potential for fugitive dust emissions. On average trucks would need to spray the roads between 3 and 4 times per day during dry summer conditions to provide for the required water application rate. Water application rates will remain below levels where runoff might be a problem.	Response Satisfactory. Issue addressed.	MWLAP
2	The mixing heights were all set for 5000 meters. Although this should not affect some of the results in which the maximum occurred during stable conditions.	MWLAP	RWDI - Because we were using screening meteorology, we did not have sufficient information to accurately estimate mixing heights. As such we chose the default SCREEN3 height of 5000m. As a check of how this assumption might affect the model predictions, we ran the worst case (Case 1) with the mixing height set to 50m. The worst-case predicted concentrations at the Terry Ranch were occurring under stable conditions (Stability Class 6). This conservative approximation did not result in any change in the maximum 1-hour prediction for all sources combined, and increased the maximum 24-hour concentrations by approximately 10%.	Response Satisfactory. Issue addressed.	MWLAP

# ID	Issues Raised	Submitted by	Proponent Response	Review Status	Responsible Agency
3	If the emissions from the piles are dependant on wind speeds should variable emission rates be included in the modelling?	MWLAP	RWDI- We agree that variable emission rates are the most accurate way to look at fugitive dust emissions. However, this would require calculating an emission rate for every hour of the year based on windspeed. Screening meteorology would not be adequate for this calculation and therefore it was considered to be beyond the scope of a screening level assessment. Notwithstanding the above discussion, if the meteorological data set provided by MWLAP for Tumbler Ridge (year 1993) was used to predict fugitive dust emissions from stockpiles, the result would be that no fugitive dust emissions from wind erosion would be predicted for the year. The highest hourly mean wind speed in the dataset is 9.6 m/s and fugitive dust emissions for the stockpiles and exposed areas at the dump and tailing pond are not predicted for wind speeds less than 10 m/s. Threshold friction velocities for coal stockpiles are presented in Table 13.2-4 of AP-42 US EPA documentation.	Response Satisfactory. Issue addressed.	MWLAP
4	Fugitive dust from haul roads in winter when water application is not possible is a concern.	MWLAP	RWDI - No known chemical dust suppressants are widely used for winter dust suppression. WCC will take the position that if fugitive dust from haul roads in winter is a problem and results in elevated concentrations of particulate at the Terry Ranch they will investigate possible solutions. WCC commits to develop Dust Management Plan.	Response Satisfactory. Issue addressed.	MWLAP
	Abbreviations				
	ARD - Acid Rock Drainage				
	CCR - Coarse Coal Rejects				
	Cochrane - Cochrane Consulting				
	EAO - Environmental Assessment Office				
	EPD - Environmental Protection Division, MWLAP				
	ES - Environmental Superintendent				
	Keystone - Keystone Consulting				
	Lorax - Lorax Environmental Services Ltd.				
	MEM - Ministry of Energy and Mines				
	MWLAP - Ministry of Water, Land and Air Protection				

# ID	Issues Raised	Submitted by	Proponent Response	Review Status	Responsible Agency
	OMS - Operational Monitoring Stability				
	Piteau - Piteau Associates Engineering Ltd.				
	PAG - Potential Acid Generating				
	PML - Potential Metal Leaching				
	QOC - Quintette Mine				
	RUSLE - Revised Universal Soil Loss Equation				
	RWDI - RWDI West Inc.				
	USEPA - United States Environmental Protection Agency				
	WCC - Western Canadian Coal Corp.				
	WQ - Water Quality				