Coal Valley Resources Inc Robb Trend Project
Supplemental Information Request
EPEA Application No. 028-00011066
ERCB Application No.1725257
September 18, 2012

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1. Acronyms used in this Supplemental Information Request

The following acronyms are used in this Supplemental Information Request.

AAAQO	Alberta Ambient Air Quality Objectives
AEW	Alberta Environment and Water
ANFO	Ammonium Nitrate and Fuel Oil
ASTM	American Society for Testing and Materials
CACs	Criteria Air Contaminant Species
CEAA	Canadian Environmental Assessment Act
CF	Capture Factors
COPC	Chemical of Potential Concern
CR	Consultant Report
CVRI	Coal Valley Resources Inc.
DFO	Department of Fisheries and Oceans Canada
EIA	Environmental Impact Assessment
EIA	Environmental Impact Assessment
EPA	Environmental Protection Agency
FTOR	Final Terms of Reference
GHG	Greenhouse Gas
HHRA	Human Health Risk Assessment
HLSA	Hydrogeology Local Study Area
HRIA	Historic Resources Impact Assessment
km	kilometre
LFN	Low Frequency Noise
LSA	Local Study Area
m	metre
MPOI	Maximum Point of Impingement
NIA	Noise Impact Assessment
PAI	Potential Acid Input
PM	Particulate Matter
RQ	Risk Quotient
RSA	Regional Study Area
SR	Surface Runoff
TEK	Traditional Environmental Knowledge
TLU	Traditional Land Use
TOR	Terms of Reference
TSP	Total Suspended Particulate
WHO	World Health Organization

2. Board

The responses to questions in this Board section will not be considered as part of the EIA completeness decision made by Alberta Environment.

GENERAL

1. Provide an update on any Project changes, and their impacts, which have occurred since the filing of the Application.

2. Provide an update on any public consultation activities which have occurred since the filing of the Application. Specifically, provide an update on CVRI's efforts to address concerns raised by the Foothills Ojibway, Tourmaline OilCorp., and Trout Unlimited Canada.
   a. What activities have been undertaken?
   b. What issues have been raised?
   c. What issues have been resolved and how?
   d. What issues remain outstanding and how will they be resolved?

3. Provide a statement with respect to all applicable surface and mineral rights ownership in the permit area.

4. **Cover Letter to CEAA dated April 11, 2012**.
CVRI references a July 18, 2011, Project Agreement with the Government of Canada outlining the regulatory process regarding the Project.
   a. Provide a copy of this document.

5. **Section A.4.3.4, Page A-10.**
CVRI lists the additional approvals required for the project, including requirements under the *Water Act*.
   a. Provide a detailed schedule for all permits, licences and approvals associated with the Project, beyond that shown in Table A.6-1.

6. **Section A.8.16, Page A-56.**
CVRI states it has identified other surface and subsurface land and resource users located within the Project mine permit boundary.
   a. Provide a detailed map of all existing facilities/infrastructure in or affecting the permit area, and a discussion on their impacts to mining and vise versa.
   b. Provide an update on CVRI's discussions with the owner(s) of other facilities/infrastructure and confirmation if proximity agreements have been reached.

GEOLOGY

7. **Section A.4.3.1, Table A.4-2 and Section B.6.1, Table B.6-1.**
CVRI lists the sections under application for the proposed permit. In Section B.6.1 CVRI states "*Mancal holds a Mine Permit that overlaps a portion of the west edge of the Project.*" and "*CVRI will negotiate with the lease holder for rights to mine the area*."

a. Provide justification for overlapping the requested permit area over coal leases owned by others.
b. Provide a revised Figure B.6-1 with all existing and proposed permits in the area and highlight the overlapping areas.
c. Describe the specific consultation completed with those third party lease/permit holders and plans for further communication.
d. Provide a timeline for approval of the areas on Figure B.6-1 shown as "Lease Requested" and "Lease Applications Pending".
e. Confirm that the "Lease Requested" areas marked on Figure B.6-1 are not listed in Table B.6-1.

8. Section A.8.3 and Section E.3.1.

CVRI states, "*Information regarding the characteristics of groundwater in the area has been available since 1975*."

a. Provide justification that the Coal Valley Mine (CVM) hydro-geological experience is applicable given that the proposed permit extension is on a different geological trend of "*the western limb of the Alberta Syncline*" mentioned in Section B.2 with the CVM on the Entrance syncline.
b. Provide a discussion on the distance and geological changes between the hydro-geological regime in the Robb trend and the water well near the office of the CVM.
c. Provide discussion on the relevance of data from water wells near Robb to the hydro-geological regime in the Robb trend and how that data was used.

9. Section B.3.1.2, Page B-3.

CVRI states, "*Denison completed exploration and feasibility evaluations for the area...*"

a. Provide a summary (names, locations, size, sampling conducted) of test pits and adits done by Denison in addition to the drillholes already mentioned.
b. Provide a summary of any coal quality testing done on samples from those test pits or adits.

10. Section B.4.3, Page B-8.

CVRI states, with respect to areas of previous underground mining, "*CVRI has worked through such areas previously and maintains 'codes of practice' for operating in such area.*"

a. Provide the codes of practice for coal exploration drilling in areas of previous underground mines.

11. Section B.6.2.1, Page B-11.

CVRI states, "*The report translates this price to a 'breakeven strip ratio' of 6:1 (BCM/RMT) as the relationship for determining the maximum mining depth and pit configuration.*"

a. Clarify if this strip ratio is an Incremental Cut-off Strip Ratio or an Overall Pit Strip Ratio.

12. Table B.6-2 and Table B.6-3.

CVRI provides reserves by strip ratio and reserves by seam separately.

a. Provide a matrix of coal reserves by different strip ratio by mining area with separation into the various coal seams in one table.
b. Provide Table B.6-2 with an additional column of Overall Pit Strip Ratio for each "BESR".

13. Section B.

CVRI has not provided a plan showing drillhole locations within the application. However, MDH has submitted plans in Appendix 9, Figures A1 to A5 showing drillholes with additional geological information for parts of the proposed mine permit amendment.

a. Re-submit figures with all geological features marked and annotated including drillhole locations, cross section locations, projected subcrops, faults, bedding angles, fold axis, to and beyond the proposed permit amendment. Ensure that all drillholes are annotated and the proposed permit amendment boundaries are clearly shown.

14. Section C, Figures C.2-3 to C.2-15.

a. Resubmit these figures with coal holes shown and all geological features marked and annotated including but not limited to geological formations, folds, and faults. Ensure that all drillholes are annotated and the proposed permit amendment limits are clearly shown.
b. Provide cross-sections for a permit application at approximately 800m to 1000m spacing. All coal seams must be shown on each cross section, even if they are projected from geological interpretation.
c. Provide a discussion on what further geological information is needed to complete the modeling and project the coal seams beyond proposed pit limits.
d. Submit longitudinal sections with the extents of previous underground mines, drillhole locations and all geological features marked and annotated. Clearly show annotated drillholes and the proposed permit amendment limits.

15. Section C, Figures C.2-3 to C.2-15.

These cross sections show construction of external dumps above coal resources.

a. Provide justification for sterilizing the coal resources, including evaluation of alternative dump locations.

16. Appendix 10, Section 1.0.

Norwest states, "*...the surface mineable portion of the coal seams that underlie the Robb Main Trend (RM) and the Robb West (RW) coal blocks...*" It appears not all proposed mining blocks have been modeled.

a. Confirm that the material in this appendix deals with all the proposed permit amendment of Robb West, Robb Main, Robb Center, Robb West.
b. Confirm that the geological models used for analysis in this appendix deal with all the proposed permit amendment of Robb West, Robb Main, Robb Center, Robb West.

17. Appendix 10, Section 1.0.

Norwest states, "*The first report, prepared in accordance with the requirements of National Instrument 43-101....*" In Appendix 10, Section 2.0 Norwest states, "*The Technical Report provides a detailed description of the history, tenure and geology of the*

Robb Trend and surrounding area. The reader is directed to "Technical Report – Robb Trend Coal Property" dated November 5, 2010 for these details."

a. Provide the first report (Technical Report).
b. Confirm that the first report describes the evaluation process or that the sub-Appendix "A" describes the evaluation process.

18. Appendix 10, Section 1.0.

The text between Tables 8.2 and 8.3 says, "*At present the economic potential of the Arbour Seam in the Robb Trend area is unknown. The Technical Report offers some guidance in terms of what information would be required to better assess the potential of the Arbour Seam.*"

a. Discuss the additional information that is necessary to assess the potential of the Arbour seam and how and when CVRI will obtain this information.

19. Appendix 10, Section 3.0.

Norwest states, "*Footwall surfaces were created and then sliced onto a 100 m spaced North-South grid set. Seam polygons were drawn on a section by section basis.*" and Appendix 9, Section 2.3.1-2 MDH states, "*Interpretation of drilling data and geophysical logs indicated that faulting exists at Robb East from 36800E to 43000E. The faulting displaces the Val D'Or and Arbour coal seams as well as the lower seams of the coal zone. Through this region the Val D'Or Seam is notably thicker, likely due to the faulting*."

a. Discuss how the partially known faulting, mentioned in Appendix 9, is being incorporated in the resource modeling being done as a simple monocline apparent in Appendix 10 text and cross-section.

20. Appendix 10, Section 3.0.

Norwest states, "*To account for the rock partings that are included in the seam solids, an ore-waste composite ash value was calculated for the drill holes, where the interval thickness for each material type within the coal package contributed to the overall raw ash value. The composited raw ash values for each seam were interpolated into the model blocks using the composited drill hole data*." and "*Quality data were then incorporated into the model where ash was assigned to each lithology from the limited drillhole quality data that was available for each seam.*"

a. Provide discussion as to whether the ash values were determined from only the few coal quality analysis available or interpreted from other drillhole data.
b. Confirm that, as it appears in the cross-sections, the process of seam composites appear to have assigned uniform ash values to each block in thicker seams.
c. Provide discussion on how the "*Quality data*" re-estimated the previously modeled ash values.
d. Discuss if there was a distance limit to extrapolation of that data.
e. Describe what the process was for blocks beyond the distance limit.

21. Appendix 10, Section 3.0.

Norwest states, "*Once the in-place composited ash was determined, contact dilution was introduced to simulate the raw coal recovery process. This was accomplished by replacing 0.2 m of in-place coal with 0.2 m of rock at each external rock/coal contact*."

a. Provide discussion on whether it is an industry standard to have the concepts of top-loss and bottom dilution modeled in this fashion.
b. Provide discussion if the thicknesses of top-loss and bottom dilution are appropriate for this style of mining and proposed mine equipment.

22. Appendix 10, Section 3.0.

Norwest states, "*ROM SG = 0.98* ROM Ash% + 1.209*".

a. Provide discussion on how SG would be calculated when there are two seams in one block.
b. Errata. The Ash % is more properly represented as Ash decimal.

23. Appendix 10, Figures 6-2 to 6-5.

The figures provided are diagrams showing the LG results in cross-section.

a. Provide similar cross-sections to those requested in SIR #14 or confirm that the lines on the MDH cross-sections (Appendix 9, Figures in sub-Appendix B) are the results of the LG shells.
b. Confirm the LG shells represent the geological faulting mentioned in Appendix 9, Section 2.3.1-2.

24. Appendix 10, Table 6.1 and 6.2.

Norwest titles these tables as "…*Resource Summaries*"

a. Errata - Norwest titles as "Robb Trend Resource Summary" with headers including "in-place Coal/Kbcm", "ROM/Kcmt", "clean/Kcmt". It is understood that, as the volume changes for different "coal price", the "in-place Coal" is only the coal resource within the respective LG shells and is not the total resource of the coal deposit. "in-place Coal/Kbcm" should be "recoverable resource", "ROM/Kcmt" should be "ROM reserves", "clean/Kcmt" should be "clean reserves", and the table header "Robb Trend Resource Summary" should be "Robb Trend Reserves Summary".
b. Provide the initial in-place coal resources including all categories of coal (not limited to the resource within the LG shells) and listing each seam individually.

25. Appendix 10, Section 8.0.

Norwest states, "*…was modified to include the Arbour seam. The adjusted pit shell was used to estimate the in-place tonnage of this seam and the incremental strip ratio required to recover it. The adjusted ROM resource including the Arbour seam is reported on a by seam/package basis in Table 8.2.*"

a. Confirm that the inclusion of the Arbour was based on re-calculating the LG shells to also include this large resource.
b. Provide discussion on the resulting strip ratios if the original LG shells from non-Arbour LG modeling were used.

26. Appendix 10, Section 8.0.

Norwest states, "*The operating history at the Coal Valley Mine shows that the Arbour seam is not generally recovered due to high ash and the presence of inseparable and difficult to process bentonitic layers, therefore the Arbour seam has not been included in the resource evaluation.*"

a. Clarify that the coal resource is the estimated value for recoverable resources or in-place resources even if there is no recovery.

27. Appendix 10, Figures 8-1 to 8-4.

a. Why do the proposed base-of-pit lines for the 'Base Arbour Excluded' scenario not have the Val D'Or as the footwall?

28. Appendix 10, sub-Appendix "A" Figure 3.

Norwest shows plan views of the various pit shells.

a. Provide similar figures that show all BESR outlines for each pit location within the proposed permit amendment.

MINING

29. Section A.1, Page A-1.

CVRI states, "*This additional tonnage would provide CVRI with the necessary resources to operate at projected rates of production until 2038*."

a. Provide a list of other satellite pits, in addition to those shown in Table C.1-2, with corresponding reserves by pit.
b. Provide a plan for investigating the feasibility of mining in other locations concurrent with Robb Trend.

30. Section A.3, Page A-3.

CVRI identifies project alternatives for the development of its coal reserves; however, no mention is made of investigating the applicability of highwall mining.

a. Provide an assessment of employing highwall mining at the Robb Trend mine site.

31. Section B.4.3, Page B-8.

CVRI states, with respect to areas of previous underground mining, "*CVRI has worked through such areas previously and maintains 'codes of practice' for operating in such area*."

a. Provide the codes of practice for surface mining operations in areas of previous underground mines.

32. Section C.1.1, Page C-2, Table C.1-1.

a. Update and resubmit table to include overall ratio in BCM/RMT.

33. Section C1.4.2, Page C-12.

CVRI states, with respect to tailings storage, "*Long term storage capacity in the pond is available*."

a. What is the life and capacity remaining in the pond?

34. Section C, Table C.3-1, Page C-35 and Figures C.3-1 to C.3-11.

CVRI provides a table summarizing the nine stages of the proposed mine development. Figures C.3-1 to C.3-11 show the stages at a low level of detail.

a. Resubmit the figures to show each of the stages in more detail that includes pit locations and names, dump locations and names, haul roads, mining methods, and creek/river diversions.
b. Provide representative cross sections showing accurate depictions of each stage. All the coal seams and other lithologic layers must be identified and shown to the maximum extent of the exploration drilling conducted to date.

35. Section C.2.2, Page C-31.

CVRI states, "*pit limits are determined by applying a BESR on each of the cross-sections*." and Appendix 10, Section 6, Page 6-1 states that Lerchs-Grossman pit optimization was used to develop ultimate LG pits.

a. Provide clarification on how the two methodologies correlate.

36. Section C.3, Page C-35.

CVRI states that backfill of the pits should be maximized yet backfilling is not apparent in figures C.3-1 to C.3-11.

a. Provide the proposed waste allocation plans for the Project.

37. Appendix 9, Section 3.2, Page 25.

MDH states, "*As indicated by Norwest's preliminary pit shell layouts for the RT project, the deepest pit will be up to 190 m. The results of the slope stability analysis by Piteau (1982) did address designs for pits up to 280 m deep*."

a. Application Section C, Figures C.2-3 to C.2-15 appears to show the deepest pit at 180 m. Provide a contour map showing CVRI's proposed conceptual mine plan.
b. Provide the economic assessment that showed Piteau analysis of mining to a depth of 280 m.

38. Appendix 10, Page 3-1.

Norwest states, "*The geologic model (the model) was primarily concerned with the Val d'Or and Mynheer Seams…"*

a. Describe how the other seams were evaluated for mining, and confirm if resources and reserves were modeled for all seams.

39. Appendix 10, Page 3-1.

Norwest states that it "*did not develop a base of oxidation surface; it was decided that the introduction of an oxidation provision would not materially alter the conclusions of the current study. It is recommended that CVRI introduce an oxidation surface at the next level of study*."

a. Describe how CVRI will address this in the detailed mine plan.

40. Appendix 10, Section 3, Page 3-3.

Norwest states that their study applied SG and Yield equations consistently to all seams and recommended CVRI introduce seam specific equations for the next level of study when more detailed coal quality information is available. The ERCB requires analysis of the coal as per Clause 4(1)(f) of the Coal Conservation Regulation (CCR).

a. Provide seam specific coal quality information.

41. Appendix 10, Section 3, Page 3-4.

Norwest states, *"In Section 16.7 of the Technical Report the author concludes that the Robb Trend coal quality dataset is not presently strong enough to support reserve designation."* The ERCB requires a statement on established recoverable reserves to issue a mine permit.

a. Clarify this statement in the context of Clause 4(1)(e) of the CCR.
b. Discuss CVRI plans to mitigate deficiencies in the dataset.

42. Appendix 10, Section 6.0 page 6-6.

Norwest states, "*The ratios are somewhat skewed by the depth restriction imposed on the dragline mining scenarios and the thicker till pockets seen in the Robb Center area*."

a. Provide discussion how the constraint affected the LG process.

43. The ERCB notes that the nearby proposed Coalspur Vista Project is currently under regulatory review. This proposed project has an overall average clean coal strip ratio of 9:1 based on a C$80 coal price. Justify why CVRI's proposed project shows lower recovery.

GEOTECHNICAL

44. Section B.3.1, Page B-3 and Appendix 9, Section 2.3.1, Page 8.

CVRI states that over 730 drill holes have been drilled in the Project during different exploration programs and that additional drilling is currently being conducted.

a. How many of these drill holes were geotechnical holes used to investigate subsurface conditions and obtain samples for testing?
b. How many of these holes were cored holes?
c. Provide a site plan showing the geotechnical drill or core hole locations.
d. Discuss CVRI's plans to conduct geotechnical drilling to gather additional site-specific geotechnical information.

45. Section B.4.3, Page B-8 and Appendix 9, Section 2.5, Page 16.

CVRI states, with respect to areas of previous underground mining, "*CVRI has worked through such areas previously and maintains 'codes of practice' for operating in such area.*" CVRI also indicate that the *approximate* extents of the underground mines are known.

a. Discuss CVRI's plans to conduct detailed review and reconnaissance to accurately delineate the extents of underground mine workings relative to pits, dumps and other proposed mine infrastructure.
b. Discuss the potential impacts old underground mines could have on the pit floor, external dump and pit wall stability.
c. Discuss CVRI's plans to conduct detailed assessments of these potential impacts prior to at the licencing stage.

46. Section B.5, Page B-8.

CVRI provides a section related to the geotechnical assessment and references Appendix 9 as the source of the assessment for the Project.

a. Provide CVRI's summary of the information provided in Appendix 9, including a list of all recommendations provided by MDH and CVRI's intent to adopt these.

47. Appendix 9, Section 2.1, Page 3.

MDH states that faults may be present in the Project area but are relatively uncommon and generally have displacements of less than 10 metres. Appendix 9, Section 2.3.1-2 MDH states, "*Interpretation of drilling data and geophysical logs indicated that faulting exists at Robb East from 36800E to 43000E.* The chart provided in Appendix 9, Figure 3.1 shows footwall (coal seam) as high as 70 degrees and cross joint dips as low as 20 degrees coincide with this area.

a. Describe the impact of this faulting on the pit wall design.
b. How will CVRI mitigate these impacts during operations?
c. Describe how CVRI plans to conduct site-specific verification of faulting and structural geology in general.

48. Appendix 9, Section 3.0 and 4.0, Pages 16 and 33.

MDH provided geotechnical assessments for the pit and external dump designs.

a. Provide site plans showing the proposed locations of the pits and external dumps. These plans must show proposed haul roads and creek/river diversions and topographic contours.

49. Appendix 9, Section 3.1, Page 17 to 24.

MDH provided preliminary geotechnical parameters for pit design including rock type, rock strength and structure, which are based on previous studies and/or CVRI experience.

a. Describe CVRI's planned detailed site specific investigations to determine local parameters.

50. Appendix 9, Section 3.2, Pages 24 to 32.

MDH identifies that maintaining pit wall stability is highly dependent on drained conditions in the pit wall. The Application shows a significant portion of the Robb Main area between 11000E and 17000E will include mine pits that are in very close proximity to the Erith River or the Erith River diversion.

a. Discuss if this represents the worst case scenario of pit wall/surface water interaction in the Project.
b. Discuss CVRI's plans to control groundwater levels and thereby maintain pit wall stability in such areas.
c. Discuss how CVRI's dewatering plan will address the potential water management of extremely large volumes.
d. Discuss how detailed pit wall design will address the worst case pit wall portions of the mine and if more stringent stability requirements will be required in such areas.
e. Describe CVRI's plans for groundwater and stability monitoring plans for pit walls.

51. Appendix 9, Section 4.2.2, Page 36.

MDH states, with respect to external dump design and geotechnical parameters, *"…site specific geotechnical field investigations will be carried out at the pit licensing stage to assess foundation conditions of the proposed overburden dumps at RT."*

a. Confirm that CVRI will conduct the required detailed site specific assessment to determine foundation conditions and discuss how CVRI will improve on the quality and quantity of the information required during the dump licencing stages of the Project.
b. Describe CVRI's plans for groundwater and stability monitoring plans for external dump.

SOCIO-ECONOMICS

52. Section E.9.2.6, Page E-143.

CVRI states "*In total 460, or 92% of the CVM direct workforce is resident to the RSA.*" In Section A.8.9 CVRI states that the mine will continue to ensure "*Provision of employing 490 RSA residents in well-paying jobs*." The application is unclear in the number of workers employed during operations that reside in the RSA. CVRI provided two different numbers.

a. Clarify how many people will be directly employed during the operation phase.
b. Provide an estimate of how many employees will be from the RSA.

53. Consultant Report # 9, Section 1.3.1, Page 2.

"*Workforce requirements for the Project, including a description of when peak activity periods will occur*" is identified in TOR 7.1 [B] c) but was not addressed by CVRI or the consultants. The TOR states requirements that need to be covered by the applicant.

a. Provide a description and timeline of when peak activity periods will occur.

