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Attn. Mr. Chuck Hubert
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By email only: chubert@reviewboard.ca

RE: Environmental Assessment EA1415-001, Prairie Creek Mine All Season Road Information Request/comments - Oboni Riskope

After CanZinc's Dec. 16th letter to MVEIRB (visible in the public record) seeking clarification on the Special Sections covered in the Oboni Riskope Associates Inc. (ORA) risk assessment (ORA-11-18), a draft reply was prepared, dated December 20th. The aim of CNZ was then clarified as "CanZinc is trying to better understand the risk assessment in order to improve their project design", a very advisable initiative as stated in the conclusions of ORA-11-18.

In particular ORA were asked to elaborate on the information used to derive the risk evaluation for the Special Sections and include any relevant assumptions made or limitations in the data.

Two specific questions were formulated, i.e.:

1. For each of the Special Sections, please portray the risk of each section by showing the accident number and consequence ratings.
2. For Figures 28A, 28B and 28C:
 - a. Please list each figure on its own page and expand the y-axis to increments of 10
 - b. Break out the Special Sections so that the number of excursions can clearly be seen for each of the Special Sections



Thus the present text has three parts:

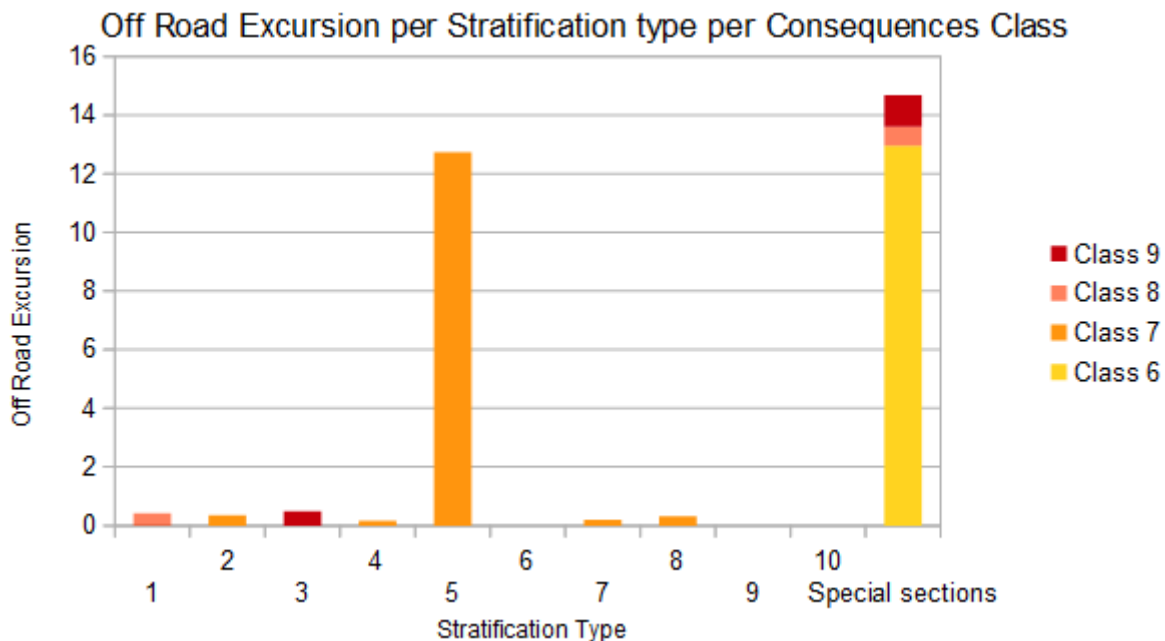
- **PART 1** discusses Figures 28, 28C and the conclusions drawn in CNZ December 16th letter to MVEIRB,
- **PART 2** requests an information check/update in order to ensure an adequate reply to CNZ requirement for more details from December 16th letter.
- **PART 3** replies to the specific questions above using the data which were considered/available up to October 24th as they were included in ORA-11-18, with explanations.

PART 1

CNZ wrote on December 16th : *In the RA, the results are mostly provided in Figure 28 according to road stratification.*

....However, Figure 28C shows that the stratifications having the higher consequence classes are 5, 8 and 'special sections'.

1) We would invite CNZ to carefully examine Figure 26 of ORA-11-18, copied below for reading ease, which has apparently been missed in CNZ reading of the report. This Figure shows the number of expected off road excursions over the service life of the road per Stratification for the higher Consequences Classes (6 to 9).



The key to the allotment of the Consequences Classes (also copied from ORA-11-18) is the following:

- Stratification 1-4:** bridges, watercourses and caribou & Arctic Grayling population.
- Special Sections:** high embankments, presence of creeks, significant down slopes, caribous and Arctic Grayling population (in the first segments of the road).
- Stratification 5:** presence of sensitive drainages proximity to creek.
- Stratification 7-8:** water crossings, drainage and karstic environment.

