



Upper Lillooet Hydro Project

Weekly Environmental Monitoring Report #92

Reporting Period: April 10-23, 2016

Upper Lillooet River Hydroelectric Facility (Water File No. 2002561, Water licence No. C130613), Boulder Creek Hydroelectric Facility (Water File No. 2003049, Water licence No. C129969) & Transmission Line (TX Line)

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		Date Prepared: May 17, 2016 Date Submitted: June 1, 2016

Owner Construction Permits and Approvals

- Environmental Assessment Certificate No. E13-01 (Amendment 1, 2, 3, 4, 5, 6, 7)
- Fisheries Act Subsection 35(2)(b) Authorization No. 09-HPAC-PA2-000303 (Amendment 1, 2)
 - Letter of Advice for the Transmission Line No. 09-HPAC0-PA2-000303
 - Leave To Commence Construction (ULRHEF) File No. 2002561
 - Leave To Commence Construction (BDRHEF) File No. 2002453
 - Leave To Commence Construction (TX Line) File No. 2002561/2002453
 - Conditional Water Licence (ULRHEF C130613) File No. 2002561
 - Conditional Water Licence (BDRHEF C129969) File No. 2002453
 - Conditional Water Licence (BDRHEF C131153) File No. 2003601
 - Licence of Occupation (ULRHEF #232384) File No. 2409871
 - Licence of Occupation (BDRHEF #232386) File No. 2409998
 - Licence of Occupation (TX Line #2423386) File No. 2410654
 - Occupant Licence to Cut (ULRHEF) No. L49717(Amendments 1, 2, 3, 4, 5, 6, 7)
 - Occupant Licence to Cut (BDRHEF – KM 38 laydown) No. L49698
 - Occupant Licence to Cut (BDRHEF) No. L49816 (Amendments 1, 2, 3)
 - Occupant Licence to Cut (TX Line) No. L49697 (Amendments 1, 2, 3, 4, 5, 6, 7, 8, 9)
- General Wildlife Measure Exemption Approval Letter (TX Line & BDRHEF) File No. 78700-35/06 UWR and 39585-20 WHA Heritage Conservation Act – Alteration Permit (ULRHEF) File No. 11200-03/2014-0033
- Road Use Permit No. 6123-13-02 (Lillooet River FSR); 5673-13-01 (Rutherford Creek FSR); 7977-13-01 (Lillooet South FSR); 8015-13-01 (Ryan River); 8188-13-01 (Pemberton Creek FSR); and 9717-13-01 (Miller Bench FSR)
 - Junction Permit (ULRHEF & BDRHEF) File No. 11250-32/6123 (Amendment 1)
 - Aeronautical Obstruction Approval (Tx Line - Lillooet River Crossing) File No. 2013-004
 - Aeronautical Obstruction Approval (Tx Line - Ryan River) File No. 2013-005
 - Aeronautical Obstruction Approval (Tx Line - North Miller) File No. 2013-006
 - Aeronautical Obstruction Approval (Tx Line - South Miller) File No. 2013-007
 - Aeronautical Obstruction Approval (Tx Line - Pemberton Creek) File No. 2013-008
 - Aeronautical Obstruction Approval (Tx Line - Lillooet River near Pemberton) File No. 2013-009
 - Aeronautical Obstruction Approval (Tx Line - Lillooet River near Meager Creek) File No. 2013-010
 - Navigable Water Protection Act (ULRHEF) File No. 8200-2009-500434-001
 - Navigable Water Protection Act (BDRHEF) File No. 8200-2012-501-032-001
 - Navigable Water Protection Act (Tx Line – North Creek) File No. 8200-2013-500103-001
 - Navigable Water Protection Act (Tx Line – Lillooet River) File No. 8200-2013-500101-001
 - Navigable Water Protection Act (Tx Line – Lillooet River) File No. 8200-2013-500102-01
 - Navigable Water Protection Act (Tx Line – Ryan River) File No. 8200-2013-500104-001
 - Navigable Water Protection Act (Tx Line – South Miller River) File No. 8200-2013-500100-001
 - Navigable Water Protection Act (Tx Line – Boulder Creek) File No. 8200-2013-500099-001
 - Navigable Water Protection Act – Extension Approval (ULRHEF, BDRHEF, Tx Line)
 - Navigable Water Protection Act (Bridge – Ryan River) File No. 8200-2013-500381
- Navigable Water Protection Act (Bridge – Upper Lillooet Side Channel; Extension Approval) File No. 8200-2013-500383
 - Section 57 Authorization (ULRHEF) File No. 16660-20/REC202717
 - SLRD Temporary Use Permit No. 34 – Boulder Creek HEF
 - SLRD Temporary Use Permit No. 35 – Upper Lillooet River HEF
 - SLRD Building Permit (10864) – Upper Lillooet River HEF Powerhouse
 - SLRD Building Permit (10865) – Boulder Creek HEF Powerhouse
 - Works Permit for Construction within FSR Right-of-Way No. 6123-14-01
 - Works Permit for Construction within FSR Right-of-Way No. 7977-15-01
- Section 52(1)(b) FRPA Authorization for Ryan River Wet Crossing File No. FOR-19400-01/2014
- MOTI Permit to Construct, Use and Maintain Works Upon the Right-Of-Way of a Provincial Public Highway No. 2014-06099
 - Magazine Licence File No. UL76018 (Renewal 1)
- Section 8 Approval – Short Term Use of Water File (Lillooet River and Tributaries) No. A2006123 (Amendment 1)
- Section 8 - Special Use Permit issued for the operation of an avalanche weather station on Crown land (File No. S25988)