54. Consultant Report # 9, Section 3.1.2, Page 28.

CVRI has provided a breakdown of current operating costs. The company states, "*The CVM's total annual operating budget is in the order of $226 million per year.*"

a. Clarify if CVRI assume operating costs will remain at approximately the same level?

55. Consultant Report # 9, Section 3.2.1.2, Page 32.

CVRI states, "*The Project will create approximately 250 PY of employment over the construction period, predominantly for equipment operators, surveyors, carpenters and welders. The onsite workforce is estimated to range between 20 to 30 persons from 2014 to 2016.*" The company's consultant states construction employment in person years and then in employee numbers. Since there are four phases of the project, it is unclear how many people, or person years, are required for each phase.

a. Clarify if the 250 PY for all phases or for the construction period 2014 to 2016?
b. Clarify if the 20-30 persons represent the construction workforce?
c. What is the estimated construction workforce for each of the four stages; Robb Centre, Robb Main, Robb East and Robb West.

WATER

56. Consultant Report #6.

Numerous watercourses will be diverted during mine construction, operation, and following closure. This will require approvals from both ESRD (Water Act) and DFO.

a. Provide an update on discussions and consultation with DFO and ESRD regarding timing and requirements for these approvals.

57. Consultant Report #6.

Numerous mountain mines have resulted in increases in Selenium loading to watercourses and water bodies.

a. Provide baseline data and describe the risk that there will be increased Se in receiving water bodies.
b. Describe monitoring and finding for Se concentrations in water and fish tissue from existing CVRI mines in the region.
c. Describe CVRI's plans to monitor Se concentrations in water or fish tissues at the Robb Trend mine.
d. Discuss how mine and reclamation plans incorporate mitigations to minimize the risk of Se loading to local water courses.

58. Consultant Report #3.

CVRI provided 2009 Annual Report entitled "*Groundwater Monitoring Coal Valley Mine*" prepared by Millennium EMS Solutions Ltd.

a. Submit the most up to date groundwater monitoring report and provide a discussion on any changes that occurred in 2010-2011 in the condition of subsurface soils and groundwater in the Coal Valley Mine.

59. Section E, Page E-44.

CVRI states, "*A synthesis of 74 hydraulic conductivities determined in the historical information has noted that the maximum value observed was 3.7 x 10 -3 m/s while the minimum was 3.4 x 10 –9 m/s with a median value of 2.9 x 10–6 m/s. The million-fold range of hydraulic conductivity is not unusual given the fact that the nature of the rock can range from solid, intact strata to collapsed coal seams in abandoned underground workings*."

a. Provide a site plan showing the testing locations and a summary table with the monitoring wells' completion details including the completed interval's depth and lithology and the measured hydraulic conductivity.

60. Section E, Page E-44.

CVRI states, "*Generally, groundwater in the Project will have TDS less than 800 mg/L, will be sodium bicarbonate in nature and pH may be expected to be approximately 9*."

a. Provide a site plan showing the sampling locations and a description of the major hydrostratigraphic units in the project area and identify from which the water samples were collected, including lithostratigraphic description and the depth range.

61. Section E, Page E-45.

CVRI states, "*Section 2.3.3 of the CR#3 (Hydrogeological Report by Millenium EMS Solutions) contains the details of the hydrogeological regime comparable for that of the project*. "

a. Section 2.3.3.1 and Section 2.3.3.2 of the Section 2.3.3 of the CR#3 describes two different hydrogeological regimes. Outline the major hydrostratigraphic units, the depth to the water table, the principle directions of the lateral and vertical shallow groundwater flow direction in each of the defined units specifically in the proposed expansion area based on the available site-specific data.
b. The Erith River and a number of Creeks flow through the proposed expansion area. Describe how mining activities will impact groundwater-surface water interaction in the proposed development area.

62. Section E, Page E-46.

CVRI states, "*Because of the steep dip of the geological structure of the area drawdown of groundwater levels take place in a cross-formational direction. Declines in water levels will be transmitted across formations rather than along the formations.*" Further, CVRI states, "*The operating procedure for pit dewatering is to return the water to the local drainage course. This will have the net effect of an insignificant change in the volume of flow in the water course*."

a. Provide a conceptual drawing illustrating the dewatering technique.
b. Demonstrate quantitatively that the impact of dewatering is environmentally insignificant for the major water courses in the project area such as the Erith River. Include the model inputs such as pumping rates and schedules.

63. Section E, Page E-49.

CVRI states, "*Hackbarth Environmental (1999) presented an assessment of the behaviour of nitrate in mine spoil. Hackbarth determined that nitrate may be elevated above background in mines (or portions of mines) where significant amounts of explosives were used. He further determined that the nitrate was leached out after several years. Thus, the occurrence of nitrate is self-mitigating. The impact of nitrate on groundwater chemistry is insignificant*."

a. Provide updated monitoring data from 2000-2011, analyze these results and show that the new monitoring data supports the findings of the 1999 report.

64. Section E, Pages E-49 to E-50.

CVRI stated, "*Unacceptable drawdown of water levels in wells is likely to occur when mining operations are active in the areas of the Lakeside and Bryan Mines. This impact will be highest for shallow wells located close to these areas and much less for wells which are deeper and/or located farther away from the former underground mines*," and "*CVRI will inventory water wells in all three residential areas of Robb as mining approaches the Lakeside Mine in approximately 2029*."

a. Provide a summary of the domestic water use in the impacted area, including a map showing the locations of all the water wells in the 3 km radius and a table summarizing completion and use details for all the water wells using the publicly available sources.

b. Provide information on any existing and expired water diversion licenses in the LSA/RSA.
c. Define the time lapse between the surveys and anticipated adverse impacts on the groundwater supply.
d. Describe the components of the survey (i.e. the groundwater levels, yields and the chemistry) and the selection criteria for the water wells that will be accessed for the baseline water well testing;
e. Specify the number and frequency of the monitoring and sampling events that will be conducted prior to the development in order to establish the background groundwater quality and quantity.
f. Provide a list of components that the background water samples will be analyzed for, specifying the indicator parameters that will be monitored and the guidelines that each parameter will be compared against.

TERRESTRIAL

65. Section F.3.4, Page F-27.

CVRI states, "*Where reclamation stock is available suitable understory species would be inter-planted with the tree seedlings.*"

a. Discuss what species will be selected and how CVRI will secure stock for use in reclamation.
b. Describe CVRI's experience with this approach, and provide examples of where it has led to certified reclamation.
c. If shrub stock is not available for reclamation, what will the effect be on capability for target wildlife species?

66. Section F.4.2.4, Page F-48.

CVRI states, "*Traditional value plants will be identified in respect to their possible use as revegetation species.* "

a. Discuss CVRI's commitment to use Traditional Use species as presented in *The Aboriginal Consultation, Traditional Ecological Knowledge and Land Use* report, March 1, 2012, Section 4.1, Important Plant and Fungi Species Identified in the Project Area, Table 11, Page 53/54.

67. Section 5.6.4, Page 145.

CVRI states, "L*ong term impacts on community and landscape level biodiversity in the LSA and the RSA, following mitigation, are negligible given that ecosites will be reclaimed following mining.*

- *Aim at the establishment of equivalent levels of biodiversity areas common to predistubed conditions (AEP 1998:27)*
- *Immediate direct placement of soil salvaged (with propagules) in areas of high and very high biodiversity*
- *Reestablishing deciduous trees, native shrubs (willow, berry species), and forbs to provide structural diversity, and wildlife habitat to the coniferous dominant ecosystem.*"

a. Discuss the CVRI strategy to establish a range of ecosite phases that would provide an equivalent area and quality of habitat for listed species found in the LSA.
b. Provide local empirical reclamation information to demonstrate that ingress has been an effective reclamation strategy for the establishment of ecosystems and wildlife habitat that could support the documented pre-disturbance Listed Species at closure.

68. Table F.3-4, Page F-28.

This table indicates that an objective of the upper ridge BRU is to establish plant cover to control surface erosion.

a. Describe other methods that have been considered to control erosion (e.g. soil mounding), and why those have not been incorporated or considered acceptable by CVRI.

69. Consultants Reports #14, and Section E.

Although maps are provided showing habitat values at various stages of mining for elk and moose, no similar maps are provided for species of management concern (Listed species) except for mammalian carnivores (CR #7).

a. Provide maps at the local and regional scales showing the location and describe the amount of habitats of various quality for species of management concern at baseline and during mining.
b. Provide maps at the local and regional scales showing the location and describe the amount of habitats of various quality for species of management concern following closure.
c. Discuss how CVRI will demonstrate that equivalent capability for species of management concern has been achieved.

70. Consultant Report #7, Section 5.3.5.3, Page 78/79.

CVRI states, "*Upon closure and decommissioning, reclaimed mined lands once again revert to the Province of Alberta. Symbaluk (2008) and Kansas and Symbaluk (2011) noted that it is after mine closure that grizzly bears are most vulnerable to potential increases in mortality associated with public access. Without careful land planning and management, an attractive source for grizzly bears has potential to quickly become a mortality sink*."

a. Discuss the CVRI management strategy to design the closure landscape and vegetation to separate people from the places that would attract grizzly bears post closure.
b. Describe the process the CVRI will use to determine final land uses and landscape design to support these uses.

71. Consultant Report #7, Figure 19.

a. Discuss how the CVRI management strategy and reclamation will comply with ESRD's Grizzly Bear Recovery Plan.
b. Provide a tabular representation of pre-disturbance habitat units, (hectares of H, M, L suitability) of the LSA for grizzly bears based on an analysis of predisturbance habitat suitability figures provided with in the Mammalian Carnivore Report

72. Consultant Report #7, Section 6.6.5, Page 94.

CVRI states, "*The causes and pathways of cumulative effects on grizzly bear mortality are both compounding and synergistic. Increasing open motorized road access is being used by humans leading to increasing probability of contact with grizzly bears. Such contacts are resulting in death of bears as indicated by the high percentage of radio collared bears being killed. Probability of contact between humans and bears is highest in areas where attractive, high quality habitat overlaps with high road densities and potential for human occurrence (Nielsen et al. 2006). Examples of such areas include regenerating clear cut complexes and riparian vegetation along river valleys (Roever 2007) and surface coal mine permit areas (Stevens and Duval 2005, Kansas 2005).*"

a. In Volume 1, Section 16.2.2, Table E.16-3, pg. E-264-268 and Table E.16-4, pg. E-268-271 CVRI lists oil and gas surface rights dispositions and other surface dispositions issued to Forestry companies within the area covered by the Project. Discuss CVRI's intent to partner with regulatory agencies and other resource development companies to develop and implement local and regional integrated land management strategies to minimize the effects of roads, their locations, resource development and reclamation to grizzly bear populations of the LSA and RSA.
b. Provide an assessment of the cumulative effect that all existing, approved and planned development within the RSA would have on the sustainability of grizzly bear populations of the RSA. Include the effect the developments would have on grizzly bears populations during development and post closure. Include the effect of displacement of grizzly bears from development areas.
c. Provide a discussion of development and reclamation strategies that would be implemented to ensure sustainable grizzly bears populations in the LSA, and RSA due to the cumulative regional development effect to grizzly bears populations.

ERRATA

73. Appendix 9, Section 2.0.

CVRI states the faults and folds are 70 to 150 million years old. However, it is the sediments that are that age.

74. Section C, Table C.2-5.

The units in the title should be in "million tonnes".

75. Section B, Table B.6-2.

The units in the title should be in million RMT.

3. General

1. Volume 1, Section A.2, Page A-2

a. What are the specific provincial and national environmental achievement awards that CVRI has received?

b. Will CVRI provide copies of reclamation certification for end pit lakes at CVRI? How does CVRI's *industry leading* practices for the development of end pit lakes differ from other coal mines?

2. Volume 1, Section A.3.2.1, Table A.3-1, Pages A-3 and A-4

With respect to CVRI's evaluation factor *biophysical factors/environment – fisheries, vegetation, timber, wildlife, soils, air quality, noise, groundwater, surface water and hydrological*:

a. What does a rank of 3 (best) indicate, i.e., what are the criteria used to determine Environmental ratings for this project?

b. Describe project elements and their effects on Environmental rating.

3. Volume 1, Section C.2.1.2, and Figure C.2.1, Page C-24-25

It is stated that several external overburden dumps will be constructed and reclaimed.

a. Discuss the rationale for the number of external overburden dumps proposed.

b. Discuss/present options available to reduce the number of proposed external overburden dumps.

4. Volume 1, Section C.6.6, Page C-59

CVRI indicates that in their Environmental Protection Program they have a program for emergency response and wildfire control and prevention. There are several underground coal seam burnings/fires within and in the periphery of the RT mine development boundary. They are considered a wildfire hazard.

a. Describe CVRI understanding of the locations of these underground coal seams burnings/fires.

b. Discuss CVRI's approach to manage underground coal seam burnings/fires that are within the permit boundary.

c. Discuss CVRI's approach to manage underground coal seam burnings/fires that are in the periphery of the permit boundary.

3.1. Public Engagement and Aboriginal Consultation

5. Volume 4, CR #12, Section 1.3, Page 6

Coal Valley Resources Inc. states that *….field studies to identify particular traditional use locations have been largely completed, but some fieldwork is still required. Reports on the results of traditional studies are in preparation or have been finalized by the*

majority of the groups. Those currently completed, and permitted by those Aboriginal groups to be reproduced, appear as Appendices.

a. What is the status of Coal Valley Resources Inc.'s outstanding fieldwork?

b. Were there any concerns regarding impacts to Rights and Traditional Uses raised by First Nations to Coal Valley Resources Inc. as a result of this additional field work? If so, how have they been discussed and avoided or mitigated?

c. There are no reports on the results of traditional studies in the Appendices of Consultant Report #12; Are there First Nation traditional use reports completed that can be shared? If so, provide these reports or a summary of the results of these studies.

d. Are there completed First Nation traditional use reports that Coal Valley Resources Inc. is not permitted to share? If so, for which First Nations?

6. Volume 4, CR #12, Section 3, Page 17

a. How has access to traditional lands in the Project Area during all stages of the Project been discussed with First Nations?

b. What were the outcomes of these discussions?

7. Volume 4, CR #12, Table 2, Page 18

Coal Valley Resources Inc. states under the April 11, 2007 entry …*response to concerns sent May 3, 2007* to Alexis Nakota Sioux Nation.

a. Provide a copy of the written response to concerns that was sent to Alexis Nakota Sioux Nation on May 3, 2007 or outline specifically how the concerns were addressed.

8. Volume 4, CR #12, Table 8, Page 43

Coal Valley Resources Inc. states under the August 13-24, 2007 and October 17, 2007 entries that *Mitigative measures provided in the report include…report is okay to be seen in the public record….A mitigation plan was devised*

a. Provide the referenced report.

b. Provide the referenced mitigation plan developed with O'Chiese First Nation.

9. Volume 4, CR #12, Section 3.8.1, Page 46

Coal Valley Resources Inc. states …*the Paul First Nation officially provided a letter of endorsement for the Mercoal West, Yellowhead Tower, and the Project extensions on November 18, 2009.*

a. Provide the referenced November 18, 2009 letter from Paul First Nation to Coal Valley Resources Inc.

10. Volume 4, CR #12, Section 4, Page 52
Volume 2, Section A.8.12, Page 48
Volume 5, Appendix 7, Pages 32-46

Coal Valley Resources Inc. states that *Discussions regarding First Nations concerns with the development and possible mitigation strategies are on-going, and will be finalized on a group-by-group basis after the Project application submission date*.

a. What is the status of Coal Valley Resources Inc.'s discussions with each First Nation regarding potential impacts of the Robb Trend project on First Nations Rights and Traditional Uses and the proposed avoidance or mitigation strategies for their concerns?

b. Provide a table similar to Volume 15, Appendix 7 Public Engagement, Appendix 4, presenting; potential impacts to Treaty Rights and Traditional Uses by First Nation, Coal Valley Resources Inc.'s proposed avoidance and/or mitigation, and the First Nations responses to the proposed avoidance/mitigation.

c. How will Coal Valley Resources Inc. report on any outstanding First Nations concerns that could not be avoided or mitigated?

11. Volume 4, CR #12, Section 4.4, Page 58

Coal Valley Resources Inc. states at the end of the first paragraph *Specific address of these concerns is discussed in the appropriate sections of the EA report…*

a. How have the appropriate sections of the EA report (including Consultant Reports) relating to First Nations concerns, including potential impacts to First Nation Rights and Traditional Uses, avoidance and/or mitigation as outlined in the EA, been discussed with First Nations?

b. What were the outcomes of these discussions and how will Coal Valley Resources Inc. report on these discussions and outcomes?

12. Volume 4, CR #12, Section 4.4, Page 58

Coal Valley Resources Inc. states in the second paragraph *The avoidance of ceremonial areas, specific plant species, graves and other areas during construction and operation of the proposed Project area has been negotiated, or will be negotiated, on a case-by-case basis with individual Aboriginal groups. CVRI has already agreed to avoid some areas of particular importance within or adjacent to the Project area, and has entered into agreements with some groups for longer-term monitoring of impact to medicinal and other plants, or for monitoring of general environmental impacts.*

a. What is the status of Coal Valley Resources Inc.'s negotiations with First Nations to avoid traditional sites?

b. Provide the monitoring agreements that Coal Valley Resources has entered into in order to avoid or mitigate impact to First Nation Rights and Traditional Uses or provide a summary of the content of those agreements.

3.2. Transportation

13. Volume 1, Section C.1.3.2 to C.1.3.5, Pages C-5 to C-9

CVRI discusses draglines crossing the highway, truck/ shovel operation, timber salvage, and blasting operations in these Sections. Alberta Transportation is concerned that operations will impact traveling public on the highways in the vicinity of the Project.

a. Discuss CVRI's Traffic Accommodation Strategy for the event of a dragline crossing a provincial highway;

b. Provide the haul route and truck volumes for the timber salvage and truck/shovel operations; and

c. Discuss the impact of the operations on highway traveling public and mitigation methods.

14. Volume 1, Section C.1.5.1, Page C-12

CVRI states *The main entrance to the facility area is from Highway 40.* As per part [A] Section 2.5 of the Terms of Reference, CVRI is to *discuss the traffic implications of the Project, including the anticipated changes to traffic (e.g. type, volume) on highways. Consider other existing and planned used of the same highways*. However, CVRI did not clearly provide the anticipated traffics generated by the Project (type and volume) during construction, operation, and expansion phases, and whether any improvements to highway accesses are required.

a. Provide anticipated traffics generated by the Project (type and volume) during construction, operation, and expansion phases, and determine their impacts to highway operation and whether any improvements to highway accesses are required.

3.3. Historic Resources

15. Volume 3, CR #4

The FTOR for this project states:

HISTORIC RESOURCES

A. Describe the Historic Resource Impact Assessment (HRIA) work done for the Project, and provide a schedule for any future work.
B. Describe the implications of the findings of the HRIA work on Project design and scheduling.
C. Describe any Project uncertainties arising from the need for future HRIA work.

Consultant Report #4 Historic Resources of Volume 3 does not contain any information. Coal Valley states that this report was *Submitted under separate cover to Alberta Culture ad Community Spirit*. However, it is a requirement that a summary and overview of the information be provided in the EIA for the Public Record while not disclosing information that is protected under provisions of the *Historical Resources Act*.

a. Provide the information as outlined in the Terms of Reference:

i. Describe the Historic Resource Impact Assessment (HRIA) work done for the Project, and provide a schedule for any future work.
ii. Describe the implications of the findings of the HRIA work on Project design and scheduling.
iii. Describe any Project uncertainties arising from the need for future HRIA work.

16. Volume 4, CR #12, Figures 16, 17, 18 & 19, Pages 73-75

a. Did CVRI obtain permission from First Nations to have the photos of traditional camp-out published?

4. Air

17. Volume 2, CR #1, Section 2.1.1, Page 4

CVRI states that the Application and Planned Development Cases are based on Year 2034 without justification with respect to consideration and exclusion of other projects in the general vicinity. Specifically, AEPEA s 47(d) states that the EIA must include *a description of potential positive and negative environmental… impacts of the proposed activity including cumulative, regional, temporal and spatial considerations.* This is particularly true for the air quality assessment where emissions from facilities several kilometers away have the ability to materially affect the predicted impacts within the Local Study Area (LSA) and Regional Study Area (RSA).

Cumulative effects assessment must have regard for reasonable foreseeable projects, activities and natural events that could affect the magnitude, duration or significance of a project's cumulative effects. As well, any overlap among multiple projects with respect to temporal and spatial scales must be considered and discussed. Several other coal mining and quarrying projects have been announced, approved, are undergoing regulatory review, or are directly associated with the Project (e.g., Lehigh, Cardinal River Operations, Coalspur) and these projects are outside the selected approximately 50 km by 50 km RSA.

a. Justify the suitability of the spatial boundary of the RSA that was selected for the cumulative effects assessment, or otherwise revise the RSA extent accordingly to account for additional projects within the general vicinity.

b. Provide a summary of all mining, quarrying, oil and gas and other industrial projects within the general vicinity (100 km by 100 km, or larger, if necessary) that may have the potential to affect the predicted results of the air quality assessment.

c. Provide a timeline for the start and duration for each of these projects, and identify the year when the potential exists for the greatest contribution, in addition to the Project emissions, to occur to regional air emissions loadings. Characterize these loadings from predicted emissions in terms of the RSA, the Robb townsite, and sensitive ecosystems (i.e., water bodies and vegetation).

d. Provide a discussion of the expected air emissions from these projects and potential for influencing the outcome of this EIA.

e. Provide justifications for their exclusion or otherwise include and consider them in the regional air quality assessment, using numerical modeling.

f. Consider the staging and location of the emission sources each year for these projects in relation to Robb and confirm whether the suggested Project years (2034 and 2035) are still appropriate.

g. Evaluate whether the results from the Application and Planned Development Cases may be materially affected by these additional projects.