The above is based on Table 14, also copied below from ORA-11-18

Road and Environment features are:		Comments
ENVIRONMENTALLY SENSITIVE TARGETS	DOMINANT CROSS SECTION/ TERRAIN (Downhill of road) SLOPE	CARGO OR DIESEL FUEL COULD:
NOT IN POTENTIAL REACH	Fair with fill less than 3m high	be easily contained and recovered Class 1
	Moderate with fill less than 2m high	be contained and recovered with some effort Class 2
	Significant even if fill height less than 1m	be contained and recovered with greater effort Class 3
WITHIN REACH Intersect environmentally sensitive target Or Containment and recovery require specific salvage equipment	Fair with fill less than 3m high	be contained and recovered Class 4
	Moderate with fill less than 2m high	be contained and recovered in difficult conditions Class 5
	Significant even if fill height less than 1m	be contained and recovered in very difficult conditions Class 6
BRIDGE/WALL PRESENT		
WITHIN IMMEDIATE REACH Intersect the environmentally sensitive target. Containment and recovery require specific salvage equipment	Low Bridge/ culvert/wall (less than 2m from bottom)	be contained and recovered Class 7
	Moderate high bridge/ culvert/wall (2-3m from bottom)	be contained and recovered in difficult conditions Class 8
	Higher bridge/culvert/wall (more than 3m from bottom)	be contained and recovered in very difficult conditions Class 9



Table 14 was built based on the concepts (ORA-11-18) that higher consequences will occur as a result of accidents featuring at least one of the following characteristics:

- a) relative higher energy (careening over higher/ steeper natural or man-made slopes, faster driving, etc.)
- b) potential larger spread of contaminants
- c) relative increased difficulties in recovery of pollutants.

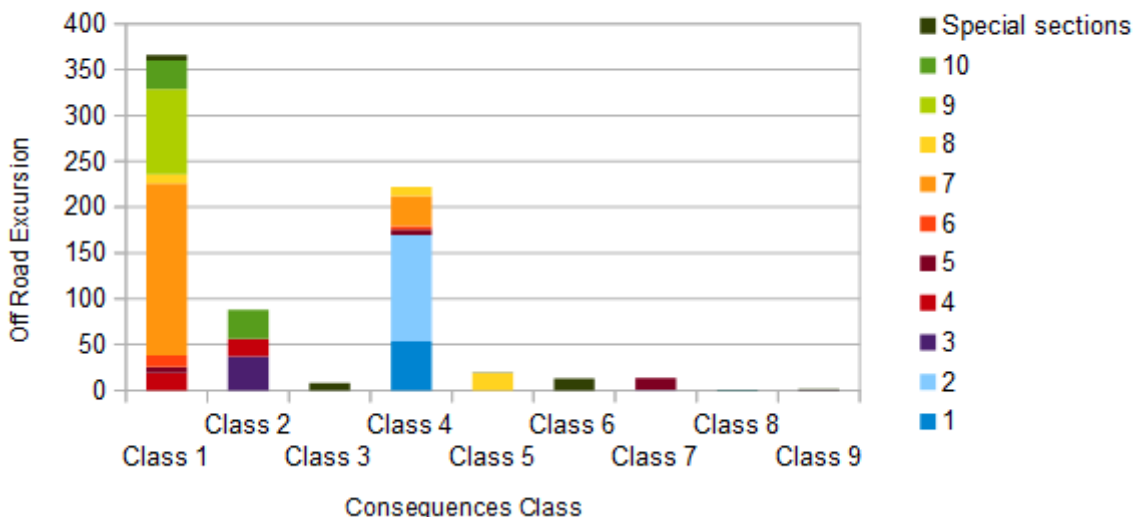
Thus, it is possible for anyone to transparently check the road drawings (Stratification Types drawings) and allot a Consequence Class "meter by meter" (when drawings exist)" allowing of course for reasonable margins of safety regarding the limits of each allotment.

2) There is no Figure 28 in ORA-11-18. Did CNZ mean 28A,28B, 28C? Each figure shows the total number of off-road accidents over the service life per Stratification (28A), per Stratification and Consequences Class (28B) or per Consequence Class and Stratification (28C).

Figure 28C (we have copied it below) shows that the highest Consequences Classes (6 to 9) are by far less represented (in terms of total number of accidents over the service life of the road) than milder accidents (which would be, of course, expected).

Thus we have trouble understanding how one comes to the conclusion that Stratification 8 has the "higher consequences class".

Off Road Excursion per per Consequences Class per Stratification Type



PART 2

1) Special Sections

From RE: Environmental Assessment EA1415-001, Prairie Creek Mine All Season Road Information Request - Oboni Riskope

The special sections include 6 road segments, 5 of which have preliminary engineering designs consisting of "cross sections, longitudinal profiles and plan views". Therefore, suitable data (according to Oboni) is available for the 5 special sections. As a result, we are asking for Oboni to provide results for those 5 special sections separately (broken- out), in order that we may understand the location of the associated and assessed higher consequence risks.

ORA has replied to the question asked in Part 3 of this text based on data available on October 24th (i.e. May 10th and August 17th). However, since the situation is not as clear to ORA as it is to CNZ, ORA would be delighted to proceed to a final evaluation once CNZ have firmed-up the data and ensured we can work on the latest versions, as described in the six points below (See also Part 3 of this text for a reply to the specific questions based on data which were considered/available up to October 24th as they were included in ORA-11-18, with related explanations).

