The original Apex watershed assessment report (2016) was revised to include "*This section has been revised August 2018 to include consideration of climate change impacts within the risk analysis. The original … report provided climate change considerations in an appendix to the report*. (p22)"

This 2018 Apex report, with the same title and file number has different data that decreases the protection of our water. Below are some of the examples:

A) Most significantly, the risk analysis rating has been altered for four risks.

These ratings have been decreased to allow more leeway for the licencees and less protection for our water source. There is nothing that explains why these risks have been altered: no new data, no extra field days cited.

1) LANDSLIDE RISK TO GID INTAKE: The original 2016 Apex report states it is a Moderate risk, in the 2018 revision it has been revised down to Low.
   a) Original Report (p27): However, none of these existing landslides has been sufficiently large to result in substantial, long-term impacts to the intake. Based on this knowledge the historical likelihood of a large slide capable of causing long-term impacts to the intake is less than at least 1:40 years (<0.025 annual probability) which corresponds to a Moderate or lower likelihood.
   b) Revision 2018(p 30): In addition, there appear to be no natural landslides that have caused damage to the intake since it was constructed. These observations suggest that the current likelihood of a natural landslide capable of damaging the water intake is Low.

2) FLOOD RISK TO GID INTAKE: in the original it is listed as Moderate, in the 2018 revision it is listed as Low.
   a) Original Report (p28): The Glade Irrigation District intake is the element at risk in this assessment. Currently there is a Moderate Risk (low hazard x high consequence) of a damaging flood event.

Table 7. Risk Matrix for Water Intake

Hazard	Consequence		
Debris flood	High	Moderate	Low
Very High	Very High	Very High	High
High	Very High	High	Moderate
Moderate	High	Moderate	Low
Low	**Moderate**	Low	Very Low

   b) 2018 Revision (p32): The Glade Irrigation District intake and water quality and flow timing at the intake are the elements at risk in this assessment. Currently there is a Low risk (very low hazard x high consequence) of a damaging flood event.

Existing risk of damaging flood

Hazardous event	Consequence		
Debris flood	High	Moderate	Low
Very High	Very High	Very High	High
High	Very High	High	Moderate
Moderate	High	Moderate	Low
Low	Moderate	Low	Very Low
Very Low	**Low**		

3) HARVESTING LEVELS INCREASING THE HAZARD OF FLOOD EVENTS was listed as Low in the original Apex report and changed to Very Low in the 2018 Revision.
   a) Original Report (p25): Harvest levels for the north fork tributary of less than 25% overall and less than 15% (or less than about 184 ha of the 1224 hectare area) of the area south of the north fork channel, represent a low likelihood of increasing the hazard of damaging flood events if openings are situated primarily on southern to western aspect slopes and encompass a range of elevations.

b) 2018 Revision (p26): Harvest levels for the north fork tributary of less than 25% (390 ha) ECA overall and less than 15% ECA (184 ha of the 1224 hectare area) of the area south of the north fork channel, represent no change to the very low likelihood of damaging flood events if openings are situated primarily on southern to western aspect slopes and encompass a range of elevations.

4) RISK TO INTAKE FROM LANDSLIDES THAT ARE UPSTREAM OR UPSLOPE changed from High risk in the original Apex report to a Moderate risk in the 2018 Revision.

a) Original Report (p29): Currently there is a High risk to the intake from landslides off of gentle-over-steep, potentially unstable terrain and erodible glaciofluvial terrace slopes located upslope from the water intake. Any future development proposed in this area will require measures to identify and manage for this hazard. Drainage plans that identify and prescribe measures to maintain surface drainage patterns and avoid interception and concentration of subsurface water should be undertaken as part of all landslide risk assessments (DTSFA's).

Damaging landslide	High	Moderate	Low
Very High	Very High	Very High	High
High	Very High	High	Moderate
Moderate	**High**	Moderate	Low
Low	Moderate	Low	Very Low

b) 2018 Revision (p33): Currently there is a Moderate risk (low likelihood x high consequence) of a damaging landslide upstream from the water intake. Several development-related landslides occurred in the gentle-over-steep, potentially unstable terrain and erodible glaciofluvial terrace slopes located upslope from the water intake. These landslides occurred due to poor road building practices and drainage control on the hydro access road. (Note: The addition of the 'poor road building practices' is a new phrase in the 2018 revision.)

Existing risk of damaging landslide

Hazardous event	Consequence		
Damaging landslide	High	Moderate	Low
Very High	Very High	Very High	High
High	Very High	High	Moderate
Moderate	High	Moderate	Low
Low	**Moderate**	Low	Very Low

B) Material deleted, new risk rating entered in Revision that was not included in the original report.