18. Volume 2, CR #1, Section 2.2.1.4, Page 6
Volume 2, CR #1, Section 6.2, Table 6.2-1, Page 86
Volume 2, CR #1, Section 4.3, Table 4.3-1, Page 46
Figure 7 of the AEW Air Quality Model Guideline (2009), indicates that if the Project emissions are >5% over the baseline emissions, then PAI modelling must be completed. In Table 4.3-1 of the air quality assessment, the Project Case 1 NOx emissions were calculated as being about 86% higher than the baseline or existing case. As a result, PAI results should be determined and reported.

a. The summary of annual emissions in Table 6.2-1 also support an increase of acidifying emissions above 5% although the totals do not always agree with Table 4.3-1. Confirm which totals are correct.

b. Undertake appropriate analyses and report PAI results, or otherwise provide a justification regarding why this is not required.

19. Volume 2, CR #1, Section 2.5.4, Page 16
Volume 2, CR #1, Section 4.2, Page 42
CVRI states that measured background concentrations represent the effect of distant industrial and all natural sources. Historical ambient measurements for years 2006 to 2010 were added to the predicted concentrations for the Project Only and Planned Development scenarios (year 2034) with no change or adjustment in concentration despite the approved, announced or otherwise public disclosure of other projects with substantial air emissions in the general vicinity, although outside of the identified RSA.

a. Explain why or if background ambient concentrations are anticipated to remain the same for the life of the Project, given these other projects have been disclosed and/or approved.

20. Volume 2, CR #1, Section 3.1, Pages 17-18, Table 3.1-1
CVRI is relying upon historical ambient measurements that were acquired from a location that is remote from the Project. The Hightower Ridge station was chosen as *representative of rural concentrations*. It would be more accurate to characterize it as a high elevation background station, because it is unlikely to be subject to typical rural activities like farming. Ozone concentrations are higher at Hightower Ridge than Steeper, which is expected because of the higher elevation.

a. Discuss why most of the statistics for other pollutants, in particular SO_2 and NO_2, are higher at Hightower Ridge in comparison to the other stations?

21. Volume 2, CR #1, Section 3.1, Page 18, Table 3.1-1

For PM_{10}, CVRI has proposed a 24-hour maximum AAAQO of 50 µg/m^3. The cited reference is AEW (2011b).

a. Confirm the correct source for the stated value for PM_{10} and its relevance to this assessment.

22. Volume 2, CR #1, Section 3.1, Table 3.1-2, Page 19
Volume 2, CR #1, Section C3.3, Table C3-5, Page C-16

CVRI proposes to account for the non-Project emissions in the RSA by using percentile values calculated from existing monitoring stations and adding these data to the CALPUFF model predictions.

a. Confirm that the 1-hr and 24-hr SO_2, $PM_{2.5}$, PM_{10} and TSP concentrations are the same values for each contaminant.

b. Confirm the correct value for the 90^{th} percentile $PM_{2.5}$ in Table C3-5, the value is 9 ug/m^3 compared to 6.4 ug/m^3 in Table 3.1-2.

23. Volume 2, CR #1, Section 4.1.1, Page 20, Project Case 1

Loading, hauling, and dumping of soil are specified by CVRI as emission sources for Robb West, and loading, hauling, dumping and bulldozing of soil are specified for Robb Main, but only bulldozing of soil is specified for Robb East and bulldozing of soil is not specified for Robb West.

a. Provide an explanation regarding these differences.

24. Volume 2, CR #1, Section 4.1.2, Page 26
Volume 2, CR #1, Section 4.1.4, Page 33

CVRI states that *Winter dust emissions from haul roads were reduced by 90% because roads will be covered by snow and/or frozen*. This statement is reiterated in Section 4.1.4 (Page 33) with further explanation. However, the 43% reduction in dustfall for winter measurements compared to summer measurments at Smoky River does not, in itself, justify assuming a 90% level of control in winter. If the Sheep Creek haul road was uncontrolled in summer, then only a 43% level of control could be justified for winter. Furthermore, these findings will depend on the volume of traffic and size of vehicles using the Sheep Creek haul road, and whether that traffic is consistent throughout the year.

A 90% level of control in winter is considered an optimistic assumption. This will be achieved during periods of snow cover and when the roads are wet, but not when they are cleared and frozen. On those occasions, freeze drying of the surface and pulverization of surface material by heavy vehicles can cause appreciable dust emissions. As result, the average level of control over a winter may be substantially less than 90%, and worst-case could be at times near zero percent.

a. Provide further documentation of the Smoky River measurement program, together with documentation of what dust control was applied to the Sheep Creek haul road during the summer season at that location (amount and frequency of water or other

dust suppression treatment), as well as information on the volume of traffic (by time of year) and size of vehicles on that haul road.

25. Volume 2, CR #1, Section 4.1.2, Page 26

CVRI states that *haul roads will be regularly watered in summer, reducing dust from wheel entrainment by 80%.*

a. Provide information with respect to the equipment that is expected to be deployed for watering (e.g., size, number and capacity of water trucks), source of water, daily amount of water that will be available, and the rate at which water can be applied, when needed.

26. Volume 2, CR #1, Section 4.1.2, Page 26

CVRI states *Emissions were estimated using AP42 emission factors (U.S. EPA 1998a). Criteria Air Contaminant species (CACs) which are particulate (PM2.5, PM10 and TSP) and specific gas (SO2, NOX, and CO) emissions from diesel combustion were also calculated using U.S. EPA (1994). Dust and combustion emissions from blasting were calculated using emission factors (Roy et al., 2010, NPI 2012, and NPI, 1999).*

a. Discuss the limitations and uncertainty associated with the emission factors selected to represent emission sources for the Project.

27. Volume 2, CR #1, Section 4.1.3, Page 30

CVRI indicates that 100% of daily maximum coal production is loaded into two silos and then loaded directly onto coal trains. There does not appear to be any emissions estimates or dispersion modelling of dust emissions from coal handling facilities, loadout or combustion products from any trains which are expected to use diesel oil when idling or otherwise moving within the RSA.

a. Confirm the number of freight trains, including frequencies and extents of movements, and summarize expected emissions within the RSA.

b. Confirm whether these emissions were accounted for in the CALPUFF model, or otherwise why they were not.

28. Volume 2, CR #1, Section 4.1.3, Page 30

CVRI has summarised the stack emissions for the stationary equipment that is expected to be operated continuously. No mention is made of equipment that may be used for upset, emergency or support conditions. Commonly, diesel generators, diesel fire water pumps, and diesel water pumping units are used during periods of power shortages or interruptions. Each of these types of units are also routinely tested weekly for short durations. Emissions associated with this equipment should be accounted for in the emission inventory, GHG calculations and the CALPUFF model.

a. Confirm if diesel-powered upset, emergency or support equipment is proposed for the Project, and if so, how it is accounted for in the emission inventory, GHG calculations and the CALPUFF model.

29. Volume 2, CR #1, Section 4.1.3, Page 31
Volume 2, CR #1, Section A3.9, Page A-20
Volume 2, CR #1, Section B4.0, Page B-9

Dispersion models like AERMOD and CALPUFF have the ability to modify plume behaviour based on a comparison of stack heights and building dimensions using the BPIP algorithm found in both models. The user selects this option and it should be used routinely since building downwash effects can create much higher concentrations near buildings with short stacks (< 2 times building height). It is not clear whether the BPIP building downwash pre-processor was used or not, as there are contrary indications regarding this.

a. Confirm if the BPIP algorithm was used, or otherwise why it was not.

30. Volume 2, CR #1, Section 4.1.4, Page 32

CVRI notes that calcium chloride is reported to be applied twice per year on Highway 40 south of Coalspur by Alberta Transportation. The assumed level of dust control for this measure is 80%. However, Figure 13.2.2-5 in Chapter 13.2.2 of U.S. EPA AP-42 indicates that a monthly application of chemical dust suppressant can achieve 40 to 80% dust control, depending on the quantity of chemical that is applied and the inventory that is built up on the road surface. For a twice-per-year program, a much lower level of average effectiveness would be expected, as the first treatment wears off, leaving the road essentially untreated for a period time before the next treatment. This effect will be exacerbated by the heavy truck traffic. As a result, the average level of control may be closer to 40% and worst-case will be near zero percent (e.g., for a period of time in spring before the first application, and for a period of time prior to the second application).

a. Provide data from published studies, field measurements or other credible sources to justify an assumption of 80% control from twice-per-year calcium chloride applications as a reasonable worst-case scenario in this case.

31. Volume 2, CR #1, Section 4.2, Page 43, Table 4.2-1

CVRI created an emissions inventory of other significant emitters in their RSA and modelled these emissions. Several of the compressors listed are shown to have no NOx or CO emissions but $PM_{2.5}$ and TSP emissions are listed, which is an unlikely condition.

a. Confirm that these data are correct as reported, and if emissions from these compressors were appropriately incorporated and modelled in CALPUFF.

32. Volume 2, CR #1, Section 5.13.2.1, Page 84

Construction dust emissions related to the Project are expected to be substantial. This is a normal consequence and these effects tend to be intense but relatively short term in duration. CVRI has not provided details or commitments with respect to applying mitigation measures and using best management practices. A large area around the Processing Plant is muddy during parts of the year and has the potential to generate dust when dry due to ongoing truck activity.

a. Explain how increases in construction dust emissions can be readily managed with appropriate dust control. Provide examples and commitments to meeting the AAAQO.

b. How will the impact of construction dust emissions be evaluated in the apparent absence of ambient monitoring?

33. Volume 2, CR #1, Section 6.5, Page 89

Dispersion models in themselves are not designed to over-predict. Field trials, and model calibration verification studies suggest accuracy within factors and models tend to under-predict or over-predict depending on the application and location and some models have inherent bias. In general, it is the assumptions made by the modeler that would create an over-estimate or conservative outcome.

a. Provide evidence and references to support the following statement, *"…notwithstanding a tendency for CALPUFF to predict conservatively.*"

34. Volume 2, CR #1, Section 6.6, Page 90

Meteorological measurements of the standard required for dispersion modeling have not been provided by CVRI for the Project site so records from regional stations located elsewhere have been summarized.

a. Based on the wind roses reported from some of the regional meteorological stations, the best case' dust control measures evaluated, and given the very high proportion of calms that lead to poor dispersion conditions, explain why CVRI proposes to operate a continuous ambient air quality monitoring station for a period of time less than the life of the entire Robb project? For example, construction of the Halpenny and Erith Corridors is scheduled to begin in Q4 2013.

b. Confirm when Robb Main is scheduled to begin operations. Table A.6-1 (Project Introduction) indicates production in Q1 2015, and Section 6.6 indicates year 2022.

c. Explain why continuous monitoring is only proposed near Robb, and not outside of this area, to monitor the effects of fugitive particulate matter, metals and NO_2 on the ecosystems (i.e., vegetation, waterways, etc) in the RSA?

d. In the absence of commitments to regional ambient air quality monitoring, explain how CVRI proposes to measure the effectiveness of mitigation plans?

e. What measures will CVRI undertake to address measured exceedances of the AAAQO?

35. Volume 2, CR #1, Section 6.6, Page 90

As required in the FTOR:

a. Explain how the data (i.e., emissions, ambient air quality and meteorological measurements, etc.) will be disseminated to the public, Aboriginal communities, and other interested parties.

b. b) Discuss how the results of monitoring programs and publicly available monitoring will be integrated within CVRI's environmental management system.

c. c) Describe adaptive management plans that minimize the impact of the project.

36. Volume 2, CR #1, Appendix A, Section A2.2, Page A2

CVRI states that *The moisture content of coarse coal reject… was assumed to have the same moisture content as ash from power plants (Table 13.2.4-1 in AP 42; US EPA, 2006a).* Note that Table 13.2.4-1 of AP-42 shows moisture content of ash received at a municipal landfill, and there is no indication that it was from a power plant. In any case, the high reported moisture content (27%) implies that the coal reject is handled in the form of a slurry.

a. Provide physical data on the coarse rejects to show that it compares well with fly ash, and confirm that it is handled in a high moisture form.

37. Volume 2, CR #1, Appendix A, Section A2.2, Table A2-3

CVRI states the silt loading for Highway 40 and all other unpaved public roads is 3.8%. Based on past experience, this is a relatively low average silt loading for unpaved roads, which suggests that the measurements were done after calcium chloride was applied and/or were too few to be representative. Calcium chloride has the effect of reducing surface silt loading, once the road has been compacted by traffic. This is a key part of its effectiveness in reducing dust emissions. To apply this silt loading in combination with an additional assumed 80% control for calcium chloride may represent significant double counting of the effect of the calcium chloride. The silt loading measurements should be taken prior to the first calcium chloride treatment in spring, to represent the road in an uncontrolled state, before applying a percentage reduction to account for calcium chloride. Also, given the length of roads involved, it is important that the measurements are made at numerous locations to ensure that a representative average value is obtained.

a. Provide details of the silt measurements from Luscar (1999) and confirm that these measurements were taken long after the last calcium chloride treatment (preferably in spring, prior to the first treatment of the year).

b. Confirm that the value shown represents an average from road silt samples taken at numerous locations along Highway 40.

38. Volume 2, CR #1, Appendix A, Section A2.2, Table A2-3

The reported silt contents for raw coal and clean coal are reported by CVRI to be derived from US EPA AP-42. No source has been cited for the paved road silt loading of 0.17 g/m^2.

a. Provide information on the actual silt content of coal at the existing coal mining operations in the area, in order to confirm that the AP-42 values are appropriate for this area.

b. Provide the source and justification for this paved road silt value, as it does not correspond to any values given in U.S. EPA AP-42, Chapter 13.2.1.

39. Volume 2, CR #1, Appendix A, Table A2-5, Page A-7

For public roads, such as Highway 40 south of Coalspur, CVRI states that the traffic is represented as one two-way trip per day by 512 vehicles. This translates to a daily average traffic volume (ADT) of 1024 vehicles (pass-bys rather than two-way trips) for that highway. This is inconsistent with the text below the table, which reports an average daily vehicle count of 780 vehicles (presumably pass-bys) averaged over all major roads.

a. Clarify that this data in Table A2-5 is correct, as well as the data in the text.

40. Volume 2, CR #1, Appendix A, Table A2-6, Page A-9

CVRI states that, for Highway 40 South of Coalspur, that there is 8760 hours/year of operation of each of 512 vehicles, which suggests that the traffic volume is actually 512 vehicles per hour rather than 1024 vehicles per day, as derived from Table A2-5, or 780 vehicles per day as derived from the text. In addition, the table shows a fuel use rate of 14 L/hr, whereas, the text below the table reports a fuel consumption of 14 L/100 km. This implies a traffic speed of 100 km/hr on Highway 40.

a. Clarify these traffic assumptions.

b. Verify the correct fuel use value and also provide information on the expected average traffic speed on Highway 40, including that of the coal trucks.

41. Volume 2, CR #1, Appendix A, Section A3.2, Page A-11

An equation for overburden dragline operations is applied by CVRI to all types of excavating, loading and unloading for overburden, coal and reject.

a. Provide data that demonstrates the sensitivity of the emissions to using alternate approaches, such as the equation for material handling in Chapter 13.2.4 of AP-42, so that a better understanding of the uncertainty and justification for this approach can be gained.

42. Volume 2, CR #1, Appendix A, Section A3.4, Page A-14

CVRI indicates that the vehicle weight to be used in the unpaved road dust equations should be in metric tons; however, according to the US EPA AP-42 source, the weight should be in imperial tons. Use of metric tons would underestimate the predicted emissions.

a. Verify that imperial tons were used in this calculation.

43. Volume 2, CR #1, Appendix A, Section A3.5, Pages A-15 and A-16

CVRI states that the roads are snow covered and as such, dust emissions are significantly reduced by this natural phenomenon.

a. Provide documented information on the state of the roads in this area during winter, confirming that they are usually snow covered, with little or no exposed dust-generating material.

44. Volume 2, CR #1, Appendix A, Section A3.6, Page A-16

CVRI states that a forested area with trees ranging from 18 to 20 m tall effectively traps dust and reduces emissions from 80 to 100%. Field observations indicated that the trees are generally not densely planted nor are >18 m tall. Deciduous trees that drop their

leaves in the autumn will offer no or minimal reduction or removal of dust emissions. Moreover, clearing and slashing of any trees is a natural consequence of any mining project and these activities are usually completed well in advance of over-burden removal and mining operations.

a. Provide an approximate inventory of the tree cover that will lie between the hamlet of Robb and the proposed CVM operations at their closest approach, giving an indication of the type of trees, height and density, and where there may be gaps in the tree cover.

45. Volume 2, CR #1, Appendix A, Section A3.7, Page A-17

For wind erosion, an equation from A&WMA (1992) is used by CVRI, as opposed to equations from either Chapter 11.9 or 13.2.5 of AP-42.

a. Provide a justification, ideally supported by data, regarding the sensitivity of the calculated emissions to using alternative equations, so that the level of uncertainty may be better understood.

46. Volume 2, CR #1, Appendix A, Section A3.6, Page A-16

Reference is made by CVRI to a paper by Cowherd, suggesting that dispersion models over-estimate impacts from fugitive dust sources by a factor of 4. This may be true for large-scale, regional gridded models (such as CMAQ), but is not necessarily so for short-range dispersion models (e.g. AERMOD) and puff models, such as CALPUFF. In large-scale gridded models, depletion of plume mass due to deposition is calculated explicitly on the grid and, as a result, the predicted amount of depletion will be sensitive to grid resolution. At typical resolutions of these models (smallest grid spacings are around 1-4 km) this can lead to a significant underestimate of deposition for low-level sources.

In CALPUFF, on the other hand, plume depletion is tracked in each puff and calculated at every time step. This amounts to a much higher resolution approach. It is clear from the title and from discussions within the paper, that Pace (2005) was thinking of regional-scale and urban-scale models, not local scale (he used the phrase “several hundred meters” as the distance over which substantial dust removal will occur). Data from other literature sources indicates that tree belts reduce particulate matter levels at low wind speeds, with the reductions being more on the order of 50% for a dense tree belt, with no gaps. At higher wind speeds, the reductions tend to be less.

Table A3-4 is derived from Pace (2005). But Pace’s caveat with respect to high wind events and also the very approximate nature of these CF values were not mentioned. In the case of “Forest”, the appropriate CF would be highly dependent on the density, extent and character of the forest. It also does not contemplate dispersion models such as CALPUFF, in which deposition processes are modeled differently from gridded models. Local scale models, such as CALPUFF already provide significant removal of particulate matter over “several hundred metres” through modeling of deposition processes. When these processes arre modeled within CALPUFF, no additional effect of trees around the site should be added.

a. Provide a more thorough review of the relevant literature, focusing on the effect of trees over shorter distances and a justification for applying additional removal effect of trees over and above deposition processes already incorporated into CALPUFF.

b. Provide an approximate inventory of the tree cover that will lie between the hamlet of Robb and the proposed CVM operations at their closest approach, giving an indication of type of trees, height and density, and where there may be gaps in the tree cover.

47. Volume 2, CR #1, Appendix A, Section A4.1, Page A22, Table A4-2

Table A4-2 cites an average NO_X emission factor for ANFO of 3.34 kg/ton. The source of this information was the Australian National Pollution Inventory document "Emission estimation technique manual for Explosives detonation and firing ranges." The current version (V. 3, 2012) cites an emission factor of 8 kg/tonne (same as US EPA AP-42) for ANFO mixed on site, with 6% fuel oil content. For branded mixtures of ANFO, it gives values of 1.4 and 3.8 kg/tonne. The branded ANFO products are named as Energen and Powergel. It also suggests an adjustment factor of 4 for each additional 1% of fuel added to the mixture, relative to the 6% normal. Thus, the emission factor for 7% ANFO mixed on site would be 32 g/kg, or about a factor of 10 higher than the value used for the proposed coal mine in the present case. Thus, the value of 3.4 kg/tonne appears to be a low-end value from among the wide range of possible emissions. Without more detailed information on the specific ANFO to be used, it would seem appropriate to use a higher end value of emission factor.

a. Provide details of the ANFO that the proponent expects to use, whether it is an on-site mix or a branded product, potential brands, and the upper bound of fuel oil content in the explosives mixture.

48. Volume 2, CR #1, Appendix A, Table A4-1, Page A-21

The units are shown by CVRI as g/kWh, but the units in NONROAD documentation for these emission factors indicate the units are in g/hp-hr. (Exhaust and Crankcase Emission Factors Nonroad Engine Modelling – Compression-Ignition, U.S. EPA, 2010).

a. Verify that the correct units were used in the actual emission calculations.

49. Volume 2, CR #1, Appendix A, Section A4.3, Page A-26, Table A4-8

Emissions of metals are an important calculation for input to the CALPUFF dispersion model. This section does not indicate the source of emission metal emission factors for the Dryer Stack cited in Table A4-8.

a. Provide a copy of the reference document, CVRI (2007).

b. Provide the source of that information and a sample hand calculation showing how the metal emission factors were scaled by the $PM_{2.5}$ emissions.

50. Volume 2, CR #1, Appendix C, Page C-7
Volume 2, CR #1, Section 3.1, Table 3.1-2, Page 19

CVRI states (Page C-7) that *in accordance with AEW (2009a) for a detailed assessment, 90th percentile hourly and daily and annual average measurements are added to model predictions.* The cited Air Quality Model Guideline allows two interpretations for the

calculation of background concentrations for 1-hour and 24-hour background concentrations: 1) use the same 90th percentile of 1-hour average concentrations; or 2) use the 90th percentile of 1-hour averages and the 90th percentile 24-hour averages, respectively.

The quoted sentence suggests that the report followed the second approach. However, Table 3.1-2 (Page 19) shows identical values for hourly and 24-hour background concentrations for all four pollutants for which 24-hour AAAQO exist. This is unlikely if the second approach was used.

a. Confirm the calculated values are correct as reported.

51. Volume 2, CR #1, Appendix C, Pages C-23 and C-24, Figures C3-8 and C3-9

CVRI has summarized the background ambient concentrations of PM10 measured at several regional stations.

a. Why are diurnal and seasonal cycles at Hinton and Steeper so different?

b. Provide a similar figure for the Hightower Ridge station.

52. Volume 2, CR #1, Appendix C, Page C-25

CVRI has summarized the background ambient concentrations of ozone measured at several regional stations.

a. Explain why observations at Hightower Ridge are consistently higher than at Steeper in every hour of day and every month of the year.

53. Volume 2, CR #1, Appendix C, Page C-26, Figure C3-10

CVRI has summarized the background ambient concentrations of ozone measured at several regional stations.

a. What is the reason for the unusual behaviour for the ozone concentrations in the fourth hour of the day at both stations?