1. Please confirm that the cross sections, longitudinal profiles and plan views for the Special Sections 1, 2 and 3 from Allnorth report May 10th are still relevant. If not please provide us the new information or where to find it (See summary table copied below showing there are differences between May 10th and December 5th Stratifications).
2. Unless Special Section 4 (km 28.0 to 28.8) has updated cross sections, longitudinal profiles and plan views made available for its full length it will not be included (See summary table copied below, and Part 3).
3. Please confirm that the cross sections, longitudinal profiles and plan views for the special section number 5-1, 5-2 from "Undertaking responses from tech session - (Allnorth 19,23,24) Appendix A" are still relevant, if not please provide us the new information or where to find it.
4. The special segment from May 10th km 122.7-123.4 is not present anymore in the summary below. An explanation and documents would help firming up the results.
5. Please confirm (and support with data) that since the road alignment has changed from the time TetraTech Risk analysis -landslide hazards_4May2016.pdf study was completed their findings are applicable to the latest version of the design.

6. Please confirm (and support with data) that since the road alignment has changed from the time Alpine Solutions report (2012) study was completed their findings are applicable to the latest version of the design.

Construction Stratification Type	from km	to km	Length km	Version
Special	13	13.76	0.76	May 10 th
Special 1	13	13.8	0.8	December 5 th
Special	23	23.7	0.7	May 10 th
Special 2	23	23.8	0.8	December 5 th
III	25	26	1	May 10 th
Special 3	25.2	25.6	0.4	December 5 th
Special 4	28	28.8	0.8	December 5 th
Special	33.2	34.2	1	May 10 th
Special 5-1	33.4	33.9	0.5	December 5 th
Special	34.8	39	4.2	May 10 th
Special 5-2	34.6	38.7	4.1	December 5 th
Special	122.7	123.4	0.7	May 10 th
Special 6	158.9	159.5	0.6	December 5 th

NB: "Undertaking responses from tech session - (Allnorth 19,23,24)" include Appendix A Updated Road Designs: km 33.2 to 34.2; km 34.8 to 39.0.

NB: Special km 122.7 to 123.4 has been deleted (?)

2) Higher consequence classes.

From RE: Environmental Assessment EA1415-001, Prairie Creek Mine All Season Road Information Request - Oboni Riskope

However, Figure 28C shows that the stratifications having the higher consequence classes are 5, 8 and 'special sections'.

We also ask Oboni to provide the updated results with greater resolution for the higher consequence classes.

See PART 1 of this text for explanations: there seems to be a misunderstanding, figure 28C does not show that. What CNZ is asking is already provided in figure 26. Anyway Stratification 8 isn't that remarkable.

We don't see what we could do more for this with the data available to date (see below). As stated in Oboni Riskope response to 08-Dec-2016 Notice of proceeding ([link](#)), unless cross sections, longitudinal profiles and plan views are provided for those segments we cannot give better risk classification.

From Table 5: Road Construction Types Allnorth May 10th

TYPE V 4.0 NEW CONSTRUCTION WITHIN EXISTING R/W, SAND MINOR SILT SOILS, 0 TO 30% SIDE SLOPES, 50% SECTION LENGTH OVERLAND CONSTRUCTION, BORROW MATERIAL WITHIN 300M OR IDENTIFIED OTHERWISE

TYPE VIII 6.0 NEW TYPICAL OVERLAND CONSTRUCTION REQUIRED ON 100% OF THE SECTION. BORROW MATERIAL PROVIDED BY DEFINED BORROW PITS OUTSIDE THE NORMAL RIGHT OF WAY CLEARING WIDTH.

Construction Stratification Type	from km	to km	Length km	
V	88	89	1	May 10 th
TYPE V	86.3	90.3	4	Dec 5 th
VIII	52	53	1	May 10 th
TYPE VIII-1	50.9	53.9	3	Dec 5 th
TYPE VIII-2	94.3	95.3	1	Dec 5 th
TYPE VIII-3	124.3	126.3	2	Dec 5 th

PART 3

1. For each of the Special Sections, please portray the risk of each section by showing the accident number and consequence ratings.

