

**International Kootenay Lake Board of Control
Annual Board Meeting**

**Prestige Lakeside Resort, Monashee Room
Nelson, British Columbia**

**Tuesday, 6 October 2015
2:00 – 4:00 PM**

**IKLBC Annual Meeting
Attendance**

	Canada	United States
Chair	Bruno Tassone	Col. John Buck
Members	Glen Davidson	Kyle Blasch
Secretariat	Gwyn Graham	Sara Marxen
IJC Commissioners	Gordon Walker	Rich Moy
IJC Advisors	David Fay	Mark Colosimo
Guests	Darren Sherbot (BCHydro), Jamie King and Ryan Steele (FortisBC)	

**Agenda
2:00 – 4:00
pm**

1	Welcome and Introductions	Bruno Tassone
2	Review of the Agenda	Bruno Tassone
3	Business from the Previous Meeting	Bruno Tassone
3.1	<i>Review of Action Items from 2014 Board meeting</i>	<i>Gwyn Graham</i>
3.2	<i>BC Hydro update on Grohman Narrows dredging feasibility study</i>	<i>Darren Sherbot, BC Hydro</i>
4	New Business	
4.1	<i>Compliance with the Order</i>	Gwyn Graham
4.2	<i>Report from the Applicant</i>	Jamie King (Fortis BC)
4.3	<i>2015 Correspondence and Briefing Review</i>	Gwyn Graham
4.4	<i>2015-16 Work Plan review</i>	Gwyn Graham
5	Preparation for the Public Meeting	Bruno Tassone
6	Adjourn	

Welcome, Introductions, Review of the Agenda

Canadian Section Bruno Tassone called the meeting to order Tuesday, October 6th, at 2:00 pm. The Board reviewed the agenda and did not make any changes.

Description of morning tour

Earlier in the day, Board members, Board secretaries and other attendees met with FortisBC staff at Corra Linn Dam for a tour of the project and view of the forebay intake of BC Hydro's Kootenay Canal Project. The tour started at 09:00 and was led by Darren McElhinney (General Operations Manager). Also assisting with the tour was Greg Johnston (Senior Dam Safety Engineer), Ryan Steele (Power supply planning specialist) and Jamie King (Manager, Power Supply Operations) who helped provide an overview of the power sharing agreement between Fortis BC's Corra Linn Dam and BC Hydro's Kootenay Canal Plant (aka. The Canal Plant Agreement).

The Corra Linn project is a concrete dam on the Kootenay River (approximately 15 km (9 miles) downstream of Nelson, BC) initially built in 1932 to control upstream storage in Kootenay Lake for power generation benefits. The dam generates power through three 19,000 horsepower Francis turbine units (approximately 20 MW generating capacity each). The overall generating capacity is about 60 MW. The turbines are original units although with some refurbishment over the years. The flow control gantry and gate system on the dam is currently due for refurbishment and Fortis BC is seeking approval through the BC Utilities Commission (BCUC). Refurbishment would include seismic upgrade work and corrosion protection. The flow control gates are operated from the Fortis BC control center (Warfield, BC) but also have on-site back-up gate operation systems (natural gas and diesel powered generators as well as hand-crank back-up) in case of problems with the electronic gate control.

The Canal Plant agreement between Fortis BC and BC Hydro was initially established in 1974 with subsequent renewals in 2005 and 2011 and allows BC Hydro to make the most efficient use of flow regulation from upstream Duncan and Libby dams and requiring Corra Linn dam to meet certain operational requirements in exchange for a power generation entitlement. BC Hydro's Kootenay Canal plant draws on the Corra Linn forebay to route flow through a canal to a dam and power plant and discharges back into the Kootenay River after bypassing 4 FortisBC power plants on the Kootenay River. The Canal Plant has a generation capacity of about 585 MW

Business from the Previous Meeting

Darren Sherbot (BC Hydro) provided an update on the BC Hydro's Grohman Narrows channel improvement project (GNCIP) study.