54. Volume 2, CR #1, Appendix C, Page C-33, Figure C4-1

CVRI has summarized the wind climate statistics from several regional stations. These data are important to help assess the dispersion potential.

a. What are the percentages of calms for the Edson, Hinton and Hightower Ridge Stations?

b. Why are the calms so high for the Coal Valley Mine office?

c. What was the wind sensor height above grade at the Coal Valley Mine office?

d. Are these high percentages of calms representative of Project site conditions, as they suggest higher than expected frequency of poor dispersion conditions?

55. Volume 2, CR #1, Appendix C, Page C-33, Figure C4-3

CVRI has summarized the wind climate statistics from several regional stations. These data are important to help assess the dispersion potential.

a. Why are the measured calms so high at the Hinton (69%) and Steeper (55%) stations?

56. Volume 2, CR #1, Appendix C, Pages C-41 and C-42, Figure C4-6

CVRI has summarized ambient temperature statistics from several regional stations:

a. The caption states that the data sources are CASA 2011 and CVRI 2011. Was the data for Edson not taken from Environment Canada? If not, explain why, because for comparison with the climate normals for Edson, one should use the same station.

b. Confirm that the figure panels and underlying data have been fully confirmed (given that there appear to be a number of unlikely temperatures), or otherwise review and update. For example, see:
   i. Comparison with Edson's climate data make it appear unlikely that a minimum temperature of less than -30 degrees Celsius occurred in June. Hinton, which covers the same period, shows an expected minimum temperature above -10 degrees.
   ii. A maximum temperature of almost 30 degrees in January on Hightower Ridge, was not confirmed at any of the other locations.
   iii. A minimum temperature below -40 degrees in September in Edson and Hightower Ridge is not in agreement with Hinton's minimum temperature above -10 degrees, which is more in agreement with Edson's September minimum temperature of -11.4 degrees over the climate normals period.

57. Volume 2, CR #1, Appendix C, Section C5.0, Page C-53

CVRI states that measurements at the Hightower Ridge station are representative of background concentrations.

a. Why was the Hightower Ridge station not used to determine PM background concentration, in lieu of using data from Steeper, which is within the RSA?

58. Volume 2, CR #1, Appendix C, Page C-15

CVRI states that there were no $PM_{2.5}$ measurements at Hinton, but there are data summarized in Table C3-5.

a. Which of these is correct?

b. It seems highly unlikely that Edson, Hinton, and Steeper all had the same maximum 1-hour maximum concentration. Confirm these data or otherwise correct.

59. Volume 2, CR #1, Section A4.4-1, Page A-27

CVRI has identified, calculated and summarized expected GHG emissions.

a. Confirm that GHG emissions are accounted for from all transportation emission sources such as trains, etc.

60. Volume 2, CR #1, Section B1.0, Page B-1

The Air Quality Model Guideline requires that specific versions of meteorological and dispersion models are used. The versions of CALMET and CALPUFF used for the study are not cited.

a. Provide the versions of the models used and the justification for choosing them.

61. Volume 2, CR #1, Section B2.1, Page B-1

Selection of the appropriate model parameters are based on decisions with respect to selecting recommended default values and best engineering judgement. A horizontal grid size of 1000 m for CALMET was used by CVRI. CVRI states that *This grid size was chosen to capture major terrain feature influences on wind flow patterns in the area*.

a. Explain, in terms of scale of variation of terrain and land use in the study area, as to why the chosen horizontal grid size is sufficient.

62. Volume 2, CR #1, Section B2.1, Page B-2
Volume 2, CR #1, Section C4.0, Page C-32

CVRI indicates that only meteorological data from MM5 were used and *No surface stations were used as there are none in the RSA.* Hourly observations from the Steeper and Coal Valley Mine Office were summarized and presented in Section 4.0 and both stations are located in the RSA.

a. Clarify why hourly observations from these two stations were summarised in the climate analysis but not used in the CALMET model.

63. Volume 2, CR #1, Section B2.2, Page B-2

Selection of the appropriate model parameters are based on decisions with respect to selecting recommended default values and best engineering judgement. The radius of influence for surface and upper air and vertical extrapolation of surface winds are discussed by CVRI, but it is stated that MM5 are the only input data for CALMET, which would render these options irrelevant.

a. Clarify why these options are included in the discussion, if only MM5 data were used.

64. Volume 2, CR #1, Section B2.2, Page B-2, Table B2-1

Selection of the appropriate model parameters are based on decisions with respect to selecting recommended default values and best engineering judgement. The radius of influence for terrain influences, TERRAD, was chosen as 1 km by CVRI. According to CALMET guidance from SRC in the link below, *Odds are TERRAD is going to be of order 5 to 10 grid lengths expressed in km.* For the chosen horizontal grid resolution of 1 km, guidance suggests that TERRAD should be on the order of 5 to 10 km.

http://www.src.com/calpuff/FAQ-answers.htm#2.7.1

a. Explain the choice of 1 km for the TERRAD parameter.

65. Volume 2, CR #1, Section B2.2, Page B-2
Volume 2, CR #1, Section B2.3, Page B-2
Selection of the appropriate model parameters are based on decisions with respect to selecting recommended default values and best engineering judgement. CVRI states that *Hourly surface heat fluxes, as well as the observed morning and afternoon temperature soundings, were used to calculate mixing heights*. However, in Section B-2, it was stated that MM5 was the only input to CALMET.

a. Provide an explanation regarding this discrepancy.

66. Volume 2, CR #1, Section B2.3, Page B-2
Selection of the appropriate model parameters are based on decisions with respect to selecting recommended default values and best engineering judgement. CVRI states that *The inverse distance-squared method, which was recommended by Dean and Snyder (1977) and Weiand McGuinness (1976), was used to interpolate air temperature, with a radius of influence of 500 km*. However, in the model options given in Table B2-4, ITPROG is given as 2, which would indicate that MM5 data was used for temperature.

a. Clarify which method was used.

67. Volume 2, CR #1, Section B4.0, Page B-16
Selection of the appropriate model parameters are based on decisions with respect to selecting recommended default values and best engineering judgement. Table B4-9 and Table B4-1 provide the dry and wet deposition parameters used for the study, respectively.

a. Provide a reference for these selections.

68. Volume 2, CR #1, Section B4.0, Page B-17
Selection of the appropriate model parameters are based on decisions with respect to selecting recommended default values and best engineering judgement. In Table B4-11, monthly background ozone and ammonia concentrations are selected as 12*23, and 12*0.22, respectively.

a. Explain how these values were chosen and provide references.

69. Volume 2, CR #1, Section C4.4, Page C-46
Selection of the appropriate model parameters are based on decisions with respect to selecting recommended default values and best engineering judgement. CVRI states that *Mixing heights are not explicitly used as inputs to the CALPUFF model*. However, CVRI states, in Section B2.1, Page B-1, that *the [CALMET] overland boundary layer module computes gridded fields of surface friction velocity, convective velocity scale, Monin-Obukhov length, mixing height, Pasquill-Gifford stability class, air temperature, and precipitation rate*.

a. Explain the discrepancy between the two statements.

5. Water

5.1. Hydrogeology

70. Volume 2, CR #3, Section 2.3.4, Page 14

In Section 2.3.4 (Page 14), CVRI indicates that pumping rates to dewater the mine for coal extraction have been observed at the Coal Valley Mine to range from 330 to 12,000 m^3/ day, based on previous coal mining operations to the west.

a. Provide a numerical groundwater model for the Robb Trend Project site, including adjacent areas as appropriate, illustrating the baseline hydrogeological conditions. The modeling should follow guidelines published by the American Society for Testing and Materials (ASTM).

b. Provide site specific hydrogeological data and analysis, taking into account the variability in hydrogeological parameters, to quantify the amounts of water that are anticipated to be required to be removed during mining operations. For this assessment, use the numerical model generated in a) to confirm the predicted drawdown. Provide an analysis of potential error in the prediction.

71. Volume 2, CR #3, Section 2.3.5, Page 15

In Section 2.3.5 (Page 15), CVRI states that drawdown adjacent to the pits will be insignificant beyond approximately 200 m from the pit. This assertion is based upon observations at previous mining operations to the west.

a. Provide site specific hydrogeological data and analysis quantifying the drawdown of groundwater during mining operations at the site and in adjacent areas. For this assessment, use the numerical model generated in SIR 1a) to confirm the predicted drawdown. Provide an analysis of potential error in the prediction.

b. Provide a balanced water budget quantifying the groundwater contribution to stream flow in the pit footprint, and adjacent areas where groundwater drawdown is predicted. Provide the balanced water budget for time periods prior to, during and after mining operations are completed. Define the length of time from the end of active mining operations until static conditions are re-established.

c. Quantify the effects on stream, wetland and peatland water levels that will result from the reduction of groundwater levels in the mine pit footprint and adjacent areas where groundwater drawdown is predicted.

d. Quantify the groundwater contributions to stream flow (before, during and after mining) for streams in the area where drawdown is predicted due to dewatering of the mine pit footprint and adjacent affected areas. Quantify the percent reduction in stream flows that will result from the reductions in groundwater levels.

e. Quantify the anticipated effects on stream flow associated with reduced groundwater recharges to the streams in the areas affected by the groundwater level declines.

72. Volume 2, CR #3, Section 3.3.3, Page 24

In Section 3.3 (Page 24), CVRI states that groundwater is anticipated to be drawn down in the area of the abandoned Lakeside and Bryan underground mines. As a consequence CVRI anticipates that groundwater levels will decline to 1,050 m on the southeast side of the Hamlet of Robb and to 1,040 m on the northwest side of the Hamlet of Robb.

a. Provide site specific hydrogeological data and analysis, taking into account the variability in hydrogeological parameters, to quantify the drawdown of groundwater anticipated during these dewatering operations in the area of the abandoned Lakeside and Bryan underground mines and adjacent affected areas.

b. Provide site specific hydrogeological data and analysis quantifying the lateral extent of the drawdowns of groundwater anticipated during these dewatering operations.

c. Following the completion of mining operations, how long will it take for the water levels to recover to static levels observed before the beginning of mining operations?

d. For a) to c) above, use the numerical model generated in the earlier SIR to confirm the predicted drawdowns and recovery times. Provide an analysis of potential error in the predictions.

73. Volume 2, CR #3, Section 4.2.9, Table 4.2.1, Page 38
Volume 2, CR #3, Section 3.3, Page 24
Volume 2, CR #3, Section 4.2.6.1, Page 35

In Table 4.2.1 (Page 38), CVRI states that significant impact to surface water quantity is not anticipated. In Section 3.3, CVRI indicates that groundwater levels will be drawn down significantly due to dewatering the abandoned Lakeside and Bryan underground mines and in Section 4.2.6.1, CVRI states that groundwater contributes to stream flow.

a. For streams in the affected areas, provide a balanced quantitative water budget that quantifies stream input and output parameters prior to, during and after mining operations. Provide this quantitative analysis for each stream that transects the mining footprint, and including adjacent affected areas.

b. Describe and quantify the groundwater contribution to the streams in the area where drawdown is anticipated in relation to the dewatering of the Lakeside and Bryan underground mines.

c. Quantify the anticipated declines in wetland and peatland water levels associated with reduced groundwater recharge in the areas affected by the groundwater level declines.

74. Volume 2, CR #3, Section 4.2.9, Table 4.2.1, Page 38
Volume 2, CR #3, Section 2.3.4, Page 14
Volume 2, CR #3, Section 2.3.5, Page 15

In Table 4.2.1 (Page 38), CVRI does not indicate potential impacts to streams as a consequence of declining groundwater levels during mining and the time that water will be recharging the pit lakes. In Section 2.3.4 (Page 14) and Section 2.3.5 (Page 15), CVRI indicates that groundwater levels will be drawn down significantly (to the depth of the mine pit below the water table) due to dewatering in the mine footprint, and adjacent areas, respectively.

a. Provide a balanced quantitative water budget showing stream input and output parameters prior to, during and after mining operations in the pit footprint and outlying areas. Provide this quantitative analysis for each stream that transects the mining footprint.

b. Describe and quantify the groundwater contributions to the streams in the areas where drawdowns are predicted by dewatering the mine pit footprint and adjacent affected areas.

c. Quantify the anticipated declines in stream levels associated with the reduced groundwater recharge to the streams in the areas affected by the groundwater level declines.

5.2. Hydrology/Surface Water

75. Volume 1, Section C.4.3, Pages C-49 to C-50, Figures C.1-7 and C.4-1
Volume 3, CR #6, Section 4.4.3, Pages 51-52

The referenced sections discuss channel diversions. Volume 1, Figure C.4-1 shows the locations of 15 major watercourses that cross the planned mine area and which need to be diverted for surface mining to occur, but there is no companion figure showing the final layout. The expected timing and nature of these diversions is summarized in Volume 1, Table C.4-2 and a corresponding table (Table 12) in Volume 3. Volume 1, Figure C.1-7 illustrates a typical watercourse diversion plan which shows a three stage process ending with restoration of the watercourse with a close-to-original alignment over a land bridge fill over the mined pit.

The discussion of diversions emphasizes activity during the mine operation phase and it is unclear whether the project is proposing any permanent reclamation phase diversions as illustrated in the third stage in Figure C.1-7 or as described in Volume 3, CR #6, Table 15, Page 66: *Restore all channels to replicate natural regime sized channels… improve habitat in main restored channels… with fine gravel zones for spawning areas*. Except for figures involving the Erith River, reviewers were unable to locate a figure for the hydrology assessment that shows the planned final configuration of end pit lakes and permanent diversions in the project area. Volume 1, Section F, Figures F.4-1 and F.4-2 show conceptual reclaimed landscape and conceptual end land use plans, but the lake boundaries are unclear (some of the lakes appear to be connected by wetland or riparian zones) and there appear to be more waterbodies than identified in CR #6.

a. Provide a figure which shows the anticipated configuration of end pit lakes and final channel alignments. Identify locations of restored channels.

b. Provide a summary of diversions to be completed over land bridge fills over previously mined areas, per illustrated Stages 2 and 3 in Volume 1 Figure C.1-7. Indicate the anticipated lifespan of each land bridge diversion, the maximum depth of fill, and the amount of fill settlement which can be expected over the life of each diversion.

c. Describe the basis for the settlement amounts and reference any empirical studies or data which were used for this analysis.

76. Volume 1, Section E, Page E-30
Volume 3, CR #6, Section 4.5.2, Page 59

CVRI describes that the upper 70% of the Bacon Creek watershed will be diverted to the Erith River and the remaining downstream 2.4 km long channel will have only about 30% of its original flow. This assessment does not disclose that the upper end of the remaining 2.4 km long channel will have zero flow.

a. Clarify the impact to Bacon Creek and assess what, if any, portions of the remaining downstream channel would be expected to have perennial flow.

77. Volume 1, Section E.2.3.2, Page E-30
Volume 1, Section E.6.3.2, Pages E-85 to E-90
Volume 3, CR #6, Section 4.5, Pages 56-63

The referenced sections discuss changes in flow regime. In a summary table (Volume 1, Page E-30), CVRI states that the potential change to the flow regime of the Erith River includes *flow regulation due to settling ponds* and a *10% reduction in peak flows*. In Volume 1, Page E-87, CVRI states that *while the lakes are filling, downstream flows will be maintained by pumping* and indicates that a pump rate of 1.52 m^3/s will be provided. On the same page, it is stated that the long term impact on the Erith River will include *extensive flood peak attenuation* and that hydrologic routing of flood events through the constructed lakes *results in estimated flood peak reductions by approximately 60%*.

From Page 53 of Volume 3, CR #6, design flows listed for the Erith River diversion(s) range from 8.1 to 29.7 m^3/s for 2-year and 20-year return intervals. If downstream flows are limited to the suggested pump capacity during such events, this would produce flood peak reductions of from 80% to 95% of the natural flow. In Volume 3, CR #6, Table 14, CVRI shows that high flows during filling will be reduced by 15% but indicates, in an associated footnote, that *Percentage reductions in high flows may be greater*. Also in Table 14, CVRI discusses high flow residual impacts but does not associate these with any specific return period.

The referenced sections on flow regime do not adequately disclose and consider the very large effects on peak flows which are likely to occur when flows are maintained by pumping. Volume 3, CR #6 does not adequately describe the basis for the residual impacts to high flows, as shown in Table 14, which presumably are from flow routing through the end pit lakes. The Terms of Reference (Volume 1, Appendix 1, Page 1-15; in

particular, see TOR #3.3.2 [B]) for this proposed project requires that assessments be undertaken of changes to channel regime and river regime. Channel regime is often associated with channel formative discharge with a return period in the range of five to 10 years. From an aquatic habitat perspective, regime flows are important because they serve as flushing flows in gravel bed streams.

a. For each of the watercourses to be diverted by pumping and/or routing through end pit lakes, identify the natural five-year peak instantaneous discharge or other suitable estimate of the channel regime discharge.

b. Update Volume 3, CR #6, Table 14 to provide realistic estimates of project-related impacts on peak flows which will result from pump capacity limitations during mining and lake filling stages.

c. Update Volume 3, CR #6, Table 14 residual high flow impacts to specify residual impacts to (1) regime flows and (2) 100-year flows.

d. Estimate the future frequency of occurrence (return period) of regime flows sufficient to mobilize and flush channel substrate materials and maintain aquatic habitat.

78. Volume 1, Section E.6.3.2, Pages E-85 to E-90
Volume 3, CR #6, Section 4.4.3, Page 51
Volume 3, CR #6, Section 5, Pages 56-63

In the above-noted sections, CVRI discusses diversions and pumped flows during lake filling. There are several discrepancies in the project description. In Volume 3, CR #6, Page 51, CVRI states that pumped diversion was *not used for the Erith due to the magnitude of flow* and identifies 15 main watercourse diversions which *are fish bearing streams where natural bypass flows will be maintained at all times*. However, from the sections in Volume 1 and Volume 3 which discuss filling of the pit lakes, it is stated that the downstream flows in many fish bearing streams will require pumping for periods as long as 57 years (Table 13).

In Volume 1, Pages E-85 to E-89, CVRI states that for the Erith River, *When Lakes 4 and 5 are filling, downstream flows will be maintained by pumping*. For Halpenny Creek, *Instream flows can be maintained during lake filling… with bypass pumping*. For Hay Creek, *The end pit lake in this watershed will take up to 44 years to fill with downstream flows maintained… by using bypass pumping.* For Bryan Creek, *Extensive time will be required to fill the two end pit lakes in this watershed with downstream flows maintained… using bypass pumping.* For Lendrum Creek, *The end pit in this watershed is estimated to fill in less than two years with downstream flows maintained… using bypass pumping*. For Lund Creek, *The end pit lake is expected to take 28 years to fill with downstream flows… using bypass pumping.*

a. Describe how natural flows for fish passage will be maintained at all times in fish bearing streams when downstream flows are maintained by pumping.

b. For each downstream watercourse which will be dependent on pumped flow, assess and describe the downstream extent of adverse impacts if the pump system should fail. An initial estimate of downstream extent can made by identifying the point at

which the headwater basin intercepted by the pit accounts for less than 15% of the total basin area.

c. Describe how pumping will be performed during winter conditions and the effects that winter period pumping will have on downstream ice production and ice cover.

d. For each affected watercourse, describe what instrumentation and techniques will be considered to collect real-time streamflow data under open water and winter ice conditions and how compliance with instream flow guidelines will be achieved. When responding, consider the following statement by CVRI, from Volume 3, CR #6, Section 2.5.5: W*inter flow data are limited. This is a common deficiency for all but larger rivers due to the difficulty in accurately measuring flows during ice conditions.*

e. Determine and describe the maximum number of natural flow pump stations which will need to be simultaneously maintained and operated.

f. Describe how pumps will be powered, and what fuel storage or other infrastructure will be required. If power or fuel storage requirements are substantial, assess all associated secondary effects including air emissions. Provide a description of backup systems that CVRI will provide for pump system components (pumps, power supply, fuel, etc.).

g. Discuss the feasibility, in the event of a pump component malfunction, of CVRI providing continuous uninterrupted pumping operations, or if pump system down time would be unavoidable while a problem is being diagnosed and repairs are implemented.

h. Describe CVRI's past experience with sustained pump operations, specifically 1) continuous uninterrupted operation for periods longer than three months; 2) continuous uninterrupted operation under adverse weather conditions; and 3) pump type(s) and rated discharge capacities.

79. Volume 1, Section F, Figure F.4-1,
Volume 3, CR #6, Figure 27

CVRI proposes mining along long continuous seams which will be reclaimed as a series of lakes at various elevations, as listed in text boxes in Volume 3, CR #6, Figure 27. There are several instances of adjacent lakes within a continuous pit that will separated by backfill material of potentially high permeability (blasted and excavated rock overburden). It has not been considered whether the available backfill material is suitable to achieve and maintain lake level differentials as proposed. West of Robb, same-pit Lakes 1 and 2 (Upper and Lower Bryan Lakes) have a proposed head difference of 15 m. East of Robb, the proposed elevations for same-pit Lakes 3, 5, 6, 7 and 8 (Hay, Lower Erith, Halpenny, Lendrum and NW Lund Lakes) vary by up to 40 m between adjacent lakes. The hydraulic permeability of the backfill which will separate these lakes needs to be assessed and an evaluation made as to whether the lakes will be able to hold water at the differential elevations proposed.

a. Assess the permeability of mine spoil material which would be available to backfill the pits and create separate lakes.

b. Evaluate the amount of groundwater seepage flow which is likely between adjacent lake cells, and interpret the results in terms of lake fill times, the ability to sustain the proposed differential water levels, and implications on the proposed reclamation plan and environmental impacts.

80. Volume 3, CR #6, Section 2.4, Pages 8-11

CVRI indicates that the mean annual precipitation at Coal Valley is 618 mm, but this is computed in Volume 3, CR #6, Table 1 (Page 10) as the sum of mean monthly values which have variable periods of record. The mean annual precipitation should more correctly be taken as the average of all years for which complete records are available, i.e., the "annual" column from Table 1. This gives a mean annual value of 611 mm.