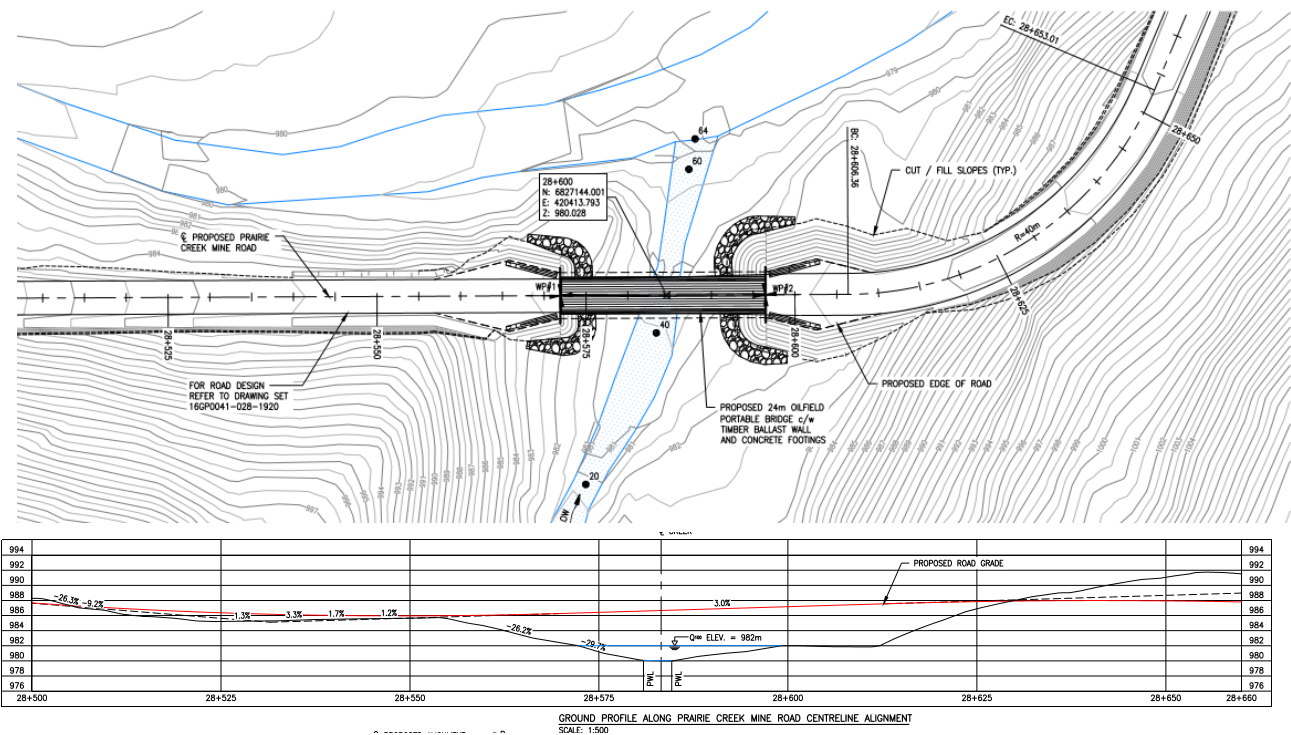
Does this question mean "cross-section by cross-section" or is it basically the same question as 2b below? We assume it is the same as 2b below as a "meter-by-meter audit" of ORA-11-18 would be totally out of the risk assessment SoW and incompatible with the design stage and extant data.

However, in compliance to the request related to the inclusion of any relevant assumptions made or limitations in the data we would like to illustrate in detail three examples, i.e. Special Sections 3, 4 and 5 (i.e. 5.1, 5.2), where major assumptions were made for the reasons explained below.

Special Section III: In May 10th Allnorth report the drawings of Stratification III (km 25.0-26.0) are present and are to be considered to be representative of km 23.8 to 25.2 and km 25.6 to KP 28.0.

In Dec. 5th Special 3 is declared to be from km 25.2 to 25.6. Thus, in ORA-11-18, Special 3 is merged in Stratification 3 and that situation is visible in all the Figures of ORA-11-18, where Stratification 3 had mostly benign Consequence Class 2, and a very small Class 9 off-road excursion (due to 10-12m high bridge, steep approaches (10%), series of turns, some very tight (15m, 20m), in rapid succession to wider turns). In the Figures below (See Part 3) we have split off Special Section 3, from Stratification III, giving an expected 0.5 Class 9 excursions over the service life.

Special Section 4: December 5th declares Special Section 4 (km 28.2-28.8). This sector was also present in the Allnorth Table 7 summary road map May 10th as km 28.0 to 28.8, but we did not find any longitudinal or cross-sections drawings. We only found the Figures below in the bridges plans section of Allnorth report, covering a meagre 200m.



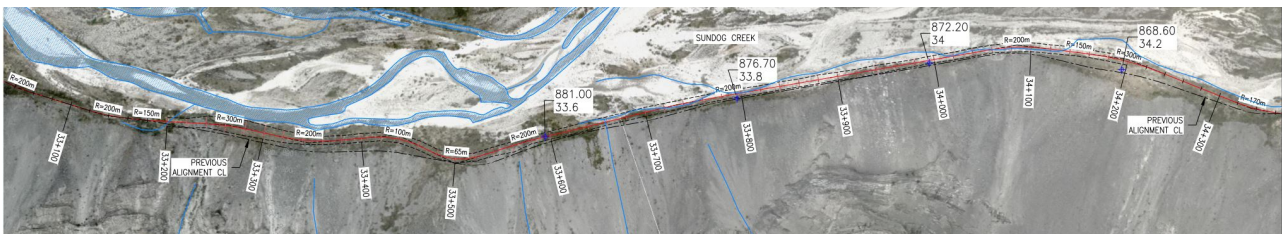
The Figures show 5m high down slopes around km 28.525; the bridge approx. 6m high with 4-5m high abutments; down slope 9m high around km 28.635 on the interior side of turn. The bridge area warrants a Consequence Class 9. The rest of the Special Segment should be documented with drawings to complete the assessment. Since CNZ wants to delve into details of risk mitigation, it would be beneficial to study the following list of elements which were not included in ORA-11-18 level of analysis:



- how they intend to proceed to retrieve a vehicle and its spilled cargo at the bottom of the down slopes in the aftermath of an accident,
- how the retrieval area would be accessed with the necessary means,
- how large is the surface that would be disturbed during the rescue/containment/retrieval operations,
- how long it would take for the required support vehicles to arrive on the spot (heavy crane, we suppose?) and retrieve, and finally,
- how long it is expected the road would be blocked due to an accident at this location.