Contractor Construction Permits and Approvals

Waste Discharge under the Code of Practice for the Concrete and Concrete Products Industry under the Environmental Management Act (Authorization No. 107204) Tracking No. 326969 (Renewal 1)
Wildlife Act Permits – Pacific Tailed Frog Salvage Permit # SU15-164805; Fish Salvage Permit # SU15-174722
Fisheries and Oceans Canada – Anadromous Fish Salvage Permit #XR 178 2015
BC Safety Authority – Temporary Construction Electrical Service Permit EL-140698-2014
Municipal Wastewater Regulation - Authorization # 107032
Water Supply System Construction Permits – VCH-14-613 for Main Camp
Water Supply System Permit to Operate Issued July 30th, 2014 for Main Camp
Section 6(3) and Schedule 3 Wildfire Regulations Fire Exemption for Ryan River Bridge File No. 14350-07
SLRD Building Inspection Report dated August 13, 2014 - Construction Camp Building Permit No. 10830
Lillooet River FSR Temporary Road Closures Approval File No. 11250-32/6123 (Amendment 1, 2)
Lillooet South FSR Temporary Road Closures Approval File No. 11250-32/7977
SLRD Building Permits for Mechanic Shop (10862) and Carpentry Shop (10836) March 18, 2015
SLRD Building Permit Stages 1 - 4 – Boulder Powerhouse Architectural, Electrical and Mechanical (10865) October 8, 2015
SLRD Building Permit Stages 1 - 4 – Upper Lillooet Powerhouse Architectural and Mechanical (10864) October 6, 2015
Water Sustainability Act Section 10(1) Use Approval dated March 24, 2016

ACRONYMS:

AMBNS	Active Migratory Bird Nesting Survey	IE	Independent Engineer (True North Energy)
Andritz	Andritz Hydro Canada Inc.	IEM	Independent Environmental Monitor
ANFO	Ammonia nitrate fuel oil (industrial explosive)	INX	Innergex Renewable Energy Inc.
ARD M/L	Acid Rock Drainage and Metal Leaching	ISW	Instream Works
BCEAO	British Columbia Environmental Assessment Office	ITM	Environmental Issue Tracking Matrix
BCWQG	British Columbia Water Quality Guidelines	JEM	JEM Energy Ltd. (Delegate Independent Engineer)
BDRHEF	Boulder Creek Hydroelectric Facility	LTC	Leave to Construct
BG	Background	MFLNRO	Ministry of Forests, Lands and Natural Resource Operations
BKL	BKL Consultants Ltd.	MOE	Ministry of Environment
CE	CRT-ebc Construction Inc.	MOTI	Ministry of Transportation and Infrastructure
CEMP	Construction Environmental Management Plan	OGMA	Old Growth Management Area
CTF	Coastal Tailed Frog	OLTC	Occupational License to Cut
DFO	Fisheries and Oceans Canada	PAG	Potentially Acid Generating
DS	Downstream	QP	Qualified Professional
EPP	Environmental Protection Plan	ROW	Right of Way
EAC	Environmental Assessment Certificate	RVMA	Riparian Vegetation Management Area
EAO	Environmental Assessment Office	SES	Sartori Environmental Services
Ecofish	Ecofish Research Ltd.	SLRD	Squamish-Lillooet Regional District
Ecologic	Ecologic Consulting	TX Line	Transmission Line
EIR	Environmental Incident Report	ULRHEF	Upper Lillooet Hydroelectric Facility
ESC	Erosion and Sediment Control	UWR	Ungulate Winter Range
FAM	Field Advice Memorandum	VC	Valued Component
FSR	Forest Service Road	WEL	Westpark Electric Ltd.
Golder	Golder Associates	WEMR	Weekly Environmental Monitoring Report
GWR	Mountain Goat Winter Range	WHA	Wildlife Habitat Area
Hedberg	Hedberg and Associates Ltd.		
HWM	High water mark		

1.0 Summary of Site Inspections for Reporting Period

The table presented below summarizes the IEM team site presence, weather and monitoring locations by component:

Date	IEM Team Personnel	Key Monitoring Locations & Activities
April 10 – 16, 2016	SE, TH, SS	<p>Construction Camp, Laydown Areas, and the Lillooet River FSR</p> <ul style="list-style-type: none"> • Road maintenance on the Lillooet River FSR • Pebble Creek Main culvert installation <p>ULRHEF Intake & Upstream Tunnel Portal</p> <ul style="list-style-type: none"> • Grout injection program and canopy tubes • ULHP Intake rebar and formwork • Blasting and excavation for BEBO (precast arch) wall • BEBO (precast arch) wall rebar and formwork <p>ULHEF Downstream Tunnel Portal</p> <ul style="list-style-type: none"> • Drilling, blasting and tunnel stabilization • Removal of soil within Mountain Goat Winter Range <p>ULRHEF Powerhouse</p> <ul style="list-style-type: none"> • Tailrace excavation • Tailrace rebar and formwork • Andritz works <p>BDRHEF Downstream Tunnel Portal</p> <ul style="list-style-type: none"> • Drilling, blasting and tunnel stabilization <p>BDRHEF Powerhouse</p> <ul style="list-style-type: none"> • Andritz electrical works <p>TX-Line</p> <ul style="list-style-type: none"> • No scheduled works
April 16 – 23, 2016	SE, MC, TH	<p>Construction Camp, Laydown Areas, and the Lillooet River FSR</p> <ul style="list-style-type: none"> • Pebble Creek Main culvert installation and armouring • Road maintenance on the Lillooet River FSR <p>ULRHEF Intake & Upstream Tunnel</p> <ul style="list-style-type: none"> • Grout injection program • Concrete works on ULHP Sluiceway • ULHP Intake rebar and formwork • Blasting for BEBO (precast arch) wall • BEBO (precast arch) wall rebar and formwork <p>ULRHEF Downstream Tunnel Portal</p> <ul style="list-style-type: none"> • Drilling, blasting and tunnel stabilization • Sediment removal with Vac truck at SUMAS water treatment system <p>ULRHEF Powerhouse</p> <ul style="list-style-type: none"> • Tailrace rebar and formwork • Andritz works <p>BDRHEF Intake & Upstream Tunnel Portal</p> <ul style="list-style-type: none"> • Trenching and conduit installation along BDR Intake access road <p>BDRHEF Downstream Tunnel Portal</p> <ul style="list-style-type: none"> • Drilling, blasting and tunnel stabilization <p>BDRHEF Powerhouse</p> <ul style="list-style-type: none"> • Andritz electrical works • Tailrace excavation <p>TX-Line</p> <ul style="list-style-type: none"> • No activity