CVRI indicates on Page 11 that a typical small basin would have "*a mean runoff rate of 280 mm, as discussed in the next section.*" On Page 40, it is stated "*SR - Surface Runoff, estimated at 233 for Project basins.*" The hydrology report has internal inconsistencies as to mean annual runoff and groundwater recharge in the study area.

a. Confirm which mean annual values for precipitation and runoff CVRI recommends for use in water balance calculations for the study area.

81. Volume 3, CR #6, Section 2.5.4, Page 17

CVRI identifies that *Some years commonly show a noticeable decrease and then a subsequent recovery in flow in late November… this is believed to be due to extreme cold spells when a significant percentage of flow is lost to the formation of ice*.

A more likely explanation for the decrease and subsequent recovery of flow is the added hydraulic resistance which occurs when an ice cover develops. When the ice cover develops, additional depth of flow is needed to pass the same discharge and this significantly increases the volume of water in the channel.

a. Provide a discussion on the potential effect of hydraulic resistance associated with ice cover as related to the patterns of decrease and subsequent recovery of flow observed in November, and how this may affect operation of natural flow pump stations during periods of ice cover establishment.

82. Volume 3, CR #6, Section 4.2.7, Pages 42-43
Volume 3, CR #6, Section 4.2.7, Table 1, Page 10
Volume 3, CR #6, Section 4.2.7, Table 13, Page 55

CVRI discusses water withdrawals and provides a summary of surface water licenses in the Regional Study Area, but appears to have overlooked the future water consumption which will result from the planned conversion of land areas to end pit lakes.

From Volume 3, CR #6, Table 13, (Page 55), the end pit lakes will have a total combined surface area of 625 ha. Under present conditions, this land area produces approximately 233 mm of annual runoff. As an open water surface, the same area will have annual water deficit of about 11 mm, because the mean annual precipitation (611 mm based on the average of years with complete data in Volume 3, CR #6, Table 1(Page 10)) is less

than mean annual lake evaporation (622 mm from Page 11). The loss of runoff production is equivalent to an annual withdrawal of approximately 1,500,000 m^3.

a. Given this scenario for future water consumption, reassess project effects on water withdrawals, downstream users, and Water Act approvals that may be required.

83. Volume 4, CR#11, Section 4.0,

TOR Section 3.4.2 [B] requires discussion *of any changes in water quality resulting from the Project including impacts on drinking water quality*. No information is provided on drinking water or other surface water users in the reaches of watercourses downstream of proposed mining activity in Section 4.1 to 4.4.

a. Provide details of downstream surface water users (existing and future), including potable surface water users (if any), and describe and assess potential changes and impacts to surface water users.

84. Volume 4, CR#11, Section 4.0,

TOR Section 3.4.2 [B] d) requires discussion of *the effect of changes in surface runoff or groundwater discharge on water quality in surface waterbodies*. In Section 4.4.2.3 on P. 56, it states that *All of the end-pit lakes proposed for the Project will likely have groundwater as a major source of water*.

a. Given that creeks flowing into the end-pit lakes, once completed, will now be subject to mixing with significant amounts of groundwater, are there any expected changes to the temperature of flows exiting the end-pit lakes during specific times of the year ?

b. If so, how might these changes affect downstream aquatic resources?

85. Volume 4, CR#11, Section 4.0

The Air review noted the PAI modelling should be carried out for this project based on the AEW Air Quality Model Guidelines (2009) unless it can be shown that critical thresholds will not be exceeded (Air Question #2).

a. If PAI modelling is carried out, describe and quantify effects that are expected on acid deposition (if any) in lakes and other waterbodies in the region. The evaluation should be extended to check if impacts further apply to soils and/or vegetation.

5.3. Fish

86. Volume 1, Section A.8.2, Pages A-21 to A-25

There is a high probability that both Bull trout and Athabasca Rainbow trout could be listed (within 2-3 years) as ‘threatened’ provincially. Athabasca Rainbow trout have already been considered by the Alberta Endangered Species Conservation Committee (AESCC) and have been recommended as ‘threatened’.

a. Describe if the current considerations by the AESCC were included in the discussion pertaining to risk for Athabasca Rainbow trout.

b. How will these designations influence consideration of alternate strategies related to watercourse crossings, water diversions, and development of mine pits and reclamation of end pit lakes?

c. What compensation achieves No Net Loss (NNL) of habitat when this development will directly result in the loss of 'critical' spawning and early rearing habitat for both species?

d. Considering that portions of several fish bearing watercourses, including an important portion of the Erith river, will be diverted, channelized, pumped, and/or dewatered, explain how the impact to fish populations as a result of flow changes is expected to be minimal.

e. Considering that rainbow trout only spawn in specific stream habitats, explain how CVRI plans to mitigate the long-term loss of annual recruitment from the permanent loss of nearly 30 km of critical spawning and rearing habitat for Athabasca Rainbow Trout in this development.

f. Considering that this mine development will create a number of large waterbodies that have a high probability of being colonized by northern pike, explain how CVRI will mitigate or compensate this significant shift in the fish community?

g. Explain how monitoring components of the compensation plan post-construction will enable effective modifications post-construction?

h. Given the scale of stream diversions and end pit lake construction proposed by CVRI in this landscape, discuss how CVRI's adaptive management process will address habitat compensation work at CVRI to yield improvements to biological productivity, water quality and other physical properties. Explain how this is being considered in pre-construction planning.

87. Volume 1, Section A.8.11, Pages A-42-44

Settled sediments (i.e., embeddedness) are having severe impacts to fish habitat and communities in several watercourses (Embarrass, Erith, Dummy) in relation to existing CVRI mines. The mitigation measures and technology proposed for this project are similar to those being utilized in existing CVRI mines, where impacts are severe.

a. Discuss how CVRI will measure, evaluate and mitigate for settled sediment (embeddedness) during construction, operations and closure in order to achieve insignificant impacts.

b. How will adaptive management inform the process?

88. Volume 1, Section A.8.11, Pages A-42 to A-44.

Dissolved oxygen concentration with depth is a major water quality variable influencing the amount of suitable aquatic habitat available.

a. Discuss why CVRI has chosen not to adjust end reclamation to ensure that all constructed lentic habitats are productive.

b. Considering the significant loss of fully productive lotic habitats and the creation of lentic habitats with productivity influenced by anoxia, discuss CVRI's claim that the effects on surface water quality in end-pit lakes is insignificant?

c. Since none of the proposed lakes mimic, in form or function, natural lakes in the area, explain any plans to have equivalent productivity studies completed, comparing end-pit lakes to the natural lakes and streams in the area.

89. Volume 1, Section C.1.6.3, Page C-19-20

a. Present information and images from previously diverted and reconstructed stream channels at CVRI indicating/supporting how this proposed methodology has successfully protected the integrity of the stream channel and water quality, and maintained functional fish habitat.

90. Volume 1, Section C.1.6.5, Page C-20

a. Describe the proposed end land uses alluded to.

b. If the intension is to develop a stocked recreational fishery managed by ESRD, include where and how access will be developed to support this plan.

91. Volume 1, Section C.2.1.1, Page C-23-24

a. Since the Robb West development (Section C.3.8.4) will necessitate the retention of the Mercoal West/Yellowhead Tower haul road for a considerable length of time, discuss the potential for CVRI to relocate the haul road in the vicinity of Pits 122 & 142 to the east, along a remaining portion of the Mercoal Main, to bring closure to outstanding water management and reclamation issues that compromise the development of an ad-fluvial population of Athabasca Rainbow Trout in these pit lakes.

92. Volume 1, Section C.4.1, Page C-47

a. What is the design criteria used to establish the size of these settling ponds?

b. What is the design retention time?

93. Volume 1, Section C.4.3, Page C-49

a. Describe how adaptive management from previous stream diversion and watercourse reclamation work at existing CVRI mine projects will be utilized to reduce risk to fish populations in the Robb Trend project.

b. In reference to the mining sequence that will affect the main stem Erith River, explain/clarify what is meant by the 'ultimate river channel'.

c. The reclamation plan, Section F, does not describe the re-establishment of the Erith River following mining of the Mynheer Seam, but rather the conversion of lotic to lentic habitat. If this is correct, explain how this is deemed reclamation, and how it contributes to NNL of lotic fish habitat. If this is not the plan, describe in detail the criteria to be used for re-establishing the Erith River channel.

94. Volume 1, Section C.4.5, Page C-53-54, and Section C.6, Page C-57

CVRI has proposed lakes that, while achieving specified water quality requirements, will not achieve the production values for the stream habitats they are replacing. The proposed lakes contradict the statements provided in the first paragraph of Section C.6; Environmental Management.

a. Explain this apparent contradiction and describe how CVRI will reclaim stream habitat in the post-mining landscape.

95. Volume 1, Section C.6.6.1, Page C-59

Adaptive Management uses structured evaluation of effect to direct future applications that reduce risk or improve outcomes. In that context, the lessons of past lake development should be directing the development of future lakes.

a. Explain how CVRI plans to incorporate lessons learned from past experiences in lake development (i.e., applying Adaptive Management) to improve the long-term productivity and sustainability of the end pit lakes it is proposing for the Robb Trend Project.

96. Volume 1, Section E.2, Page E-15-41

a. The rankings in Table E.2-3 do not appear to have been scaled to account for differing ecological parameters. Overwintering by RNTR in small tributaries is unconfirmed and further confounds rankings. Include rankings that account for a mean wintering pool depth of 0.65 m (TCEW) and a mean spawning particle size of 10 mm (TCEW).

b. For Table E.2-4, include sediment in the impact assessment for road crossings.

c. For Table E.2-5, the potential impact is unspecified. Provide a classification for risk associated with each diversion. Include the risk to invoke a fish community shift, from one dominated by salmonids to one dominated by pike, suckers and cyprinids.

d. For Table E.2-7, quantify the expected loss in production in terms of spawning and annual standing stock for all impacted lotic habits. Proposed reclaimed lakes will not address these losses. Describe compensation to offset these losses.

97. Volume 1, Section E.2.3.5, Page E-34

CVRI states *Activities associated with the Project that have potential to directly impact fish habitat and, consequently, fish populations will not extend into the RSA.*

a. Describe how the impacts will extend into the RSA given that fish are mobile and some fish will move as mining operations affect their local habitat.

98. Volume 1, Section E.2.3.7, Page E-35

The successful spawning of Bull Trout is contingent on the retention and health of specific habitats in the Erith watershed. CVRI has not identified these critical habitats and the impact associated with them.

a. Complete an assessment of critical habitat and impacts, and reassess the risk of the project to Bull Trout.

b. Describe the range of production losses (fish species including losses to invertebrates) resulting from reductions in flow and creation of end pit lakes.

c. Discuss the impact of a shift in the fish community of the upper Erith watershed.

99. Volume 1, Section E.2.5.2, Pages E-39-40.

The proposed monitoring plan is no different than any monitoring plan previously proposed. Current mining, including reclamation following mining, needs to be refined based on lessons learned from previous mining in these landscapes (adaptive management).

a. Describe how adaptive management has been and will be applied to the monitoring of end pit lakes in order to yield physical changes to the design, in order to provide for improvements in fish use, biological productivity, water quality and other physical properties.

100. Volume 2, CR#2 , Section 3.1.2; Page 8

Some data reported is nearly 5 years old. ESRD completed comprehensive surveys for the Erith/Embarras watershed in 2011.

a. Include this survey data in the EIA and present the revised analysis.

101. Volume 2, CR#2, Section 3.1.3.1, Page 9

Population estimates and expressions of density do not conform to standard reporting practices for ESRD, hence cannot be compared to historical data available for these watersheds. The Consultant has been advised on several occasions that population data is to be provided as first-pass catch/m^2. To complete 2 passes of a technique that requires a minimum of 4 passes for reliable estimation.

a. Describe the criteria used for the analysis.

b. Describe rationale for using population density and expressions of density.

Since variable effort (seconds per unit area) decreases the reliability of CPUE as an index of density, and CPUA is highly correlated with density (pending ESRD Fisheries Management Branch Standard for Small Stream Surveys), it is advised to express first-pass catch in terms of catch per unit area.

c. Rebuild Figure 4 with the following values:
- X – Sample Site
- Y – First-pass Catch (RNTR) as fish per m^2.

102. Volume 2, CR#2, Section 3.1.4.2, Page 10 and Appendix A, Table A.1, Page A-3

a. For Table A.1, clarify how these features are scaled to account for the adaptation of Athabasca Rainbow trout to the small headwater streams of western Alberta.

b. Explain why the HSI model for Athabasca rainbow trout (preferred spawning substrate - geometric mean particle size 1.0 cm; range 0.3 – 3.1 cm) wasn't used.

103. Volume 2, CR#2, Section 3.1.4.3, Page 10

a. Clarify if fish were sampled under ice to determine actual wintering.

104. Volume 2, CR#2, Section 3.2.3, Section 4.2 & Table 4.3 Pages 12-14, 64
The provincial status for Athabasca rainbow trout is currently under review and the AESCC (Alberta Endangered Species Conservation Committee) has recommended to list Athabasca Rainbow trout as 'Threatened' is pending the approval by the Minister of ESRD.

a. Discuss how the native Athabasca Rainbow Trout population has been impacted from introduced trout in the Athabasca drainage system.

b. Provide an updated evaluated risk by evaluating risk based on a status of 'threatened'.

105. Volume 2, CR#2, Table 4.12; Page-33

a. Provide an updated assessment with rescaled parameters to account for ecological impacts owing to spawning and wintering habitat losses.

6. Terrestrial

6.1. Conservation and Reclamation

106. Volume 1, Section A.8.10, Page A-40 and A-47
Volume 1, Section E.10.3.2, Page E-159
Volume 1, Section F.4.1.2, Page F-38
Volume 4, CR #10, Section 3.2, Table 1, Page 9
Volume 4, CR #10, Section 5.4, Page 59
Volume 4, CR #10, Section 5.4, Table 12, Page 60 and 61
Volume 4, CR #10, Section 6.2.1.2, Page 72
CVRI states on Page A-40 that areas where the soils are too wet will not have surface soil salvaged. On Page A-47, CVRI states that during construction, peat and topsoil materials from wetlands will be salvaged and stored for replacement during reclamation.

a. Discuss the methods and criteria CVRI will use to determine if soils are "too wet" to salvage surface soils.

b. Discuss the rationale under which peatlands and wetlands, which generally have a high water table and would be considered very wet with very poor drainage, will have surface soil salvaged, while other areas, with poor drainage such a soil landscape units F1, F2, F3, F4, L6, and M6, will not have surface soil salvaged.

c. Provide information on how these "too wet" areas will be identified in the field.

d. Provide updates to the reclamation material balances and EIA, Reclamation Plan, and CR #10 Soil Resources report as required.

107. Volume 1, Section A.8.10, Page A-41
Volume 1, Section F.4.1.3, Page F-39
Volume 4, CR #10, Section 4.2.2, Table 8, Pages 33-38
Volume 4, CR #10, Section 5.3.2, Page 56
Volume 4, CR #10, Section 5.4, Page 59

CVRI states *that during the mining process the dragline generally places the overburden on the top of the spoil piles, and that when the overburden is recontoured, the lower overburden will be close or at the ground surface*. From Table 8 in the Soil Resources report, it appears that the majority of the lower overburden is rated as unsuitable.

CVRI further states that in order to reduce the overall impact of the project on soil resources, CVRI will sample the surface spoil on the recontoured land surface to identify potentially sodic spoil prior to coversoil placement. CVRI further states that they will *ensure that sufficient quantities of suitable overburden are available either by identifying a borrow site or by stockpiling suitable overburden*.

a. Discuss CVRI's confidence that there is sufficient overburden rated as suitable to provide a minimum 1 m cover over the recontoured land surface.

b. Based on CVRI's operational experience at the existing mines, discuss the expected area (ha) that is likely to have sodic or other unsuitable spoil material at the surface prior to coversoil placement.

c. Discuss the sampling strategy (initial sampling density, delineation density, and sampling depths) that will be employed during the surface spoil sampling program.

d. If a borrow site is required, discuss potential locations of the borrow pit (i.e., is it anticipated that the borrow would be located within the mine permit boundary?) and discuss the conceptual reclamation plan for the borrow pit.

e. If CVRI decides to stockpile suitable overburden separately from unsuitable overburden, evaluate and discuss whether or not the proposed project disturbance footprint and mine permit boundaries have sufficient space to accommodate the separate suitable overburden stockpiles.

108. Volume 1, Section C.2.1.1, Figure C.2-1, Page C-24
Volume 4, CR #10, Figures 2f, 3f, and 4f

Figure C.2-1 and Figures 2f, 3f and 4f show the project footprint as being in close proximity to the Pembina River, which has a meandering configuration. The project will intercept a tributary of the Pembina River, so it is deduced that that the end pit lake to be created adjacent to the river will have a lake surface level which is lower than the river water level. The EA should assess the risk of seepage flow from the Pembina River to the end pit lake, and also the possibility of future channel migration towards the pit.

a. Assess the possibility of a groundwater hydraulic connection between the Pembina River and proposed easternmost end pit lake, and the consequence of this on Pembina River low flows.

b. Assess Pembina River flood levels and possible effects of channel migration relative to proposed project activities.

109. Volume 1, Section E.10.3.3, Page E-160
Volume 1, Section A.8.10, Page A-47
Volume 4, CR #10, Section 6.2.1.3, Page 72
CVRI states that *soils from different soil landscapes are subject to mixing in the stockpile and further mixing occurs during placement and peat and topsoil materials from wetlands will be salvaged and stored for replacement during reclamation.*

a. Confirm if salvaged mineral surface soils will be stored separately from salvaged peat materials, and describe how that will be accomplished.

b. If the materials are to be stored together, has CVRI investigated opportunities to store these two materials separately? Discuss.

110. Volume 1, Section E.10.3.5, Page E-160
Volume 1, Section E.10.6, Table E.10-3, Page E-163
Volume 4, CR #10, Section 6.2.1.5, Page 73
CVRI states that the *planned reclamation approach will provide for considerable landscape and ecological diversity* and this will act as the mitigation approach to the potential loss of soil landscape diversity.

a. Identify and describe any unique soils within the study area that will or may be lost as a result of the planned mine and resulting disturbance.

b. If any unique soils will be lost due to the project development, discuss any expected impacts to ecological diversity, especially with respect to the ability of CVRI to implement effective rare plant mitigation strategies.

111. Volume 1, Section F, Pages F 11- F 14

a. Since the ecological performance of the two lakes (Pits 122 & 142) has not been evaluated or deemed successful, explain the relevance of referencing this reclamation as a model for the Robb Trend project.

112. Volume 1, Section F.2.4.3; Page F-9, Page F-11
Reclaiming pit areas to include end pit lakes may affect fish habitat and productivity.

a. Describe specific design criteria supported by the Fish & Wildlife Division that were incorporated into the planned reclamation of pit areas.

b. Describe specific design criteria that enhance productivity in these lake developments?

113. Volume 1, Section F.2.5.6, Page F-17.
The project will result in substantial loss of vegetation through clearing. CVRI indicates that *it is planning to increase the planting of understory species to promote the development of structural complexity in regenerated forest. CVRI will also plant shrubby species for the development of shrub and shrubby meadow areas.*

Targeting these native ecosystems will result in a high demand for native plant propagules in the future.

a. Discuss steps that CVRI has taken or will undertake to conserve the genetic diversity from the landbase particularly shrubs, considering the life of the project and the need to reclaim the proposed mine footprint to native ecosystem types.

114. Volume 1, Section F.2.5.6, Page F-17.

CVRI states, *the fertilizer commonly used by CVRI is a blend of ammonium phosphate (27-27-0) with an application rate of approximately 180 kg/ha. CVRI uses advice from the seed supplier for the type of fertilizer to use for the seed mixes being used. The application rate is one that has been historically used at CVM with good results*.

The above text suggests that fertilizer application rate is not based on the nutrient potential associated with the reclamation materials.

a. Discuss how CVRI will use nutrient data from reclamation materials to determine fertilizer application rates whenever CVRI decides to carry out fertilization for exiting projects and this project.

115. Volume 1, Section F.2.5.6, Page F-18

The Project development area differs from previously mined areas as it contains large areas of deciduous and mixed wood stands (1,430 ha of deciduous and mixed wood stands in the development area). To date, CVRI has not undertaken extensive planting of deciduous species.

The importance of deciduous species and mixed wood stands has been stressed on several occasions. However, it has also been indicated that the deciduous species are susceptible to competition and browsing by wildlife, and a lack of deciduous species has been noted as a deficiency in the reclamation program at the CVM in the past.

a. Explain CVRI's options and plans to make replacement of deciduous and mixed wood stands a success.

116. Volume 1, Section F.3.1, Page F-21

CVRI states *CVRI, along with all other interested stakeholders groups, commits to being a participant in land-use planning processes that are initiated*.

a. Explain why CVRI wants to be just a participant and not partner in this initiative.

117. Volume 1, Section F.4.1.1, Page F-35.

CVRI states, *the baseline vegetation assessment identified 46 rare plants and one rare plant community within the LSA. Of those, four species (Vegetation Assessment Table 5.6) require special mitigation prior to clearing operations. These four plant species are assigned mitigation measures of transplanting to a suitable plant community, and aiding in the dispersal of propagules. The locations of the plants are known and will be identified in the field and mitigation will be applied prior to any clearing operations*.

a. The above text indicates that CVRI proposes to transplant rare plant species as a mitigation strategy should the project be approved. Citing specific examples, discuss

118. Volume 1, Section F.4.1.2, Page F-38.
CVRI states, *the soil inventory of the Robb West development area indicates there is a minimum of 2.6 M m3 of upland surface soil available for salvage and reclamation compared to a coversoil need of about 2.9 M m3. This indicates that there is potential 0.3 M m3 shortfall of upland surface soil available for the reclamation requirements. It is emphasized that this is a potential shortfall as the mean volume estimate of salvageable soil is 3.3 M m3. Refer to CR#10 for additional details on the potential shortfall.*

There is more than enough organic peat material available to meet all the wetland and littoral area reclamation needs across the entire Project area. Refer to Table F.4-2 for volumes of organic soils within the LSA.

Organic and transitional soils are suitable reclamation materials, and can be used as coversoil in upland reclamation.

a. Does the reclamation materials balance include potential salvageable organic and transitional soils?

b. If not, has CVRI considered salvaging all organic and transitional soils to make up the potential shortfall?