The list above is shown with the sole purpose of demonstrating that ORA-11-18 remained at a level of analysis compatible with the extant data, avoided excessive details in a spirit of "averaging uncertainties" and that a detailed look would likely bring up risks in certain areas, lower them in others, which is compatible with the present level of analysis.

Special Section 5.1 and 5.2: this is a perfect example for the last statement. In ORA-11-18, based on Aug 17th alignment the Consequence Classes for this Special Section were 9,4 (5.1) respectively 9,4,5 (5.2) due to the increased proximity to the Creek. The old layout (km 33.2 to 34.2 May 10th), nearer to the slope and further away from the Creek bed would have got a mix of Consequences Classes 1 to 6 based on the cross sections and less proximity to the creek bed.



Section 5.2 had in May 10th some extreme cross sections that that would have commanded the highest Consequence Class (Table 14), as they featured high cuts in extremely steep slopes, large fills hanging on the side of the valley. With the modified Aug. 17th layout (shifted towards the Creek) we allotted the Consequences Classes 9 (in locations where the road is "in the creek bed"), 4,5 based on fills heights and adjacency to the creek.

We are confident that the three examples above clarify the effort that was necessary to come out with reasonable evaluations of risks at the stage the project/design is.

2. For Figures 28A, 28B and 28C:

a. Please list each figure on its own page and expand the y-axis to increments of 10

Off road excursion per Stratification

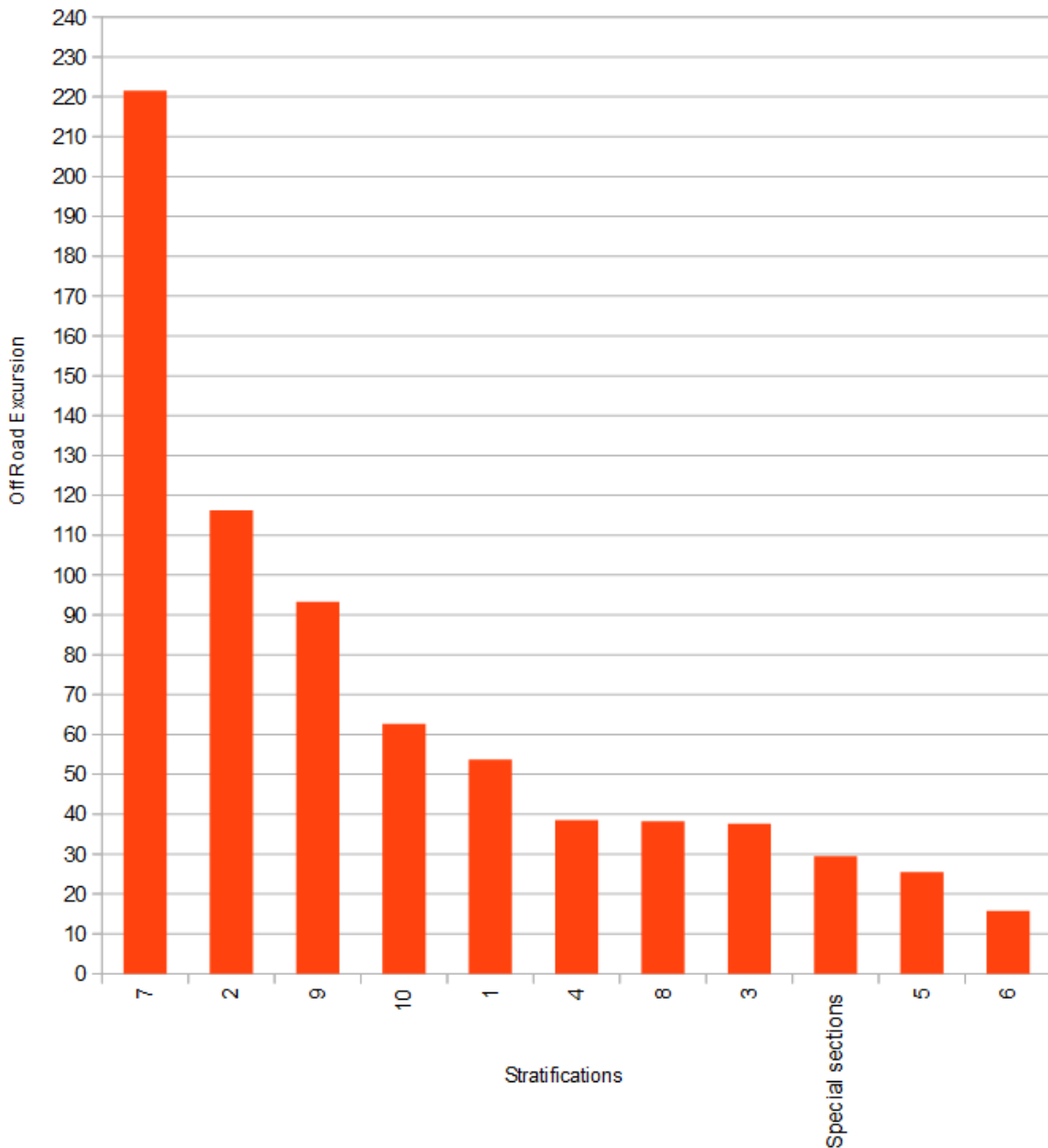


Fig. 28A High definition. Off road excursions over service life.