IEM Team Personnel: TH – Tom Hicks; SS – Stephen Sims; DA – Danita Abraham; SE – Stephanie Ellis; AS – Anne Sutherland; ML – McKenzie Lee

2.0 Administrative Summary

Key communications and meetings the IEM team had with the licensees, contractors and/or environmental authorities:

Date	Communication Type	Participants	Issues Discussed	ITM ID No.
April 11	<i>Emails</i>	CE, SES, INX	Re: Emergency repair at KM41.2 culvert – additional work. CE provided the IEM and INX with an email indicating that a Work Plan for a permanent culvert fix would be prepared; however, further temporary works were required immediately to re-establish the full width of the Lillooet River FSR for safety reasons. The IEM responded outlining concerns with the close proximity to fish-bearing waters of the Lillooet River, the temporary nature of the proposed culvert, improper installation, and requirement for IEM notification and monitoring.	-
	<i>Email</i>	INX, CE, SES	Re: ULHP <i>Water Sustainability Act</i> in Effect – Licence Required for Well(s). INX provided an email to CE outlining potential new permitting requirements associated with ground water usage.	-
	<i>Emails</i>	SES, CE, INX, JEM	Re: FAM #10 – Response from CRT-EBC. An email from the IEM was sent to CE management requesting confirmation of timeline to address outstanding drainage issues identified in FAM#10. CE responded indicating that further drainage repairs were pending the production of rock by the crushing plant to armour ditch lines, and ITM issues are expected to be addressed within this reporting period.	<i>ULR#43</i>
April 12	<i>Email</i>	CE, SES, INX, JEM	Re: FAM #10 - Response from CRT-EBC. CE indicated that a small submersible pump installed with a float switch has been installed at the bottom of the KM49-ditch line near the laydown to pump turbid water to vegetation. The pump and sump will remain in place until rock armouring is installed to protect against erosion of the ditch line and provide sediment retention.	<i>ULR#43</i>
April 13	<i>Email and phone</i>	SES, CE, Snowline Safety & Construction, INX	Re: Upper Truckwash Mountain Goat UWR Noise Monitoring Station. The IEM sent an email to the contractor regarding exceedances of noise thresholds associated with avalanche control measures (<i>i.e.</i> helicopter, blasting). Identified exceedances were the result of avalanche control blasting at ULN21. A total of 5 X 13.5 kg blasts were performed but only 3 triggered noise level threshold exceedances. As increased mitigation, charge weights were reduced for all further blasts at this location to 13.5kg from the previous 20kg weights previously used. The IEM is currently satisfied with the level of mitigation employed by Snowline Safety and Construction to reduce noise levels to the extent practicable.	-
	<i>Emails</i>	SES, CE, INX	Re: Wildlife sightings log, spring bears, mountain goat migration corridor sign. The IEM sent an email to CE highlighting the following items: use of the Wildlife Sighting Log; grizzly bear sightings,	<i>ULR#49 – Closed Tracked in</i>