1) A quote used by the Society regarding discharge gauging has been deleted, and in the absence of a risk rating, the 2018 Revision now includes one.

a) Original report (p26): For the 4 year freshet period the turbidity exceeded the BC water quality guidelines of 1 NTU for 65% of the samples. A total of 5% of the samples exceeded 8 NTU's and 4 events in 4 years or 2% of the samples, had turbidity in excess of 25 NTUs. Due to the lack of discharge gauging on Glade Creek it is not possible to relate variability in water quality to the flow regime. For this reason the hazard of flood related impacts to water quality at the intake cannot be quantified.

b) 2018 Revision (p27): Due to the lack of discharge gauging on Glade Creek it is not possible to relate variability in water quality to the flow regime. Correlation of the time series of precipitation and daily mean temperature from Castlegar Airport weather station with Glade Creek turbidity indicates that at least some of the largest turbidity events corresponded to high precipitation events while others correspond to periods of high temperature (Figure 3). The likelihood of flood related impacts to water quality at the intake cannot be confidently quantified but is estimated as very high assuming the majority of the 5% of samples exceeding 8 NTUs were caused by annual high flow events.

2) Another quote that the Society used in regards to discharge gauging and flow timing has also been deleted from the 2018 Revision, and the author's professional opinion has changed: initially it was 'impossible to quantify' changes to peak flows, now there appear to be changes to peak flows in the 2018 revision.
   a) Original (p26): Flow timing / Current hazard: The lack of discharge gauging on Glade Creek makes it impossible to quantify the hazard of runoff timing changes. However, the information from the analysis of hydrological processes undertaken in this study suggests that changes in the timing of flows in Glade Creek are unlikely given existing or proposed forest harvesting.

   b) 2018 Revision (p28): Current likelihood of changes in flow timing: Information from the hydrological analysis undertaken in this study (based on one year of flow gauging) suggests that flow timing in Glade Creek relates to snowmelt from high-elevation north aspect slopes likely driven by longwave radiation. The re-establishment of forests on these slopes following extensive early 1900's forest disturbance has likely resulted in gradual changes in flow timing over the past 70 years. Stand-level studies referenced above would suggest that the regeneration of forests on north aspect slopes in Glade Creek has shifted the peak flows to earlier in the spring compared to the disturbed condition (i.e. a high likelihood of changes in flow timing). This shift in runoff timing corresponds to the increase in longwave radiation-driven melt as forests regenerate.
      (i) Not only does the 2018 Revision appear to contradict the original report in reference to flow timing, but the addition of this new information is concerning. To now state that the regeneration of forests has been a gradual cause for changes in flow timing removes an important data measure which could have been used to measure impacts in our watershed. A shift in timing of flow is a sure indicator that something in the watershed is changing, shifts in timing can lead to flooding, increased sedimentation, and longer low flow or drought periods in summer months.
      (ii) 2018 Revision (p31) Existing Risk of Flow Timing Changes shows this chart that alters the risk of a change in flow timing to Very High. It goes on to state that 'Climate change is unlikely to substantially alter the risk of changes in timing of annual peak flows in Glade Creek but may cause elevated early spring rain-on-snow peaks'. This sentence lacks clarity, as 'elevated early spring rain-on–snow peaks' *is* a climate change and what is being described (elevated peaks) *is* a change to flow timing. And if it is already at a 'very high risk', what sort of risk does it become during the 'elevated' spring peaks?

Existing risk of flow timing changes

Hazardous event	Consequence		
Change in flow timing	High	Moderate	Low
Very High	Very High	Very High	High
High	Very High	High	Moderate
Moderate	**High**	Moderate	Low
Low	Moderate	Low	Very Low

3) In the 2018 Revision, a new phrase is used and a new rating is included again. *Sediment mobilizing floods* is not a term used in the original report and it has been given a Very High risk rating, which appears to be a new rating where none existed before. The 2018 Revision states (p 31): 'Climate change could substantially increase the already very high risk of sediment mobilizing floods as a result of bank erosion during mid-winter and spring peaks triggered by increased rain-on-snow events.' And 'Proposed forest development distributed across aspects in lower elevation portions of the watershed will not affect the existing risk of sediment mobilizing flood events'. Again, what happens when the very high risk is 'substantially increased'? How is this consistent with the determination that the proposed forest development does not increase the risk in any way?

Existing risk of sediment mobilizing floods

Hazardous event Sediment mob floods	Consequence		
	High	Moderate	Low
Very High	**Very High**	Very High	High
High	Very High	High	Moderate
Moderate	**High**	Moderate	Low
Low	Moderate	Low	Very Low

Conclusion

The FSP is a legal document that the licencees are required to share with the community. The Apex report is part of their FSP, which was judged as meeting all the requirements, even going beyond the requirements, according the FPB's draft report. However, since the original report is not the same as the 'Addendum', and it was not shared with anyone, much less as part of a legal FSP document, it could be said that both licencees have, indeed, failed in their requirement to present a complete, accurate FSP to the government regulators and public. This situation means that both licencees (Kalesnikoff and ATCO) are not meeting the government's Community Watershed objectives, or the strategies of their own FSPs, as is stated in the Society's complaint Submission to the Forest Practices Board.