Off Road Excursion per Stratification type per Consequences Class

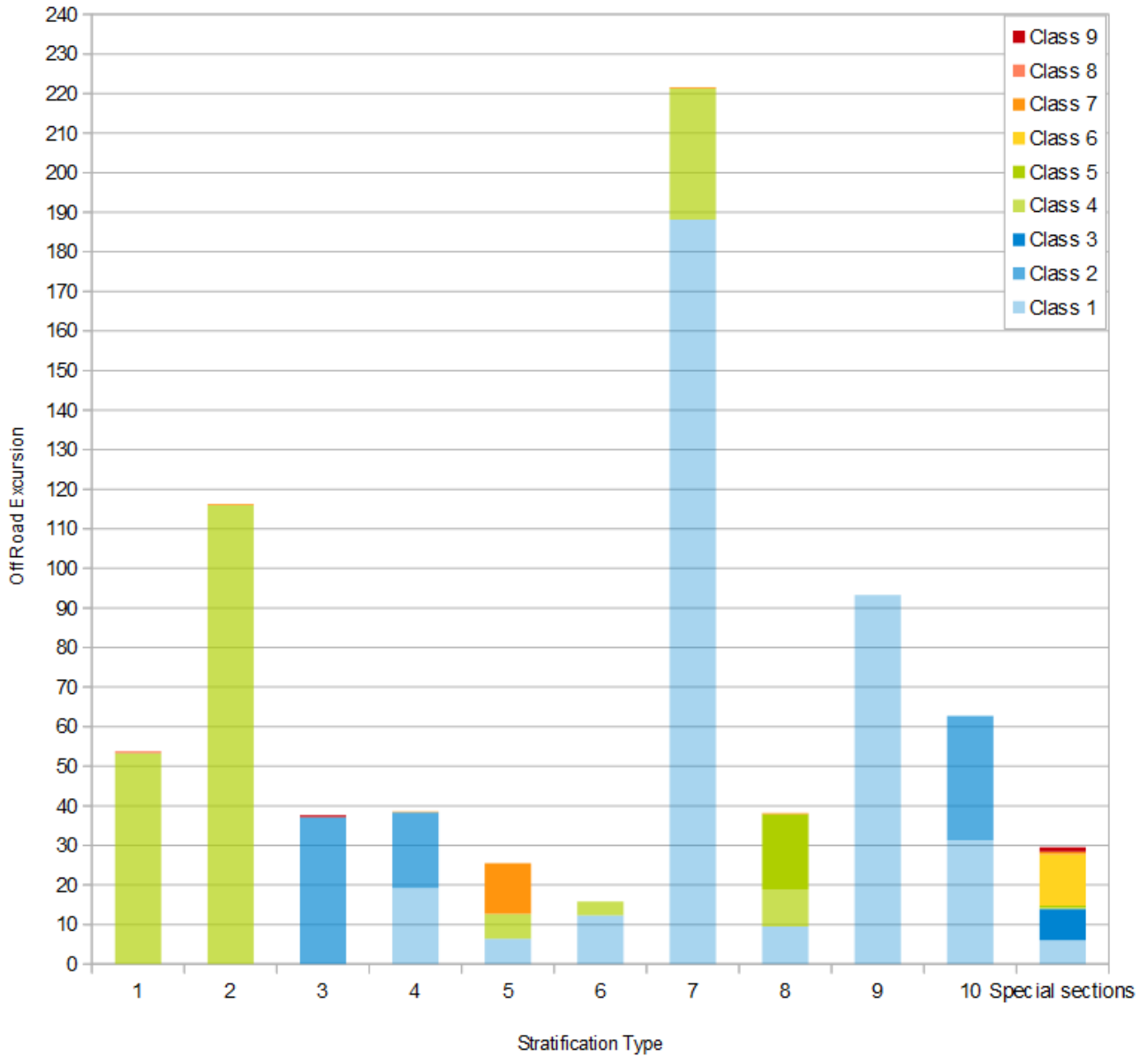


Fig. 28B High definition. Off road excursions over service life.