- The Narrows between Nelson and Corra Linn are one of the main subjects of the order. Historically, the narrows were excavated in 1890, 1931 and 1939. The 2012 flood event resulted in highest Kootenay Lake levels since 1974 and reinvigorated the plan to study potential further channel improvements. BC Hydro embarked on this study in 2011 since improving channel capacity through the Narrows could provide energy benefits from potential dredging.
- From geologic studies, BC Hydro believes the excavation could be completed with just dredging and bedrock removal/blasting would likely not be needed. Channel velocities would be stabilized, or smoothed out, resulting in better conveyance. Three alternatives were modeled in Phase 1: low excavation, medium excavation, high excavation with associated 0.7 feet, 1.0 feet, 2.0 feet peak flood level reduction, respectively. Studies indicate that 2012 high water damages would have been reduced with the high excavation option. Peak discharge wouldn't be higher, but would likely occur earlier. With greater potential for lower Kootenay Lake levels in early spring, peak Kootenay Lake levels would be reduced, as would flood damage risk, with peak freshet discharge no higher than under current conditions.
- After 2012 when Kootenay Lake peaked at the highest level since 1974 (1753.8 feet) BC Hydro began to see a significant interest by stakeholders for a change that would improve flood risk management and increase the reliability of maintaining lake levels below 1750 feet and reduce Columbia River mainstem discharges. BC Hydro had conducted Phase 1 studies to evaluate three excavation scenarios: Low excavation, medium excavation, high excavation with costs ranging from \$20 million for the "low excavation" to \$60 million for the "high excavation" with an uncertainty in the cost of -5% to + 100%. However during Phase 1 public meetings stakeholders were concerned with model results pointing to a high percentage of years where Kootenay Lake was drafted below 1738 feet. So BC Hydro conducted supplementary studies (Phase 2) and is now in the process of re-engaging stakeholders. BC Hydro has public meetings scheduled for October 29, 2015 in Nelson, B.C. at the Prestige Lake Resort, and thus, public requests for information on the BC Hydro studies at the IKLBC public meeting will likely be deferred to the BC Hydro public meeting.
- BC Hydro has conducted supplementary studies to their earlier work on feasibility of Grohman Narrows channel expansion. These supplementary studies included 2 changes: a longer period of record and additional constraints on the modeled operation. The period of record for studies was increased by an addition 15 years to include hydrology from 1929 through 2013 and the simulation of Kootenay Lake operations were constrained to prevent drafting of Kootenay Lake below 1738 feet. The supplementary study results were described as follows.

- Flood Risk – No change to Kootenay Lake flood peaks from Phase 1 to Phase 2 for all three excavation scenarios. A 5% reduction over the period of record in downstream Columbia River peak flows.
- Power – From Phase 1 to Phase 2 studies only the high excavation scenario resulted in increased hydropower generation. The Net Present Value (NPV, the total capital costs offset by power benefit amortized over 40 years) increased to plus \$15 million for the low excavation, no change for medium excavation and minus \$50 million for the high excavation.
- Kokanee shoal spawning – spawning benefits are difficult to determine because spawning survivability is all relative to where and when Kokanee spawn. BC Hydro expects to have information on potential Kokanee spawning benefits in the next report.
- White Sturgeon – Only an initial estimate was completed resulting in Phase 2 showing a possible 0.5 foot reduction in water level elevation at Bonners Ferry under all excavation scenarios. Possible implications to White Sturgeon still need to be determined.

Questions from the Board:

Q: Do the costs include flood reduction benefits?

A: No

Q: Is there a report available?

A: technical report will be available online and BC Hydro will send it to the Board.

Q: What does B.C. assign as the elevation where flood damages start?

A: The (Flood Control Operating Plan - FCOP) assigns an elevation of 1755 feet. However damages are reported at elevations of 1750 feet. Buildings are supposed to be built with a setback to elevation of 1760 feet.

Q: What were the damages estimated in 2012?

A: In 2012 damages were estimated at \$5 million. The lake peaked at 1753.78 feet. Boathouses and municipal infrastructure were damaged. There have been discussions in the Province for establishing a high water level under the Water Act for the Lake so that dispensation for permits could occur. BC's surveyor general guides determination of the natural boundary. Local/Regional government assign flood plain limits and setback/elevation distances for building. The general flood elevation limit for Kootenay Lake is currently assigned at 563.5 m (1760 ft), but some older residences may be located at lower elevations in addition to non-residential structures.