119. Volume 1, Section F.4.1.3, Page F-39.
CVRI states *Mynheer overburden is known to be sodic with unsuitable SAR (greater than 12) occurring at depth in the Project area. The Mynheer overburden is expected to produce spoil having an unsuitable SAR* [see Volume 4, CR#10, Section 4.4, Page 48].

Management of overburden in other CVRI mines has raised concerns for Alberta Environment and Sustainable Resource Development.

a. Discuss how CVRI will manage overburden differently for this project such that Mynheer overburden will not be close to the surface.

120. Volume 1, Section F.4.1.3, Page F-39.
CVRI states, *CVRI will place a minimum of one metre of material meeting the suitable overburden criteria prior to soil replacement. CVRI will ensure that sufficient quantities of suitable overburden are available for the soil replacement program by either identifying a borrow site or by stockpiling suitable overburden as it is mined.*

a. Clarify what is meant by borrow site.

b. At what stage in the project life cycle will CVRI know when to stockpile suitable overburden?

c. If suitable overburden will not be stockpiled at strategic locations within the project footprint early on in the development, is CVRI committed to hauling suitable overburden to cap deleterious materials (e.g., saline and/or sodic overburden) no matter what the hauling distance required?

121. Volume 1, Section F.4.2.5, Page F-51.

Text indicates that CVRI has never undertaken large scale plantings of deciduous species such as trembling aspen and balsam poplar. CVRI also states, *it is anticipated that CVRI will investigate mitigation actions for limiting the browse damage to deciduous reforestation. Mitigation options may include: Exclosures – fencing, netting, protectors and other physical barriers; Repellents – irritants (scents/taste), noise, visual (flagging); Replanting – planting more stock than are damaged each year*.

Given that repellant may be ineffective in managing browsing in the long-term, and exclosures and planting will be labor intensive and expensive as indicated in the application, clarify the following.

a. Discuss the ecological implications of the perceived challenges of establishing deciduous species.

b. Evaluation of the three mitigation options does not provide enough assurance that CVRI will do whatever it takes to establish deciduous and mixed wood forests. Identify which of the three options CVRI will implement should the project be approved to ensure that deciduous and mixed wood forests will be established at closure?

122. Volume 1, Section F.4.2.5, Page F-52 and Figure F.4.1, Page F-35

Linear pattern of end pit lakes in post mining landscape.

a. Discuss social, economic and environmental impact of linear configuration of the proposed 12 end pit lakes extending almost 60 km with only few gaps in between.

b. Discuss options available to reduce the number of end pit lakes and the linear alignment.

123. Volume 1, Section F.4.1.2, Table F.4-2, Page F-38
Volume 4, CR #10, Section 5.4, Table 13, Page 61

CVRI has provided information on the expected minimum volumes of material available for salvage within the project area, but there are discrepancies between the volumes presented in Tables F.4-2 and Table 13.

a. Clarify the expected minimum available volumes of material available for salvage within the project footprint.

b. Provide updates to the Reclamation Plan and CR #10 Soil Resources report as appropriate.

124. Volume 1, Section F.4.2.1, Pages F-40 to F-42
Volume 1, Section F.4.2.2, Pages F-42 to F-43

CVRI has provided information on the proposed recontouring and minesoil profile construction methods planned for the mine, but no information could be found regarding reclamation of the haul roads.

a. Provide reclamation plans and procedures for the Bryan, Erith, and Halpenny corridors.

125. Volume 1, Section F.4.3, Page F-55
Volume 1, Section F.4.4, Table F.4-8, Page F-56
CVRI describes the post-reclamation land management Phase III (following Reclamation Certification) as taking place 10 to 16 years following initial mine activities. Table F.4-8 indicates that Reclamation Certification is expected approximately 15-20 years after Resloping/Minesoil placement takes place.

a. Clarify this apparent discrepancy in the expected timeframe within CVRI expects to achieve reclamation certification on the reclaimed areas of the mine site.

b. Provide updates to the Reclamation Plan as needed.

126. Volume 1, Section F.5.4, Page F-61.
CVRI states, *The objectives of the soil monitoring program are to conduct field investigations on the reclaimed lands to: … identify concerns such as erosion, poor vegetation growth, soil problems, etc*.

a. From past operational practices, list soil problems that CVRI has encountered and discuss how they have been dealt with (i.e., describe the adaptive management that CVRI has carried out).

b. What other soil related problems does CVRI anticipate will be encountered as suggested by the use of 'etc'?

127. Volume 1, Section F.5.4, Page F-61
CVRI states that the *reclamation practice will be to replace coversoil at a minimum average depth of 30 cm on at least 80% of the reclaimed area, based on a 1 hectare area.* CVRI further states that *one of the objectives of the proposed soil monitoring program will be to evaluate 'equivalent capability' of the reclaimed soils and landscape*.

a. Discuss the potential mitigation measures CVRI may use to achieve the required minimum coversoil depth if the detailed soil and terrain data collected indicates that insufficient coversoil is present on the reclaimed minescape.

b. Discuss the criteria that will be used to evaluate 'equivalent capability' of the reclaimed soils.

c. Evaluate and discuss potential mitigation measures, including implementation strategies, that may be required if the reclaimed soils or landscapes have achieved 'equivalent capability' based on the selected criteria.

128. Volume 4, CR #10, Section 3.2, Table 1, Page 7, 8, and 9
Volume 4, CR #10, Section 5.4, Table 12, Page 60 and 61
CVRI describes the Soil Landscape Models F5 and F6 as having imperfectly well and well drained Luvisol, Brunisol, and Regosol soils in Table 1, and in Table 12, CVRI indicates that surface soil (A and B horizon material) from these two landscape units will not be salvaged because of wet conditions. Conversely, CVRI describes other landscape models such as G5 and M5 as having imperfectly drained Luvisol soils, but in Table 12, CVRI indicates that surface soil will be salvaged from the G5 and M5 landscape units (as well as other moderately well and well drained units).

a. Discuss the rationale under which surface soil is salvaged from some units with imperfectly drained soils, while it is not salvaged from other units with what appear to be similar soil moisture conditions.

b. Provide updates to the reclamation material balances and EIA, Reclamation Plan, and CR #10 Soil Resources report as required.

6.2. Terrain and Soils

129. Volume 1, Section A.8.13, Page A-49
CVRI states that *in order to assess the effectiveness of the mitigation measures, CVRI will conduct a rare plant survey on any new development areas not included in the assessment.*

a. Clarify if CVRI is planning any new developments outside of the proposed disturbance footprint.

b. If new development areas are being planned, discuss the rationale for not including those areas within the current assessment.

c. Clarify if CVRI will also conduct additional studies or surveys on soils, vegetation, wildlife, etc. on any new development areas.

d. If no additional studies will be conducted, discuss the rationale for conducting only rare plant surveys.

130. Volume 1, Section C.2.1.1, Figure C.2-1, Page C-24
Volume 4, CR #10, Figures 2f, 3f, and 4f
The proposed footprint disturbance boundary (LSA) shown on the referenced maps appear to extend right to the edge and even into the Pembina River, but no discussion of adverse impacts directly to the Pembina River could be found.

a. Confirm the boundary of the proposed footprint disturbance and discuss its proximity to the Pembina River and the Pembina River floodplain.

b. If the disturbance area will extend into the Pembina River or on to the Pembina River floodplain, discuss the potential for impacts through loss of spoil pile material or coversoil stockpiles due to flooding of the Pembina River.

c. Provide information on the minimum separation distance between the proposed disturbance area, including tree clearing and stockpile locations, and the Pembina River.

d. Discuss any impacts that may be expected on the Pembina River and any mitigation measures that may be required.

e. Provide updates to the EIA as required.

131. Volume 1, Section C.6.6.8, Page C-62

CVRI describes the general spill clean-up procedures to be used on site and states that *spilled material that cannot be recovered will be picked up and stored for proper disposal*. However, no information could be found that describes how CVRI will ensure that soil or groundwater resources left in place have not been adversely impacted by the spill.

a. Discuss the methods or techniques CVRI will employ to ensure that any soil or groundwater resources left in place after the initial spill response and removal of spilled product have not been adversely affected by the spill.

b. Discuss the contaminant guidelines CVRI will use to evaluate any potential impacts as a result of contaminants on site.

c. If any impacts are identified following initial spill response activities, discuss possible contaminant remediation measures that may be used to address those impacts.

132. Volume 1, Section E.10.1, Page E-149
Volume 4, CR #10, Section 2.1, Page 3
Volume 4, CR #10, Figures 2, 3, and 4

CVRI states that the *soils of the Regional Study Area (RSA) corresponds with the proposed Mine Permit Boundary*, but no discussion of the appropriateness of this boundary was provided. Figures 2, 3, and 4 indicate that in several places, the proposed footprint disturbance approaches very close to and in some cases appears to overlap with the proposed mine permit boundary.

a. Discuss the rationale for selection of the mine permit boundary for the RSA.

b. Discuss the rationale, when setting the RSA extent, for not using a minimum buffer distance around the project disturbance footprint, including but not limited to the full extent of peatland and wetland soil landscape units that may be affected.

c. Discuss the potential effects on soils outside of the mine permit boundary that may be affected by disturbance activities within the proposed mine footprint. For example, what effect will peat salvage operations have on any organic soils outside the mine permit boundary through potential draw down of the shallow water table or changes to the local hydrological flow regime?

d. Discuss any changes to the EIA that may occur if the RSA was expanded to encompass, at a minimum, all organic and wetland units that may be directly affected by activities within the disturbance footprint.

e. Provide updates to the EIA, Conservation and Reclamation Plan, and CR #10 Soil Resources report as required.

133. Volume 1, Section E.10.2.1, Table E.10-1, Pages E-150 to E-153
Volume 4, CR #10, Section 3.3, Table 2, Pages 12 and 13
In Table E.10-1, CVRI indicates a total RSA area of 13,548.7 ha, while CR #10, Table 2 indicates a total RSA area of 10,113.6 ha.

a. Clarify the correct size of the RSA, and if the correct size was used consistently throughout the EIA, Reclamation Plan, and CR #10 Soil Resources Report in the evaluation of potential impacts and reclamation material balance calculations.

b. Provide updates to the EIA, Conservation and Reclamation Plan, and CR #10 Soil Resources report as necessary.

134. Volume 1, Section F.3.4.1, Page F-27
Volume 1, Section F.3.4.2, Page F-29
Volume 1, Section F.3.4.3, Page F-31
Volume 1, Section F.3.4.4, Page F-33
Volume 4, CR #10, Section 3.3, Page 11
Volume 4, CR #10, Section 3.3, Table 2, Pages 12 and 13
Volume 4, CR #10, Section 5.4, Table 12, Pages 60 and 61
For each of the referenced Biophysical Reclamation Units, CVRI states that the *surficial deposits are dominated by glaciolacustrine deposits (Upper Ridge) or as lacustrine or residuum deposits (Lower Slopes, Forested Lowlands, and Riparian Lowlands*). However, Section 3.3 and Tables 2 and 12 in the Soil Resources Report indicate that the moraine landforms occupy the majority of the area within the RSA and LSA, respectively.

a. Clarify the dominant surficial deposits within the project area (RSA and LSA) and within each of the biophysical reclamation units described within the reclamation plan.

b. Provide updates to the EIA, Reclamation Plan, and CR #10 Soils Resources report as necessary.

135. Volume 1, Section F.4.1.1, Page F-36
CVRI states that *non-salvageable debris that cannot be incorporated into the soil will be windrowed to allow soil salvage to proceed and will be buried during mining operations*.

a. Provide information on the expected volumes and percentage of fallen debris and non-merchantable vegetation that will be incorporated during salvage, and buried during mining operations.

b. Discuss alternative uses for this non-salvageable debris besides burial (such as coarse woody debris on coversoil stockpiles), including benefits and constraints to use.

136. Volume 4, CR #10, Section 3.2, Table 1, Page 7
The landform of Soil Landscape Model F1 is described as Fluvial with surface expressions a, b, and t. No definition of the surface expression ‘a’ could be found.

a. Provide a definition for the surface expression ‘a’.

b. Provide updates to the EIA, Reclamation Plan and CR #10 Soil Resources report as necessary.

137. Volume 4, CR #10, Figure 3
Volume 4, CR #3, Section 2.3.5, Page 15

Several organic soil landscape map units (e.g., O1/2 map unit at western end of Robb West mine in Section 36-049-22 W5M) extend from inside the project disturbance footprint, across the RSA, and beyond the mine permit boundary, and CVRI has stated that they will salvage peat from these landscape units within the project footprint. Further, CVRI has stated that significant groundwater drawdown may extend up to 200 m from the pit.

a. Discuss how peatlands and wetlands will be affected by the predicted drawdown of shallow groundwater in the areas adjacent to the disturbance footprint.

b. Will any peatlands or peatland remnants be isolated by the project, and if yes, discuss how the hydrology of these isolated peatlands will be affected.

c. Discuss any monitoring programs planned to ensure that the peatlands and wetlands adjacent to the project disturbance footprint are not being affected.

d. Provide mitigation measures that may be implemented if the monitoring programs described in c) indicate that peatlands and wetlands are being affected.

e. Provide updates to the EIA, Reclamation Plan, and CR #10 Soil Resources Report as required.

138. Volume 4, CR #10, Section 3.3, Page 11
Volume 4, CR #10, Section 5.3.1, Table 11, Pages 54 to 55
Volume 4, CR #10, Section 5.4, Table 12, Pages 60 to 61
Volume 4, CR #10, Appendix B

CVRI states that representative soil profiles for each landscape are presented in Appendix B, and Table 11 summarizes the baseline soil horizon thicknesses, for each soil landscape model, used to calculate volumes of salvageable soil. Several of the representative soil profiles in Appendix B have Peat, LFH, A Horizon, and B Horizons thicknesses that are outside of the depth ranges summarized in Table 11. For example, the representative M2 soil profile in Appendix B has an A Horizon thickness of 3 cm. In Table 11, the A Horizon thickness range for the M2 soil landscape unit is 9-23 cm in the Robb Main-Centre East Pits and 8-29 cm in the Robb West pit, both considerably greater than the representative thickness of 3 cm, suggesting that the total volume of salvageable A Horizon material may have been overestimated.

a. Review and confirm that appropriate depth ranges have been used for each of the soil landscape models in Table 11.

b. Based on any changes resulting from the review of a), provide updates to the surface soil salvage volume estimates in Table 12 as needed.

c. Provide updates to the Reclamation Plan and CR #10 Soil Resources report as needed.

139. Volume 4, CR #10, Section 3.5.1, Page 15; Section 4.2.1, Page 32
Volume 4, CR#10, Section 5.1, Page 49
Volume 4, CR#10, Section 5.3.4, Page 58
Volume 4, CR #10, Section 6.2.2 Page 73
Equivalent land capability issues have been discussed in various sections.

a. Explain how CVRI plans to engage reclamation strategies so that equivalent land capabilities (biological productivity) will be achieved.

140. Volume 4, CR #10, Section 3.5.1, Table 3, Page 16
Volume 4, CR #10, Section 3.5.2, Table 4, Pages 17 to 20
Table 3 indicates a number of parameters used to evaluate the reclamation suitability of soils in the Eastern Slopes Region of Alberta, including pH, salinity, sodicity, saturation %, coarse fragment content, texture, moist consistence, and $CaCO_3$ %. Table 4 provides physical and chemical data from sampled soils, but does not include information on coarse fragment content or $CaCO_3$ %.

a. Discuss the rationale for not including coarse fragment content or $CaCO_3$ % when evaluating the reclamation suitability of the sampled soils within the disturbance footprint.

b. Evaluate the potential changes to reclamation suitability ratings of the soils within the project footprint if coarse fragment content or $CaCO_3$ % are included in the ratings evaluation.

c. Provide updates to the EIA, Reclamation Plan, and CR #10 Soil Resources report as necessary.

141. Volume 4, CR #10, Section 3.5.2, Table 4, Pages 17 to 20
Volume 4, CR #10, Section 3.5.2, Table 5, Pages 21 to 23
Table 5 provides Soil Quality Ratings for each soil landscape model in the Robb Trend study area. No soil sample data was presented in Table 4 for the majority of the soil landscape models, however. For example, data from 14 'L1' sites was provided in Table 4, but no data from the 'L2' and 'L4' landscape units was provided in Table 4.

a. Discuss the methods used to calculate Soil Quality Ratings when no soil chemistry was available to represent a given soil landscape model.

b. Discuss the rationale for not collecting representative soil sample data for each soil landscape model.

c. If data was collected but not presented, provide the additional data.

142. Volume 4, CR#10, Section 4.3, Page F-44.
Baseline trace elements data suggest that arsenic, barium, cobalt, molybdenum, nickel, and selenium exceed CCME guidelines. It is possible that the extent and magnitude of exceedances may be underestimated based on the sampling intensity.

a. Discuss strategies that CVRI will use to manage geologic materials with high concentration of the above trace elements such that they will not pose an ecological threat during operation and at closure.

143. Volume 4, CR #10, Section 5.3.1, Page 53
Volume 4, CR #10, Section 5.4, Page 59
Volume 4, CR #10, Section 5.4, Table 12, Pages 60-61
Volume 4, CR #10, Figures 3a to 3f

CVRI states that *Upland surface soil… salvage is limited to a maximum slope steepness of 45 percent to allow for the safe operation of equipment and slopes in excess of 45% are not included in the calculations* of surface soil salvage volumes. It appears from Table 12 and Figures 3a to 3f, however, that selected polygons with slopes in excess of 45% may have been included. For example, an S3/8-9 polygon located along the south edge of Section 30-049-21 W5M on Figure 3a appears to be located within the proposed footprint disturbance, and appears to have been included within the volumes of soil available for salvage in Table 12. Other examples were also found.

a. Provide information of the area of land (total area and area for each soil landscape model) within the disturbance footprint with slopes greater than 45%.

b. Confirm that all landscape with slopes greater than 45% have been excluded from the soil volume calculations.

c. Provide updates to the Reclamation Plan and CR #10 Soil Resources report as needed.

144. Volume 4, CR #10, Section 5.3.4, Page 58
Volume 4, CR #10, Section 5.4, Page 62
Volume 4, CR #10, Section 5.4, Table 15, Page 63

CVRI states that *thicker coversoil does not necessarily equate to better quality minesoil*. Based on the average soil horizon thickness averages provided in the report, CVRI concludes that *there is sufficient surface soil available to meet coversoil requirements in all areas of the proposed project disturbance*. Information provided by CVRI suggests that there may be greater than 1 million cubic metres of excess upland surface soil available for salvage.

a. Discuss CVRI's plans for this potential excess volume of salvaged surface soil.

6.3. Wildlife

145. Volume 3, CR#7, Section 4.5.4; Page 53

a. Based on Foothills Research Institute Grizzly Bear Project (FRIGBP) data points and open access densities in the vicinity of the CVM permit area, discuss if and how attractive food resources on the reclaimed area may concentrate bear activity in the vicinity of the mine permit area relative to the remainder of their home ranges and how this might effect mortality risk.

146. Volume 3, CR#7, Section 5.3.5.3. Page 77
Volume 5, CR#14, Section 13.0. Page 107

The proposed reclamation plan calls for about 31 kms of long, linear end-pit lakes on the 50 km mine permit area (62% of mine length) with narrow gaps between lakes.

a. Discuss the impacts this will have on grizzly bear movements and eastward dispersal.

b. Address how this will impact grizzly bear population recovery and recolonization?

c. Discuss what effects this would have on ungulate seasonal movements, dispersal, recolonization and predation risk.

147. Volume 3, CR#7, Section 6.6.1. Page 86

a. Did CVRI consider a scenario 3 which is a combination of scenario1 and scenario 2 in which a reduction in high quality habitat leads to a reduced regional population of marten and that trappers would be forced to concentrate trapping effort in these remaining high quality habitat areas resulting in a higher percentage of mortality within the reduced population? If not, what would be the effects on marten populations given this scenario 3?

In scenario 1, CVRI suggests that natural forest succession will continue to age forests and improve marten habitat quality. High and very high quality habitat consists largely of mature and old growth forests, however, logging occurs within a 2 pass system with the second pass taken before the 1st pass reaches a mature stage or old growth stage. As well, CVRI has not considered likely future mine developments within the RSA.

b. Given the above, how much high and very high quality marten habitat do you estimate will be produced in the RSA within the 50 year time frame?

c. Reply to the above question but with respect to fisher.

148. Volume 3, CR#7, Section 6.4.2, and Section 6.6, Pages 85-92
Volume 5, CR#14, Section 13.0, Page 107

Cumulative effects assessment must have regard for reasonable foreseeable projects, activities and natural events that could affect the magnitude, duration or significance of a project's cumulative effects. As well, any overlap among multiple projects with respect to temporal and spatial scales must be considered and discussed. Several other coal mining and quarrying projects have been announced, approved, are undergoing regulatory review, or are directly associated with the Project.

a. Provide a summary of all mining, quarrying, oil and gas and other industrial projects within the RSA that may have the potential to affect the predicted results of the wildlife cumulative effects assessment.

b. Discuss how CVRI defines insignificant/negligible impacts, with respect to impacts on wildlife and wildlife habitat.

c. Discuss what methodology, with respect to impacts on wildlife and wildlife habitat, was used to determine that impacts to these VEC's were insignificant.

d. Discuss what methodology was employed to determine that the Robb Trend project will not contribute to cumulative effects on wildlife resources.

e. Discuss how CVRI has accounted for the following impact of the Project in terms of immediate and cumulative effects on wildlife and wildlife habitat:
   i. fragmentation of habitat, and
   ii. connectivity of landscapes.

f. Provide discussion on how the cumulative effects assessment has changed for wildlife components at a project, local and regional scale and provide how any impacts will be mitigated.

149. Volume 5, CR#14, Section 9.1.2. Page 68
The Fisheries and Wildlife Management Information System (FWMIS) database indicates that a long-toed salamander pond has been identified within 3 km of the West Block and 5 km of a similarly sized pond within the West Block. Long-toed salamanders are considered a species at risk and they cannot be identified using a standard call survey used for frogs and toads.

a. Was a long-toed salamander specific survey conducted within the LSA?

b. If not, complete the survey using approved ESRD protocols and update the assessment accordingly.