Off Road Excursion per per Consequences Class per Stratification Type

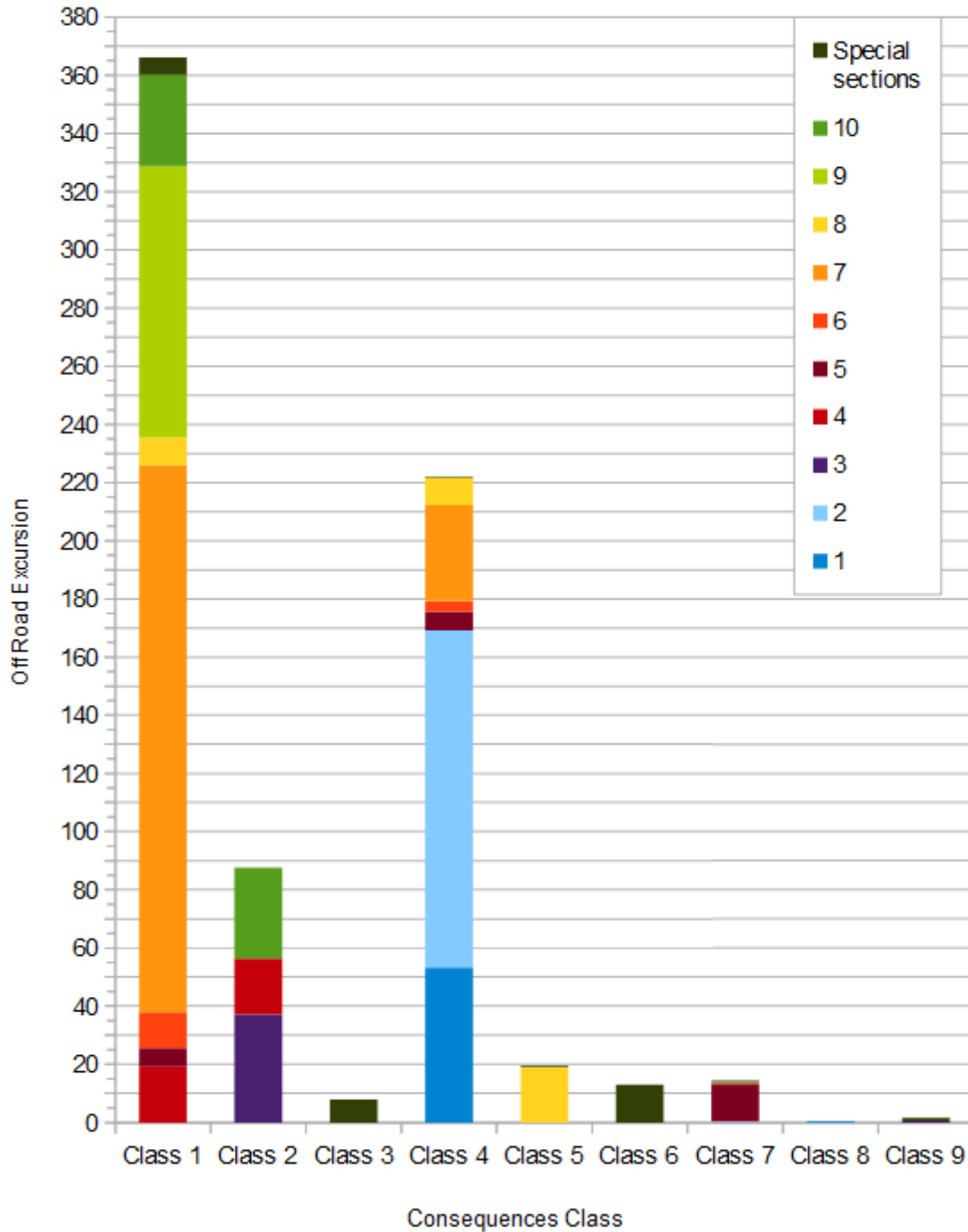


Fig. 28C High definition. Off road excursions over service life.

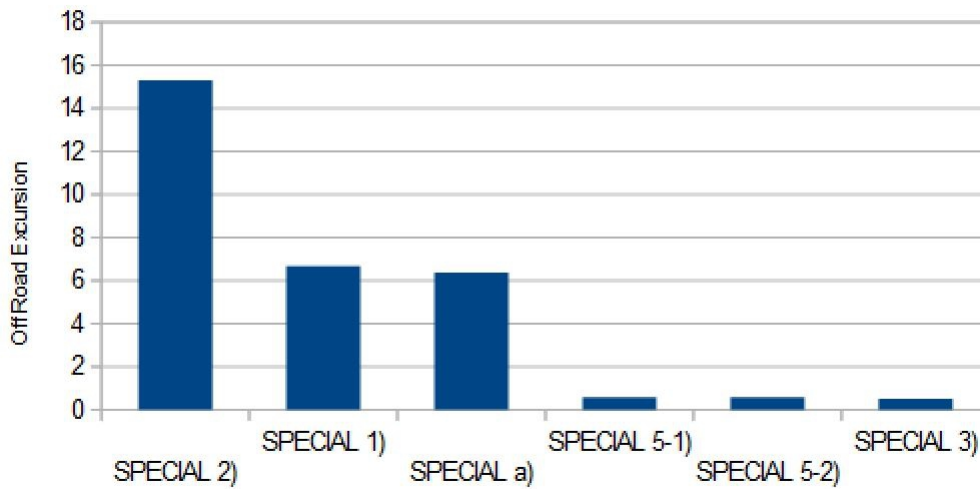


b. Break out the Special Sections so that the number of excursions can clearly be seen for each of the Special Sections