Q: Does the study look at benefits to agricultural damage reduction?

A: Unlikely at this stage.

Q: What is the plan after public meetings?

A: BC Hydro will gauge public opinion and in within the calendar year, determine whether to proceed with further engineering studies.

Q: What are engineering studies?

A: Geotechnical, fisheries, planning where to place materials, etc. This phase is estimated to take 2 years.

BC Hydro (Darren Sherbot) asked the Board if the project proponent need to apply to the IJC?

Glen Davidson – The applicant would have to consult with the province first, prior to seeking IJC input.

Q: At the last meeting, BC Hydro reported 70-80% of public approved of the project - has it changed?

A: BC Hydro isn't sure at this time. Generally, people are concerned Kootenay Lake will be drained or that there will be impacts to recreational and environmental purposes. Actual impacts point to an earlier and potentially deeper spring draft and more water will be moved through the lake earlier.

Q: If you could look into the future what do you think will happen?

A: If there were overwhelming power benefits it would be easy, but since there isn't the Province needs additional benefits shown.

Q: Was climate change considered?

A: No

Q: We should consider having a Climate Change (CC) presentation at our next annual meeting?

A: Gwyn - There's been some work done for BC Hydro by groups such as PCIC (low flow impacts associated with glacier loss, and potential impacts due to precipitation falling as winter rain as opposed to snow, etc.), - other groups also involved on this issue in the Columbia Basin. Mark Colosimo (IJC) noted that the under the IWI Climate Change studies and dissemination of information are encouraged.

Resulting Action Items from the discussion:

- 1) Consider a presentation on Climate Change impacts to Kootenay Lake
- 2) Gwyn to work with Darren (and others) on what climate change scenario information can be posted to the IJC web site.

New Business

Canadian Section Secretary Gwyn Graham reviewed the IJC Rule Curve for Kootenay Lake and Kootenay System operations for the year. Duncan and Libby operations graphs were displayed, noting that Libby discharges did not have a significant impact on Kootenay Lake this year and that Duncan was on minimums during the freshet. It was noted that higher elevation snow pack was close to normal but melted much more quickly this year due to higher than average temperatures and that precipitation occurred as rain at low-mid elevations in early February. The Spring Rise was declared on April 2 this year, the point at which the IJC rule curve switched from maximum lake elevation criteria to the lowering formula as stipulated in the IJC Order. The spring rise was declared using the Kootenay Lake 3-day

consecutive rise rule in 2015, due to lack of clear freshet signal in unregulated streams. Gwyn pointed out two heavy precipitation events, in early February and late March, which resulted in rule curve exceedances. In both cases Corra Linn was initially below the rule curve but the events were larger than expected, forcing water levels briefly above the IJC limit. In both cases, Corra Linn dam switched into free fall quickly and brought levels back into compliance. Gwyn also noted that Kootenay Lake did not meet its April 1 low level target due to the second precipitation event. Both events were communicated quickly by the Applicant to the board and at no time during the water year did the Board deem Fortis BC out of compliance with the Order, due to their actions and the nature of the events.

Darren Sherbot (BC Hydro) asked how the Board determined Corra Linn free fall and the balance between Grohman Narrows and dam control. The Canadian secretary described that the approach uses a stage-discharge relationship for the Kootenay River, upstream of Corra Linn dam, developed initially in the 1940's and subsequently updated in the early 1970s. Given Kootenay River (at Corra Linn) discharge and Queens Bay stage, the relationship indicates what the forebay elevation should be for broadly balanced conditions. This is then compared to the actual Corra Linn forebay elevation to determine if the dam or Grohman Narrows is in control. David Fay (IJC) asked if the approach should be reviewed. The Canadian secretary indicated it had been reviewed by the Board in 2012 and been found to still be a valid.

Action: Post 2012 report of IKLBC Grohman Narrows channel study to IJC web site.

There was further discussion about the plot of East Creek snow survey. It was noted that while the snow survey may show normal elevations that it doesn't tell the whole picture. There was much less low elevation snow than average. There was agreement regarding these remarks and indication that this would have to be clarified and simplified for public presentation.