7. Health

150. Volume 2, CR #1, Section 2.1.1, Page 4.
Coal Valley Resources Inc. (CVRI) states *The Planned Development Case, including all sources in the Application case and any foreseen new developments. As no planned projects have been identified in the RSA, the Planned Development Case is identical to the Application Case.*

a. Confirm that any facilities proposed beyond the RSA boundaries would result in a negligible impact on the air quality within the RSA.

b. If non-negligible impacts could occur, include a Planned Development Case that includes emissions from the proposed facilities and revise the Health Section of the EIA accordingly.

***151.* Volume 2, CR #1, Section 2.5.2, Page 11.**
CVRI states *While emissions will occur for the full duration of the Project, changes in air quality will have temporal variability due to the natural fluctuations in meteorology (wind speed, wind direction, temperature), and also to short and long-term variability in emissions. In addition, the highest concentrations typically occur for very short durations and there may be infrequent upset conditions.*

a. Describe how air concentrations and odours during upset conditions were evaluated.

b. If not evaluated, include an assessment of air quality and odour as a result of upset conditions and revise the Health Section of the EIA accordingly.

152. **Volume 2, CR #1, Section 5.9, Page 67.**
CVRI states *Effects from a longer list of COPCs are considered in the human health risk assessment included with this Application. For most chemicals, the Project contribution is negligible at all locations.*

a. Explain why there is a discrepancy between the list of COPCs identified in the Air section and the list of COPCs considered in the human health risk assessment.

153. **Volume 3, CR #5, Section 3.2.1.1, Page 9.**
CVRI states *Because of the potential influence of the mining activities on the surface water quality, water collection and impoundment structures will be used to attenuate the potential impacts of the mining activities on the local water courses, including increased sediment loads and deposition of those sediments.*

a. Conduct an evaluation of potential human health risks in the event of a failure in the water collection and impoundment structures, or provide evidence to show that such an assessment is not required.

154. **Volume 3, CR #5, Section 3.2.1.1, Page 9.**
CVRI states *Based on the conclusion that impacts, due to the Project, on surface water quality are negligible or not significantly different than Baseline conditions, it was assumed that there were no changes in surface water quality for the Application Case.*

An assessment of COPC deposition onto surface water bodies and the potential effect of this deposition on surface water quality and sediment quality was not conducted.

a. Provide an assessment of the deposition of air contaminants to surface water and evaluate the potential effects on surface water quality and sediment quality.

b. If the potential effects on surface water quality and sediment quality are not shown to be negligible, provide an assessment of potential human health impacts associated with exposure to and consumption of surface water and consumption of fish from affected water bodies.

155. **Volume 3, CR #5, Section 3.2.1.2, Page 11.**
CVRI states *Eighteen discrete locations within the RSA were selected for consideration in the HHRA, with six falling inside the LSA. The discrete receptor locations within the LSA primarily consist of recreational locations and the Hamlet of Robb.*

Four of the 18 locations listed on Page 11 are missing from Table 3-2 (i.e., R10, R11, R12 and R13).

a. Comment on whether these locations were included in the HHRA.

b. If not included, explain why.

156. **Volume 3, CR #5, Section 3.2.1.2, Pages 11-12.**
CVRI states *The HHRA assumed that people may be exposed at the MPOIs on an infrequent basis. As people will not be living at these locations, the MPOIs were evaluated only for inhalation exposure, and only on an acute basis.*

a. Confirm whether any of the designated receptor locations for chronic exposure are located at or close to the MPOI.

b. If none of the selected receptor locations for chronic exposure are at or close to the MPOI, provide an assessment of potential risks for a receptor who obtains food from locations with higher deposition, such as the MOPI or the project fenceline, or provide rationale as to why such an assessment is not required.

157. Volume 3, CR #5, Section 3.2.1.2, Page 12.

CVRI states *There are no work camps planned for the Project where people would live during construction and operation. Therefore, the HHRA did not include a Worker group.*

a. Provide evidence to support that an assessment of human health risks for mine workers present at the mine during mine operations was not necessary.

b. Provide evidence to support that an assessment of human health risks for workers exposed to air emissions predicted during the construction phase of the Project was not necessary.

c. In the absence of evidence for a. and b., complete an evaluation of human health risks for workers and/or construction workers exposed to air emissions predicted during the operation and/or construction phase of the Project.

158. Volume 3, CR #5, Section 3.2.1.2, Page 12.

The HHRA receptor groups do not include an agriculture receptor.

a. Provide evidence to support that an assessment of human health risks for agricultural receptors within the RSA was not necessary.

b. In the absence of this evidence, complete an evaluation of human health risks for agricultural receptors.

159. Volume 3, CR #5, Section 3.2.1.3, Page 16.

In this section CVRI lists the exposure pathways included in the HHRA.

a. Confirm whether ingestion of surface water and dermal contact with surface water while swimming were considered in the HHRA.

b. If these pathways were considered, which water bodies were receptors assumed to swim in?

c. If not considered, explain why not.

160. Volume 3, CR #5, Section 3.2.2, Page 16.

a. Describe the oral, inhalation and dermal bioavailability assumed in the exposure and toxicity assessments for each COPC assessed in the HHRA.

161. Volume 3, CR #5, Section 3.2.3.1, Tables 3-14 and 3-16, Pages 32 and 34.
Several reputable scientific agencies have identified naphthalene and formaldehyde as carcinogens.

a. Provide an assessment of potential health effects from chronic oral and/or chronic inhalation exposures to these carcinogens.

162. Volume 3, CR #5, Section 3.2.3.1, Table 3-17, Page 35.
This table provides a summary of the toxic endpoint identified for each COPC and the potential additive interactions of COPC. Chronic inhalation and chronic oral exposure can produce similar health effects, as outlined for aluminum, lead, manganese, selenium, uranium, and aromatic C_9-C_{16}.

a. Explain how the HHRA accounted for additive effects on target organs following combined oral and inhalation exposures.

163. Volume 3, CR #5, Section 4.1, Tables 4-1 to 4-4 pages 40-42.

a. Define the averaging period assumed for the EPA statistic in these tables.

b. Provide a table or reference to a table that summarizes the air concentrations for the acute RQ values in these tables.

164. Volume 3, CR #5, Section 4.2, Tables 4-8 and 4-9, Pages 47-49.
The air concentration data provided in Appendix D (Table D14 Summary of Air Concentrations Used to Estimate Human Exposures) does not include all of the COPCs listed in these tables.

a. Provide a table or reference to a table that summarizes the air concentrations for the chronic RQ values reported in these tables.

165. Volume 3, CR #5, Section 4.3.1, Table 4-11, Page 51.

a. Explain the value of 0% for dermal uptake during swimming when, in Appendix B - Section B3.2, manganese was above detection in all surface water samples collected.

b. Explain why incidental ingestion of surface water during swimming was not considered in this table.

166. Volume 3, CR #5, Section 4.3.1, Page 51.
CVRI states *In the current assessment, the estimated daily intake of manganese for the toddler is predicted to be 5.8 mg/day. This intake level is below the recognized NOAEL of 10 mg/day (Health Canada 2009b; U.S. EPA 1996; WHO 2000).*

a. Did this estimated daily intake for manganese include chronic inhalation exposure?

b. If not, recalculate a daily intake for manganese that includes inhalation exposure.

8. Federal

The responses to questions in this Approvals section will not be considered as part of the EIA completeness decision made by Alberta Environment.

8.1. Department of Fisheries and Oceans (DFO)

167. Volume 1, Section E, Table E.2-5, Page E-27.
Table E.2-5 describes planned diversions and associated habitat impacts. The table provides linear and area measurements to describe watercourses that will be diverted as part of mining practices.

a. Discuss what method CVRI has used or will use to define the quality of fish habitat that will be harmfully altered, disrupted or destroyed when these watercourses are diverted. How will the data used to define the quality of fish habitat be applied to a no-net-loss plan? (i.e.-how the quality of removed habitat will be incorporated into the development of a no-net-loss plan).

b. Discuss how CVRI will ensure that the fish habitat lost will be replaced with equally productive fish habitat for the species that are native to the area.

168. Volume 1, Section E, Page E-29.
CVRI states *Some of the [pit] lakes may be constructed to preclude fish access but conceptually, the lakes will be designed to maximize habitat and biological diversity and use by native fish population...*

a. Discuss examples of the types of fish habitat features that will be incorporated into the "lakes" that will help maintain native fish populations.

b. Discuss how CVRI will maximize habitat and biological diversity when lotic (flowing water) habitat is changed to lentic (still water) habitat?

c. Discuss how CVRI will maintain salmonid fish communities when portions of lotic habitat are changed to lentic habitat because of the creation of pit lakes within a lotic system.

d. Discuss the perceived impact on fish communities when constructing lentic habitat in the middle of a lotic system.

e. Discuss what the criteria are that will determine whether fish will be allowed to access pit lakes or be denied access to pit lakes.

f. Provide an update on the development of a monitoring plan that will assess the effects of the mine on fish communities, species compositions and other impacts on fish and fish habitat.

169. Volume 1, Section E, Page E-31.
CVRI states *Well established mitigation measures will be implemented to reduce potential sediment effects to a minimum.*

a. Provide an outline of specific well-established mitigation measures and their application and efficacy in relation to mitigating the impact of coal mining on the aquatic environment, using other mines operated by CVRI as examples.

170. Volume 1, Section E, Page E-31.
CVRI states *During the filling period, downstream flows in receiving watercourses will decrease. Impacts to fish habitat as a result of pit filling is expected to be minimal since it is assumed that lake filling will be gradual in order to maintain downstream flows and instream flow guidelines (AENV 2011*).

a. Discuss how CVRI will mitigate the effect of a decrease in downstream flow on the fish species that inhabit watercourses subject to diversion during critical life-cycle periods like spawning seasons and over-wintering periods.

b. Discuss how CVRI will ensure the maintenance of downstream flow in these diversion zones during the winter season.

c. Discuss how CVRI has accounted for changes to fish habitat because of reduction in downstream flows.

171. Volume 1, Section E, Page E-32.
CVRI states *A detailed compensation plan will be developed and refined in subsequent planning phases as further mine plan details become available and following consultation with regulators and stakeholder*.

a. Provide examples of how CVRI plans to incorporate successes and/or challenges of past fish habitat compensation projects into the development of a fish habitat compensation plan for Robb Trend (i.e. - the use of adaptive management).

b. Discuss how CVRI plans to develop a successful fish habitat compensation plan incorporating adaptive management and provincial fish management objectives when changing lotic habitat to lentic habitat because of mining practices, using examples from other mining operations in the vicinity.

c. Provide an update on the status of the development of the fish habitat compensation plan including, but not limited to: timelines, objectives and considerations.

172. Volume 1, Section E.2.4, Page E-38.
CVRI states *TSS is not expected to change significantly in the Embarras River or Erith River downstream of the project.*

a. Discuss what CVRI's plan is for TSS monitoring of watercourses other than the Embarras and Erith Rivers because of impacts associated with the Robb Trend development. (i.e.- impacts to water quality on Erith tributaries, Bacon Creek, Bryan Creek, Hay Creek, Halpenny Creek and tributaries, Lendrum Creek and tributaries, Lund Creek and tributaries, Mitchell Creek, Pembina River Tributary, Jackson Creek, White Creek).

b. Provide a copy of this plan or if the plan is not ready, provide objectives and timelines associated with the development of this plan.

173. Volume 1, Section E.2.5, Page E-39/40.
CVRI references an adaptive approach throughout the EA.

a. Discuss how CVRI has incorporated adaptive management in the development of mitigation strategies for the Robb Trend Mine. Provide examples from other mines operated by CVRI.

b. Discuss how CVRI will incorporate adaptive management in the development of a water quality monitoring program to assess whether or not the Robb Trend development is having a negative impact on downstream water quality in the local and regional study area. Provide context using other mines as examples.

174. Volume 1, Section E, Page E-32.
CVRI states *They will work with Fisheries and Oceans Canada (DFO) in developing a habitat compensation plan with the goal of maintaining productive fish habitat and addressing potential habitat disturbance, alteration, or destruction resulting from the project*".

a. Provide the timeline for the development of fish habitat compensation plans.

b. Discuss the concept that CVRI is working on with respect to the development of a fish habitat compensation plan.

c. Discuss what methodology will be used to calculate losses and gains of fish habitat.

d. Provide examples of fish habitat compensation concepts that have been constructed in other mines that are operated by CVRI and/or other mining operations that have prepared, constructed and monitored fish habitat compensation projects for salmonid species.

e. Explain how previously constructed fish habitat compensation projects in mining zones have been successful and to what degree, and/or explain deficiencies in previously constructed fish habitat compensation projects. Relative to the assessment of known deficiencies in previously constructed fish habitat compensation projects, incorporate a framework for adaptive management in the discussion and outline areas that require improvement.

f. Discuss how the no-net-loss plan will align with provincial fish management objectives for the species known to inhabit the watercourses that will be impacted by Robb Trend.

g. Discuss how the no-net-loss will plan align with the recovery planning strategy that is currently being developed by the province for native Rainbow Trout.

175. **Volume 2, CR #2.**
CVRI states that *Impacts to the aquatic environment including, but not limited to fish and benthic invertebrates are insignificant. CVRI indicates that the project is not expected to contribute to cumulative effects because mitigations will be in place*. However, it is not clear what methodology CVRI used to come to these conclusions.

a. Discuss what methodology, with respect to impacts on fish and fish habitat, was used to determine that impacts to these VEC's is insignificant.

b. Discuss how CVRI defines insignificant/negligible impacts, with respect to impacts on fish and fish habitat.

c. Discuss what methodology was employed to determine that the Robb Trend project will not contribute to cumulative effects on aquatic resources.

d. Discuss how CVRI has accounted for the following impact of the Project in terms of immediate and cumulative effects on fish and fish habitat:
   i. long term alteration of flows in watercourses affected directly and indirectly (downstream reaches) by the Project,
   ii. alteration of overland drainage,
   iii. elimination of lotic environment and replacing it with lentic,
   iv. fragmentation of fish habitat, and
   v. potential degradation of water quality including upsets and accidents

176. Volume 2, CR #2, Section 5.4.6.2, Pages 79-80

a. Explain how traditional ecological knowledge (TEK) and traditional land use information (TLU) will be included in the fish habitat assessment and in developing the No Net Loss Plan

b. Outline the impacts of the Project on fishery resources from Aboriginal groups perspective and the Proponent's strategies to address these impacts.

177. Volume 2, Section CR#2, Tables 5.4, 5.8, 5.15 Page 54, 55, 58, 63, 64.

a. Provide the method that will be used to determine fish passage ability through proposed culverts for the species that are known to be, or may be in the watercourses that will have watercourse crossings on them.

178. Volume 2, Section CR#2, Page 72.
CVRI states *Sediment and certain chemical contaminants that may have chronic or lethal effects on aquatic biota have the potential to enter the aquatic ecosystem during mining operations.*

a. Discuss potential contaminants that may pose a threat to the aquatic environment, using data obtained from existing coal mining operations.

b. Discuss the impact that these contaminants could have on fish and/or their habitat.

c. Provide a list of mitigations that will be put into practice to eliminate/minimize the affect that these contaminants could have on fish and their habitat.

179. Volume 3, CR #6, Section 4.1.2, Page 33.

CVRI states *Additional safeguards and pond capacities including provisions for backup in ditches and sumps will be provided recognizing the risk of abnormal events such as extreme high pumped sediment loadings, ice/snow blockages and late manual response to events. In many instances, these types of events have led to previous exceedances at CVM.*

a. Provide best management practices or guidelines that have been adaptively developed in response to past exceedances and how these practices will be adaptively applied to the Robb Trend project.

180. Volume 3, CR #6, Section 4.4.4, Page 53.
Volume 3, CR #6, Section 4.4.3, Table 12, Page 52.

In Section 4.4.3, CVRI described the options for diversions for the watercourses that will be impacted. Table 12 describes the chosen option for each watercourse.

CVRI states *It is assumed that lake filling times following reclamation will be gradual in order to maintain downstream flows. The instream flow needs guidelines (AENV 2011b) are assumed to be applied, except possibly during high flow events where pumping cannot keep up with inflow rates. Applying this guideline means that only 15% of the inflow can be used to fill the lakes and no inflow can be used for lake filling when the flow is less than the natural Q80, value, i.e. below the flow that is normally exceeded 80% of the time for that time of year. Therefore, instream flow monitoring and pump bypasses will need to be established on the lakes during filling.*

a. Discuss the range of expected flows and the type of pump systems for each diversion.

b. Provide information on how the pump(s) capacity adequately addresses the potential seasonal and annual variability in flows that could be encountered for each watercourse.

c. Describe for each watercourse with a pump around diversion, how fish passage upstream of the diversion will be accommodated. If fish passage is not being accommodated, discuss the potential impacts of the barrier on productivity.

DFO is concerned that the fate of the downstream reaches of the potentially affected watercourses rests solely on pumping. For some watercourses, downstream flow will be dependent on pumping for several years. If the pumps should fail, downstream flow will essentially be nil, as all of the water will be flowing in to the end pit lake.

d. Discuss potential downstream impacts and mitigation measures to be employed in the event of a pump failure.

Most of the diversions will require pumping through winter months.

e. Discuss how flows will be maintained through the winter months given the challenges of winter conditions. Discuss if diverting 15% of the total river flow through the winter months is sustainable from an instream flow needs perspective.

Discharging water in to downstream reaches in winter has the potential to impact the hydrology and temperature profile downstream, as well as result in frazil ice formation. There was no consideration of this in the Application Case.

f. Provide a discussion of these potential impacts.

181. Volume 3, CR #6, Table 15, Page 66.
Volume 3, CR #6, Table 13, Page 55.
No. 2.1 of Table 15 states *Minimize lake depths where possible to less than 10 m with a littoral zones target of at least 20% where practical*. Table 13 shows that only 2 lakes have average depths at or below 10 m, while the maximum depths all exceed 10 m with the mean maximum depth being 45 m.

a. Provide clarification on the purpose of this statement as it seems it was not taken into consideration in the end pit-lake design.

b. Discuss the feasibility of designing some or all of the lakes with shallower depths consistent with the statement in Table 15.

c. Discuss the limnological and biological implications of constructing long, narrow and very deep end pit lakes with respect to oxygen stratification and biological productivity.

182. Volume 3, CR #6, Section 4.5.1, Page 59.
CVRI states with respect to the Erith River *Alternatively, gravel bed river relationships (Hey et al. 1982) based upon the 2-year flood peak would predict the following impacts with a 50% decrease in the mean annual flood: a 26% decrease in channel width, a 20% decrease in bankfull channel depth and a 25% increase in slope.*

a. Discuss the time frame these changes are expected to occur over and the distance downstream that is likely to be affected.

b. Provide a short and long-term assessment of the potential impacts to downstream fish and fish habitat as a result of the channel morphological changes.

c. Discuss any similar anticipated effects on the remaining impacted watercourses.

d. Provide CVRI's approach to calculate the fish habitat losses associated with the reduction in flows in watercourses affected by the construction of the mine.

183. Volume 3, CR #6, Section 4.4.4, Table 13, Page 55.
Volume 3, CR #6, Figure 28.
Table 13 outlines the physical and hydrologic characteristics of the 12 reclaimed end pit lakes. Figure 28 shows Erith Lakes 4 and 5 reclamation plan and profile.

a. Provide an overall figure encompassing all end pit lakes and their hydrologic connectivity to one another.

184. Volume 3, CR #6, Section 4.5.2, Page 59.
CVRI states *Therefore, the lower 2.4 km long reach of Bacon Creek will be altered significantly with 70% of its basin lost. The percentage flow reduction on lower Bacon*

Creek can be expected to slightly exceed this 70% because of a higher proportional runoff contribution from the higher, steeper watershed section.

a. Provide the rationale for diverting the upper Bacon Creek flow into McPherson Pit rather than pumping it downstream in to lower Bacon Creek to maintain flows.

b. Provide the rationale for ultimately diverting the upper Bacon Creek flow into Lake 4 and discuss the feasibility of creating an outlet from Lake 5 East to Bacon Creek as mitigation for the flow reduction.

185. Volume 3, Section CR#6, Figure 26.

a. Provide examples of watercourses in the upper Athabasca watershed that have a body of water similar in appearance to a watercourse that will have a pit lake on it and describe the fish communities on the up and downstream sides of the body of water as well as within the body of water itself. (i.e.-locate watercourses that look like a watercourse with a pit lake in the middle of it and conduct an analysis of the fish community).

b. Describe the fish habitat characteristics associated with the example system(s) referenced in part "a" and critically assess the functionality of CVRI's pit lake concept.

c. Describe limiting factors to fish populations and communities associated with watercourses that resemble the types of systems proposed in figure 26 Using examples from other mines that are operated by CVRI.

186. Volume 3, Section CR#6, Page 58.

CVRI states *When lakes 4 and 5 are filling, downstream flows will be maintained by pumping. Due to the large Erith River flows, this could mean pump flows of 20, 000 ipgm (1.52 m^3/s) will be required just to maintain 85% of mean flows in the high flow months of June to July in order to meet downstream instream flow need.*

a. Discuss what type of infrastructure will be required to pump volumes of water that could be 1.52 m^3/s or greater.
   i. Discuss impacts to fish and fish habitat resulting from the infrastructure required to pump the Erith River flows.
   ii. Discuss mitigations that will be introduced to prevent impacts to fish and fish habitat.

b. Identify other watercourses in the project area that may be subject to pumping for water management and/or maintenance of downstream flows and:
   i. Discuss impacts to fish and fish habitat resulting from the infrastructure required to pump on these systems;

c. Discuss mitigations that will be introduced to prevent impacts to fish and fish habitat on these systems. Provide details on how CVRI plans to avoid entraining, impinging or killing fish when pumps draw water from one waterbody or watercourse and transfer it downstream.

d. Discuss how CVRI will mitigate the impact of pumping to maintain downstream flows on fish and fish habitat during critical life stages such as spawning and rearing if optimal flow is not present during these life stages.

8.2. Environment Canada

187. Volume 1, Section A4.4.3, Page A-31 and Volume 3, CR#6, Table 4.1-21, Page 40
EC notes a slight disparity in identifying values used to estimate the total GHG emissions during the construction phase. The main test formula on page 41 employs the value taken from table 4.1-21 of 357 kt CO2e/yr, while the formula on page A-32 intends to use the same value, but erroneously incorporates a value of 392 kt CO2e/yr.

a. Provide the correct calculation.