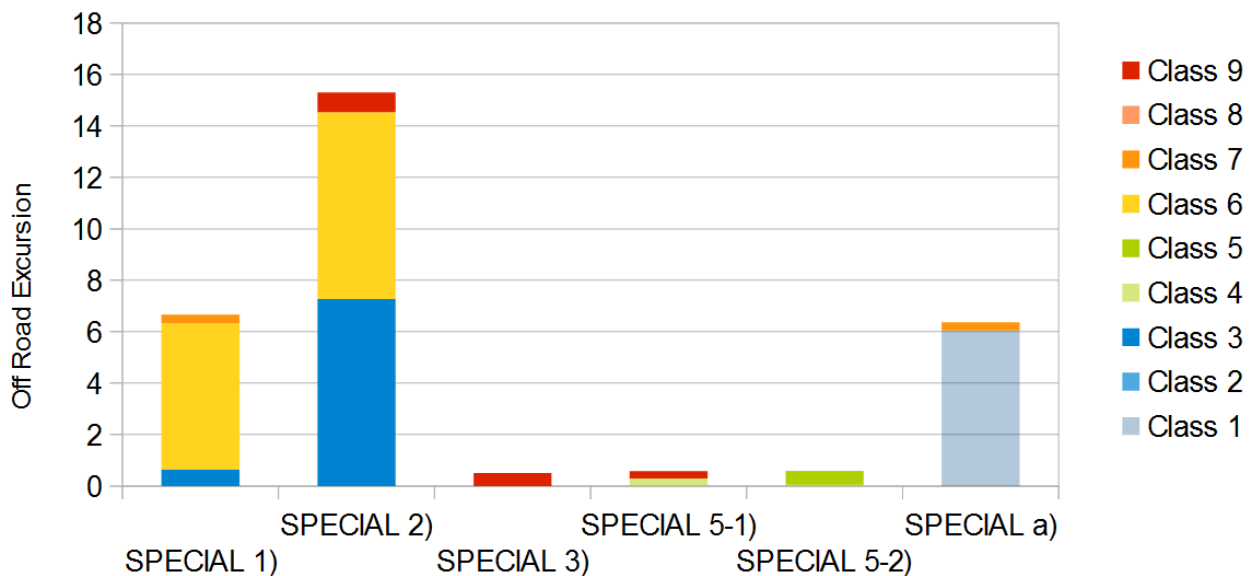
The three images below use the same structure of Fig. 28A,B,C, but apply only to the Special Sections as considered in ORA-11-18. The section named Special a) is the km 122.7 to 123.4.

For Special IV (not shown in the Figures) refer to the reply to question 1, Part 3 of this text.

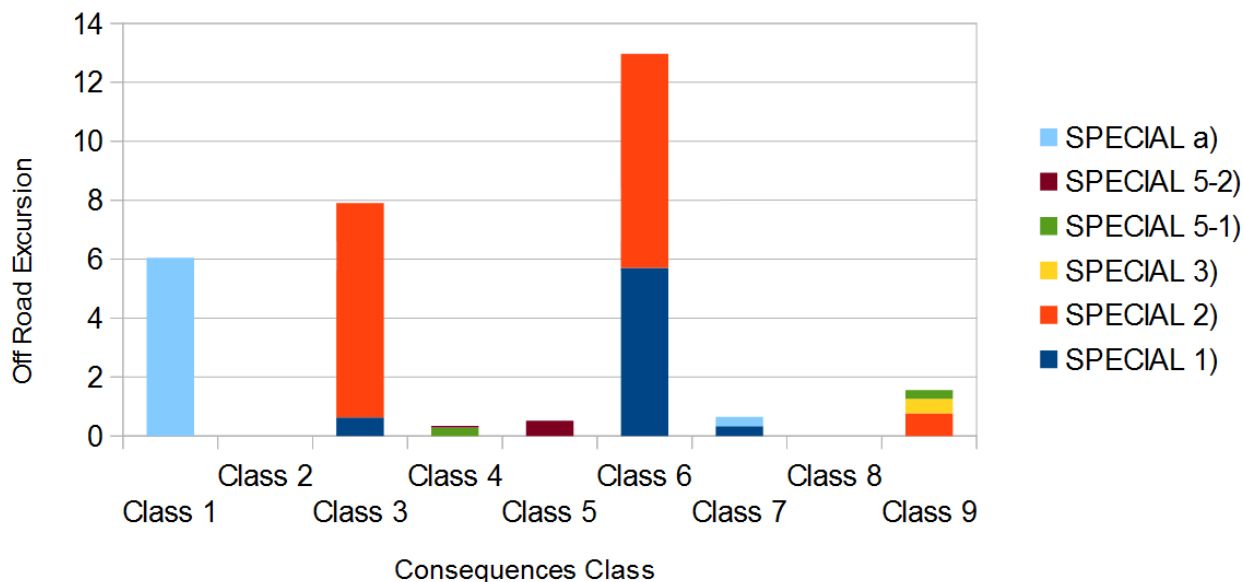
Off road excursion per Stratification



Off Road Excursion per Stratification type per Consequences Class



Off Road Excursion per per Consequences Class per Stratification Type



Conclusions

Oboni Riskope Associates Inc. remains confident that the global picture portrayed in ORA-11-18, including all the limitation and assumptions already discussed in the report, defines a valid and credible image of the risks along the project as confirmed by the bench-marking exercise.

We are delighted that CNZ will review the project in order to mitigate risks and we are very proud that together, all the parties will reach a final project that delivers its expected performances and has risks mitigated to a satisfactory level.