Jaime King (Fortis BC) gave the Corra Linn operations update. He describe that in August of 2014 Kootenay Canal was temporarily taken out of service for maintenance work, resulting in low water levels (1742 ft) in the lake. The Canal plant came back online October 25. In February a rule curve exceedance occurred, the lake had been operated to have a 1.7 foot margin but didn't expect the 45 kcfs peak inflow. In March, Fortis had been targeting reaching 1739.32 ft by March 20th when a second precipitation event pushed the elevation above the rule curve and prevented them reaching the low elevation target this year. During late summer/fall Fortis supported the Kokanee shoal spawning operation which resulted in lower lake elevations. This operation occurs every four years and prevents dewatering of kokanee eggs. Survivability in 2012 was 75% during this operation as opposed to 25% in previous years. Jamie noted that the Corra Linn spillway refurbishment project application was approved (estimated to cost \$30 million). Information on Fortis BC's 2015 payment to the Kootenai farmers (via State of Idaho)

was not yet available, but will be forwarded to the Board. The current work scope for the spillway project is:

- Conduct a condition assessment of the gates.
- Recoat the gates (the original 2011 project) or make structural modifications or replace the gates.
- Provide a means of isolating under flow should a gate fail.
- Address the superstructure concerns with regard to a major earthquake.
- Add a second power feed to provide a backup to the gantries.
- Repair or restore the concrete rollways, pier caps and splitter walls.
- Assess the seismic withstand capacity of the dam structures to withstand the updated earthquake loads.

There were questions from Darren Sherbot (BC Hydro):

When does Fortis BC generally receive recreation complaints?

A: Anything less than 1743 feet.

Are IJC exceedances based on an hourly basis? Rolling average? Fortis was not sure, board members indicated the order does not specify the time interval. The Canadian secretary indicated that water levels are automatically recording at fairly short time intervals (~15 min) and averaged over longer time periods (hourly and daily). The Canadian secretary also noted that the Board typically examines the circumstances resulting in an exceedance to determine whether the applicant was in compliance on a case by case basis (generally working off daily averages for water level data).

Kyle Blasch wondered how many precipitation gauges are used to estimate inflows from a storm event. Fortis responded that it depends on circumstances - they depend on BC Hydro and Environment Canada for information and it is not an exact science (relating precip to lake level response). They are usually in a reactive mode for short term events. Fortis received forecast data 2 times per week from BC Hydro for planning purposes.

Mark Colosimo (IJC) asked how many times since 2008 had the 1739.32 ft target been met? Gwyn indicated 4 times below target and 5 times the target was not met. Gwyn also indicated that the April 1 target has some leeway (i.e., on or about April 1st), it is intended to support drainage of farm fields in the Idaho portion of the Kootenai River flood plain.

Correspondence and presentations:

The Canadian secretary discussed Board Correspondence and presentations from 2015.

Ms. Nancy Knight (lakeshore resident) wrote to the board regarding issues with low lake levels in the last two years in late summer/early fall and outlined a number of concerns regarding lake access, navigation and water intakes. The Canadian secretary drafted a letter response for board review, indicating that the order is intended to regulate the maximum lake elevation, allowing the applicant to operate to lower elevations in consideration of a range of water management interests. A review of data suggests that the Lake was not significantly lower than previous years, but that the 2014 work on the Canal Plant intake and the 2015 Kokanee shoal spawning water management efforts had contributed to slightly more lowering than might otherwise be the case for that time of year.

Action – Board to review draft letter of response.

IJC Directive and Draft Work Plan

The Canadian secretary presented the draft work plan and requested input.

There was a discussion on considering whether climate change might affect the applicant's ability to comply with the order or whether the order might need to change in response to climate change. It was suggested that we should wait to investigate this until more is known about what will happen with Grohman Narrows channel improvement.

David Fay (IJC) noted that the order doesn't cover things like low water levels, water quality, sturgeon, etc. and wondered if these were needs that should be considered in the context of the Order.

Rich Moy (IJC Commissioner) noted that the IJC is looking at all their Orders with new knowledge and data and determining how they can better meet current needs.

Preparation for Public Meeting

The Board went through the slides for the public meeting, discussed potential questions from the public, and discussed who might be in attendance. The meeting adjourned at 4:30pm.