188. Volume 1, Section A.8.1 and E.1.3.7, Pages A-20 and E-9.
This section notes that nitrogen deposition is 4.8kg/ha/year (baseline) and 5.7 kg/ha/yr (application and planned development cases) but there is no indication of whether or not these levels are of concern.

a. Discuss how these numbers compare to regulatory or permitted levels for deposition.

189. Volume 1, Section A.8.3, Page A-26.
The text states *It has been shown that the quality of groundwater in the two proposed mining areas are similar to groundwater chemistry in present and past mining areas in Coal Valley and of acceptable quality for discharge to surface water bodies*. However, there is no information included on how "acceptable quality" was defined and which information this is referring to.

a. Provide the specific studies and acceptable levels.

190. Volume 1, Section C.1.5.2, Page C-13.
The text states: "*Coarse reject produced as a by-product from the Plant can also be used as an alternative to crushed rock*." However, there is no indication that the coarse reject has been characterised and determined to be of suitable geochemical composition for such a use.

a. Discuss the geochemical properties of the coarse rejects or testing for leaching.

191. Volume 1, Section C.3.2, Page C-37.
The text states: "*The first competent rock will be utilized to build haul roads between pits and external dump areas*." However, there is no indication that the rock will be tested before use.

a. Discuss the testing to be done on the rock and whether it will be determined to be non-PAG and non-leaching before it is used in construction.

192. Volume 1, Sections C.3.1 to C.3.9, Pages C-36 to C-46.
Insufficient details are provided on the design and functioning of the Ponds mentioned in the Project Development Plan.

a. Provide more details on the Ponds such as whether they are simply retention ponds, if sedimentation is achieved using chemical methods (and if so, which type of chemicals would be used) or if infiltration is expected to occur.

193. Volume 1, Section C.3.9.4, Page C-45.
The text states that Bryant Creek will be diverted during mining of the Val d'Or seam and directed to flow through an old pit. However, there is no discussion on the potential impact this would have on the water quality in the creek.

a. Discuss the potential impact of the diversion on the quality of the water in Bryant Creek and

b. Discuss measures that would be put in place should it be found to have detrimental effects.

194. Volume 1, Section C.4.2, Page C-49.
The text states that the proposed mining is expected to intersect abandoned underground mining areas, which contain an unknown volume of water. While the EIS states that "(m)ine waste handling facilities and practices in place at the CVM are expected to be able to adequately accommodate these volumes", there is no discussion of whether treatment might be needed and how it would be accomplished.

a. Discuss how the water from the underground mining areas would be tested (and for what) and how CVRI intends to manage it should it be found to be unfit for discharging.

195. Volume 1, Section E.13.5, Page E-204.
The proponent commits to mitigation and monitoring, i.e. implement a re-vegetation program, which aims at the establishment of ecosite equivalent to the pre-disturbed landscape. Avoidance is also one form of mitigation and the extent to which it was applied is unclear.

a. Provide the measures taken to avoid wetlands and ecologically significant wetlands.

b. Describe (and show) areas where wetlands were avoided through modifications of the mine plan.

196. Volume 1, Section E.13.3.2, Pages E-199 and E-204.
The text in section E.13.3.2 discusses the amount, type and significance of wetlands that will be lost during the project. Section E.13.5 goes on to discuss possible mitigation measures including:

- implement a re-vegetation program which aims at the establishment of ecosite equivalent to the pre-disturbed landscape;
- implement a re-vegetation program which aims at the re-establishment of ecosites which are regionally limited in distribution;

a. Provide the measures the proponent will implement to restore bogs and fens.

b. Discuss the appropriateness of recent techniques being applied in the oilsands area.

197. Volume 1, Section E.14.5.1, Page E-244.

The following measures are recommended to mitigate the potential impacts of the Project on wildlife:
• where possible vegetation clearing should be planned for outside of the May to July Breeding season;

A May 1 to July 31 restricted activity period is often acceptable for smaller areas. However when large areas are to be cleared, there is a greater likelihood of encountering migratory bird nests outside this time period. For larger areas, such as this project, Environment Canada typically recommends that at minimum April 1 to August 31 be used as the restricted activity period for clearing vegetation.

a. Clarify whether CVRI will comply with an April 1 to August 31 restricted activity period.

198. Volume 1, Section E.14.5.1, Page E-244.

The proponent has provided general mitigation measures for migratory birds, but the extent to which these may be applicable to at risk migratory bird species remains uncertain.

a. Clarify whether CVRI will target mitigation specifically for SARA and COSEWIC species (e.g. Barn Swallow, Olive-sided Flycatcher) that were confirmed as regular breeders in project area?

8.3. Transport Canada

199. Volume 3, CR #6

a. Provide information for any proposed works that are to be built or placed in, on, over, under, through or across any navigable water and that may require an approval by the Minister of TC under the Navigable Waters Protection Act (i.e. 15 watercourse diversions and 14 watercourse crossings).

b. Provide information for each proposed work not covered by the Minor Works and Waters (Navigable Waters Protection Act) Order (available online at http://canadagazette.gc.ca/rp-pr/p1/2009/2009-05-09/html/notice-avis-eng.html#d103).

Appendix A outlines the information that Transport Canada requires a proponent to submit when applying for an approval under the Navigable Waters Protection Act. If final design information is not available, provide as much conceptual information as is possible.

200. Volume 3, CR #6

a. Describe indirect effects of the project on navigation, and describe mitigation measures if warranted.

201. Volume 3, CR #6

a. Provide a cumulative environmental effects assessment of the impacts to navigation, which takes into account influences such as: overall water withdrawals, water diversion, natural river fluctuation, sand movement, and dredging.

202. Volume 4, CR #12

a. Describe Aboriginal consultation activities with Aboriginal groups in the area for specific concerns related to potential adverse impacts of TC's potential approval(s) (i.e. any works to be built or placed in, on, over, under, through or across any navigable water located at watercourse crossings – the watercourse crossings and diversions) on potential or established Aboriginal or treaty rights.

b. Provide consultation records of any consultation with all Aboriginal groups in the area who may have an interest in the above-noted works. Provide information about Aboriginal consultations, including but not limited to any concerns raised by the Aboriginal groups in relation to Transport Canada's potential NWPA approval(s) as well as the measures taken or proposed to be taken to address those concerns.

In Table 2 of the TEK study, it indicates that the Alexis Nakota Sioux Nation raised concerns related to navigable waters on April 11, 2007 and that a response to the concerns was provided on May 3, 2007.

c. Provide further details in regards to the concerns about navigable waters as well as how these concerns were addressed.

8.4. Natural Resources Canada

203. Volume 1, Section A.4.3.4, Page A-10

a. Provide a section that adds Natural Resources Canada as a Responsible Authority under CEAA where required and reference the need for a license under s.7(1)(a) of the Explosives Act.

204. Volume 1, Section C.1.5.5, Pages C13-15 & Section C.5.5, Pages C56-57
NRCan requests the proponent provide information about the presence of any temporary or permanent explosive facility that could be used on the Project site before the relocation of the manufacturing plant.

a. Confirm whether there is a plan to have any temporary/permanent maintenance/wash area on the site or to have any temporary/permanent 'magazine' on site for ancillary blasting items.

205. Volume 1, Section C.5.5, Pages C56-57
CVRI will use the existing explosive manufacturing plant and will relocate it following the beginning of the Project.

a. Confirm that the project and related explosives manufacturing and storage operations will meet the regulations and safety distances required by the Explosives Regulatory

Division of Natural Resources Canada (Guidelines for Bulk Explosives Facilities and Quantity Distance Principles Manual).
http://www.nrcan.gc.ca/sites/www.nrcan.gc.ca.minerals-metals/files/pdf/mms-smm/expl-expl/pdf/BulkRev51-eng.pdf
http://www.nrcan.gc.ca/minerals-metals/explosives/4283

206. Volume 2, CR#3, Section 3.4.2, Figure3.4.1

Cross-section 4000 East (Fig. 3.4.1) shows a buried valley (~17020N). Buried valleys have a considerable role in groundwater flow in some regions of Canada. NRCan could not find evidence in the EIS of inclusion of the buried valley in the groundwater baseline, project effect assessment and proposed monitoring program.

a. Provide an assessment of the importance of the buried valley for the groundwater flow.

207. Volume 2, CR#3, Section 3.4.3, Page 28.

The upper Robb ground water levels in Fig. 3.4.7 are not the same as noted in Section 3.4.3.

a. Clarify the discrepancy noted above.

The water well data show unexplained spikes in water levels for June 11. Presumably, further monitoring will determine the meaning of these fluctuations e.g. potential periodic drainage of old underground mine works.

b. Confirm that CVRI will be conducting further monitoring to determine the meaning of the fluctuations noted above.

208. Volume 2, CR#3, Section 4.2.6, Page 35

In Section 4.2.6, it is stated that *There are no significant lakes, ponds or similar non-flowing water bodies in the study area*. However, a brief scan of the area shows at least 6 hectares of water bodies in the vicinity.

a. Clarify the above statement.

209. Volume 2, CR#3, Section 4.2.8, Page 37

Section 4.2.8 states that drawdown of groundwater levels does not typically extend 100 m beyond a mine pit. The data show that drawdown effects extend to a least 250 m. Moreover, these drawdown measurements are across the geological strike. It is probable that drawdown along the strike (perpendicular to this direction) would be different.

a. Clarify the discrepancy noted above.

210. Volume 2, CR#3, Section 6.0, Page 41

Climate change scenarios for Edmonton were applied to the Robb Trend area. However, the current climate difference between these two places is greater now, than what the forecasted change is for Edmonton between now and 2039.

a. Explain why the climate change scenario for Edmonton was used, how it was used, and why this is the best scenario to use.

211. Volume 2, Appendix 9, Section 4.2.1.

a. Provide a definition for and description of "Re-worked till".

212. Volume 2, Appendix 9, Section 4.2.2.

Section 4.2.2 describes mechanical properties of soils, but almost all the data are from outside the LSA. For example, only 2 points are from Robb Trend. In addition, the type of surficial material plotted is not given. It is stated however, that additional data will be obtained in the future.

a. Provide any existing geotechnical data for the Robb Trend area, and elaborate on future plans to obtain these data.

8.5. Health Canada

213. Volume 2, CR 1

Two project only cases were considered in the assessment approach for the air quality assessment. Project Case 1 was chosen for the assessment, as it is the worst-case air quality scenario (Section 2.1.1 Assessment Approach).

a. Discuss whether consideration has been given to situations where the Project Case 2 scenario yields higher predicted air emissions values than the Project Case 1 scenario. For example, Table 5.5-1 Predicted PM_{10} Concentrations shows higher values for Project Case 2 than Project Case 1 for receptor locations Overall Maximum (RSA-MPOI), Robb Area Maximum, and R1-SE Robb.

214. Volume 2, CR 1, Section 2.5.2, Table 2.5-2, Page 12

Table 2.5-2 details the evaluation criteria for characterizing residual effects.

a. Discuss why there is no difference in the criteria definitions for Neutral, Positive and Negative Project Contribution/Direction.

215. Volume 2, CR 1, Section 4.1.2, Page 26

According to the National Pollutant Release Inventory the following pollutants are emitted by this industrial sector/facility: benzo(e)pyrene, dibenz(a,h)acridine; indeno(1,2,3-c,d)pyrene, phosphorus, and sulphuric acid.

a. Discuss why emission calculations were not done for these pollutants.

216. Volume 2, CR 1, Section 4.1.2, Page 26

This section details the emissions summary and states that, "*haul roads will be regularly watered in summer, reducing dust from wheel entrainment by 80% (e.g., Luscar, 2999). Winter dust emissions from haul roads were reduced by 90% because roads will be covered by snow and/or frozen. Soil handling emissions were reduced in winter by 80% to account for wet and/or frozen ground*."

a. Describe what is meant by 'regularly' when referring to road watering.

In Luscar, 1999, page 48, there is mention of a 70% (not 80%) reduction only in the Total Suspended Particulate (TSP emissions by applying water to mine haul roads, pits and dumps.

b. Describe the mitigation measures to reduce the PM_{10} and $PM_{2.5,}$ which will not be substantially mitigated by watering.

No information on winter dust emissions from haul roads being reduced by 90% because of snow and/or freezing was found in Luscar, 1999.

c. Discuss how the 90% reduction of dust emissions from haul roads in the winter months was estimated.

217. Volume 2, CR 1, Section 5.0, Pages 47-55

Air quality modeling predictions are presented and indicate a significant increase in $SO_2/NO_2/CO$ levels. Health Canada advises that all projects attempt to minimize air emissions to the greatest extent possible, regardless of any upper limits referenced in the applicable criteria, guidelines or standards. Aside from the use of Tier 4 engines, mitigation measures presented in section 6.3 only address controls for the emission of particulate matter.

a. Discuss measures for air emission control of $SO_2/NO_2/CO$ to determine if additional mitigation is feasible.

218. Volume 2, CR 1, Section 5.0, Pages 47-77

Section 2.1.1 describes the assessment approach and states that the Application Case includes both the Baseline Case and Project Case 1. Section 5.0 details the Air Quality Modeling Predictions in a series of tables.

Throughout the tables in Section 5.0:

a. Discuss why the Predicted COPC Concentrations for the Baseline Case are equal to the Application Case, when Project Case 1 values are not zero. For example, Table 5.1-1 Predicted Sulphur Dioxide Concentrations for receptor location R1-SE Robb, Baseline Case is 26 $\mu m/m^3$, Application Case is 26 $\mu m/m^3$, and Project Case is 11 $\mu m/m^3$. If Application Case includes both Baseline Case and Project Case 1, it would yield a value of 37 $\mu m/m^3$ and not 26 $\mu m/m^3$.

219. Volume 2, CR 1, Section 5.4, Page 55

This section describes the mitigating influences of forested vegetation described in Pace, 2005, and used to reduce predicted PM10, PM2.5, and TSP emissions. The capture factors (CF) provided in Pace 2005 "*are only generalized defaults and should be modified by local data or as further research becomes available. Also, the estimated CF's herein are believed to be too high for windblown dust events because the wind's turbulence will usually lift particles higher more quickly, and the opportunity for vegetative removal is likely reduced*".

a. Discuss if these generalized defaults were modified by local data specific to this project or other references were considered prior to utilizing these mitigating factors to reduce predicted particulate emissions.

220. Volume 1, Section D.2.4, Page D5

This section describes the Baseline Case, Application Case and Cumulative Effects Assessment Case. Application Case is defined as including, "Baseline Case plus the Project". Table D.2-1 provides a list of Existing, Approved and Planned projects. According to this table, Approved Activity (Application Case) includes the mining operations at Mercoal West and Yellowhead Tower Mine Areas.

a. Explain why the Robb Trend Mine Area (the Project) is not included in Table D.2-1 as the Application case.

221. Volume 3, CR 5, Section 2.5, Page 3

The Human Health Risk Assessment (HHRA) indicates that at no time will mining coincide on both sides of the Hamlet of Robb. However, the project Description (section C, pg. C-30, Table C2-4) development schedule indicates that Robb East, Robb Main and Robb West mines will all be operational at the same time. The Air Quality Assessment Report (Millennium 2012) appears to address mining at Robb West and Robb East at the same time, with no mention of Robb Main (Project 1 scenario).

a. Confirm the mining schedule and that the appropriate air modeling data was used in the HHRA for the proposed Project.

222. Volume 3, CR 5, Section 3.2.1.1, Page 6

The HHRA states that since the project will not release any chemicals in to the groundwater or surface water, the COPCs are based on air emissions only. Based on the information in the Air Quality Assessment Report (Millennium 2012), it appears that the plant operations are considered as part of the project with respect to air emissions.

a. Clarify if the processing of the mined material at the plant is considered a part of the Project.

If the processing of mined material at the plant is considered as part of the project

b. Discuss potential COPC releases to surface water and/or groundwater (i.e. tailing and settling ponds associated with the coal process plant) and incorporate these releases into the HHRA as necessary.

223. Volume 3, CR 5, Section 3.2.1.1, Page 6

Health Canada generally advises that Particulate Matter with diameter of <10µm (PM_{10}) should be considered a COPC in the air quality assessment. PM_{10} poses a risk to human health as these particles can travel deep into the lungs and affect the human respiratory system to varying degrees based on penetration and deposition rates into the lungs (WHO 2003).

a. Discuss if PM_{10} was considered in the assessment or provide a rationale for its exclusion.

224. Volume 3, CR 5, Section 3.2.1.2, Pages 10-13 and Table 3-2

Currently recreational receptors are only assessed with respect to acute inhalation. However, the project scenario appears to be for a timeframe longer than an acute scenario. It is indicated that the recreational receptors may engage in camping, hunting

and/or fishing for variable periods of time, which may require the assessment of other operable exposure pathways for this receptor group (e.g. local food consumption of foods collected from the area impacted by the site and eaten immediately or later).

a. Provide the multiple pathway assessment for the recreational receptors or provide a rationale as to why this was excluded.

225. Volume 3, CR 5, Section 4, Pages 43-46, 50-53

Acute inhalation risk quotient (RQ) exceedances: Baseline arsenic concentrations result in a RQ exceeding the target, but the application fleet will convert from Tier 1 to Tier 4 engines.

a. Clarify whether there is a plan to confirm this fleet change to validate the air quality monitoring prior to moving forward with the Project.

NO_2 and SO_2 RQ exceedances at maximum point of impingement (MPOI) are discussed as overly conservative and unlikely to result in negative health impacts. However, the predicted concentrations are unlikely to result in negative health impacts. However, the predicted concentrations may result in adverse impacts to people with respiratory sensitivities.

b. Discuss whether the project will include controls to prevent access or notify receptors that may be sensitive.

226. Volume 3, CR 5, Appendix D

The Application Case includes Baseline concentrations and project related concentrations. The Baseline concentrations include background exposure to soil, air, water and local foods.

For additional clarification on Health Canada's guidance for human health risk assessment for chemicals, please refer to *Part V: Guidance on Human Health Detailed Quantitative Risk Assessment for Chemicals, Health Canada, 2010* http://www.hc-sc.gc.ca/ewh-semt/pubs/constamsite/chem-chim/index-eng.php

a. Clarify why commercial foods were not incorporated in the total background exposure as the incorporation of commercial foods into the total background exposure may alter the results of the risk assessment.

227. Volume 4, CR 8

The Noise Impact Assessment (NIA) provides a qualitative discussion of general noise nuisance issues including blasting noise and vibrations, low frequency noise (LFN) and back-up beepers. No quantitative noise assessment was conducted; rather the NIA states that mitigation measures will be investigated when the proponent receives noise complaints. Health Canada advises that a quantitative noise assessment (with applicable adjustments for sound characteristics such as tonal and impulsive noise), and separate consideration of construction and operation phases, would provide a more accurate prediction of noise levels and potential impacts to human health. Appropriate mitigation measures could then be identified.

a. Discuss, with respect to potential low-frequency noise (LFN), whether CVRI considered the advice given in the WHO (1999) *Community Noise Guidelines.*

b. Discuss, with respect to blasting noise, if CVRI will use the US EPA's sonic boom criterion (US EPA 1974) as a blasting mitigation noise level for blasting that lasts less than one year. For blasting exposures of more than one year, Health Canada advises following the recommendations in ISO 1996-1:2003.

228. Volume 4, CR 8

The NIA does not provide any cumulative noise assessment. Cumulative effects assessments are required when other ongoing or future projects in the region may contribute to noise levels.

a. Provide a cumulative noise assessment, or provide a rationale as to why a cumulative noise assessment was excluded.

229. Volume 4, CR 8, Section 2.1, Page 2

The NIA reports predicted noise levels at 48 receptors in and around the community of Robb.

a. Discuss whether any of these particular receptors may have heightened sensitivity to noise exposure (schools, childcare centres, hospitals, places of worship, etc).

230. Volume 4, CR 8 – Noise Impact Assessment, Section 2.1, Page 2

The NIA states that all other trappers cabins, campsites, etc. that are 1.5 km beyond the mind pit boundary have not been included in the study; and that this meets the requirements of the Alberta Energy Resources Conservation Board Directive 038.

a. Confirm that project related transportation noise will not impact any human receptors 1.5 km beyond the mine pit boundary, and if there are potential impacts, and appropriate mitigation measures.

231. Volume 4, CR 8, Section 3.5, Pages 6-7

Section 3.5 describes the 3 modeling scenarios for the NIA. No construction scenario is described.

a. Explain why no construction scenario was described. Is it assumed that construction and operational noise are similar for a coal mine project operating for an extended period.

b. Provide the duration of exposure at each receptor location for either construction of operational noise.

232. Volume 4, CR 8, Section 5, Page 9

The results of the Application Case modeling indicated that operational noise results exceed the WHO (2009) *Night Noise Guidelines*.

The WHO (1999) *Community Noise Guidelines* recommendations for sleep, recommend that sound levels from discrete noise events should not exceed 45d BA Lmax inside sleeping quarters more than 10-15 times per night. With windows partially opened, this equates to an outdoor level of about 60 dBA Lmax.

a. Discuss what nighttime noise mitigation measures will be considered to ensure the annual average outdoor nighttime levels at the façade of each impacted receptor does not exceed 40dBA.

233. Volume 4, CR 8, Section 5.4, Page 32

There appears to be uncertainty about potential noise impacts on human receptors as the coalmine progresses towards the Hamlet of Robb and cabins.

a. Provide additional noise modeling to assess potential monitoring and/or mitigation that may be required.

b. Discuss whether a noise complaint/resolution line will be established for residents.

9. Errata

234. Volume 1, Section E.2.3.7, Page E-35

Incorrect statement is made regarding fishing regulations: Correct to read – Commencing April 2012, in support of the pending re-designation of the status of rainbow trout resulting from increased habitat loss, habitat fragmentation and population declines, Alberta has implemented catch & release for rainbow trout in all waters.

235. Volume 1, Section F.4.2.1, Table F.4-3 Page F-41-42

Robb West Pits - Post Reclamation Proportion values/figures are not expressed in % (appear to be ha from the previous column repeated).

a. Revise column figures.

236. Volume 3, CR #5, Appendix C, Section C3.2, Page C26.

a. References to chemical concentration in surface water and ingestion of surface water should be changed to reflect exposure via groundwater.

237. Volume 3, CR #6, Section 4.5.1, Page 59

a. Second line provides a reference to Table 11, but this reference should be to Table 14 instead.