Date	Communication Type	Participants	Issues Discussed	ITM ID No.
			reporting and importance of waste management practices; the damaged mountain goat migration corridor sign at KM44; and, the assessment of potential impacts to the mountain goat UWR replacement habitat near the ULRHEF downstream portal. CE responded the same day via email indicating completed action items or progress on the issues of concern.	<i>Section 4.6</i>
April 14 & 15	<i>Email</i>	SES, CE, INX, JEM	Re: Excavation of the ULRHEF and the infiltration ponds. The IEM issued an email to CE indicating that the sediment treatment ponds at the ULRHEF powerhouse were not holding water and that water was seen piping out the roadside slope resulting in erosion. As the ponds were not functioning as intended, the IEM issued a verbal Stop Work Order specific to the pumping of water from the powerhouse tailrace excavation to the ponds. CE immediately turned off the pumps resulting in a temporary exceedance of turbidity measured within the mixing zone of the Lillooet River. It was acknowledged in the email that CE intends to alter the function of the treatment ponds from an infiltration capacity to a detention pond capacity. The IE followed up with a request indicating that sign-off on the stability of the pond slopes from a QP must be provided prior to re-commissioning of the ponds. The IEM sent an update email on April 15, clarifying that the IEM has no objection to the continued excavation at the ULRHEF tailrace provided that no sediment laden water is generated and pumped directly to the Lillooet River.	<i>ULR#53</i>
April 14 & 18	<i>Email</i>	INX, CE, SES	Re: ULHP Road & Water Management Issues Identified by MFLNRO. INX emailed CE as a follow-up to an email received by INX from MFLNRO concerning FSR-related drainage issues within the first 100m of the Pebble Creek Mainline Road (aka camp road), and along the Lillooet River FSR ditch line at KM41.2. The IEM reviewed the email and provided initial recommendations to be considered in CE's response. CE issued an email response on April 18 regarding the history and status of the ditch line at KM41.2, and the improvements completed along the Pebble Creek Mainline Road.	<i>ULR#52</i>
April 15 & 16	<i>Email & phone</i>	CE, SES, INX	Re: ULRHEF Tailrace Excavation. CE provided the IEM and INX with additional mitigation measures proposed in order to continue excavation in the northeast corner of the tailrace prior to developing and implementing a new strategy around water treatment. The IEM agreed to the altered mitigation associated with these works provided WQ objectives could be maintained.	-
April 17	<i>Email</i>	SES, CE, INX	Re: Level 3 Mountain Goat disturbance – April 16, 2016. The IEM notified CE that level 3 disturbance behavior was observed in three goats located within UWR UL-11. The IEM indicated that CE must revise blast mitigation measures in an effort to prevent future disturbances to mountain goats (e.g. smaller charge weights, fewer holes per blast, more delays	-

Date	Communication Type	Participants	Issues Discussed	ITM ID No.
			per blast, more blast mats, etc.) prior to future blasts at the ULRHEF intake area (i.e. BEBO wall). CE responded indicating that charge weights per blast will be reduced, stemming will be done in every blast hole, and as always, blast mats will be utilized.	
April 18	<i>Email</i>	SES, MFLNRO, INX, Ecofish, CE	Re: Level 3 Mountain Goat disturbance – April 16, 2016. A notification on a level 3 mountain goat disturbance (hyper-vigilance) was reported to MFLNRO.	-
	<i>Email</i>	CE, SES, INX	Re: pH Treatment ULR Tailrace Concrete Works. CE provided mitigation measures to be implemented during the first concrete pour at the ULRHEF tailrace. The IEM approved the mitigation measures to be implemented, with the caveat that should water quality exceed BCWQGs that all pumps would be turned off.	-
April 21	<i>Email, memo</i>	CE, SES, INX Ecofish	CE distributed a memo prepared by their QP (Ecofish) detailing recommendations for the repairs to three ASTR-04 crossings and providing guidance on falling trees and clearing the BDRHEF spoil area expansion.	-
	<i>Site inspection</i>	SES, JEM, INX, CE	The IE and IEM completed joint inspection of all active works areas.	-
April 22	<i>Email</i>	SES, CE, INX	CE distributed photos of maintenance of the ULRHEF downstream tunnel portal active water treatment system that was completed following the observation of an exceedance of BCWQGs noted by the IEM earlier on April 21, 2016. See section 4.3 for further details.	-
April 22	<i>Pre-work meeting</i>	SES, CE, INX	A pre-work meeting was held to review the work plan for the trenching and permanent conduit installation in the BDRHEF intake access road outside of the UWR 500m buffer and below the locked gate. The specifics surrounding trenching near road culverts and the requirement for CTF salvage and IEM monitoring for any activity involving water management were reviewed in detail.	-

3.0 Current Work Restrictions and Timing Windows

The table presented below outlines work restrictions applicable during the reporting period for each active Project component location:

Component	Location	Wildlife/Archeology Concern	Construction/Timing Restrictions & Mitigations
Lillooet River FSR & ULRHEF	Access roads above the lower limit of the 200m buffer Truckwash Creek Migration Corridor to the ULRHEF intake	Mountain Goat UWR & Migration Corridor	<p>Noise monitoring equipment is in place to monitor background noise levels and exceedances of the 75dbA noise level maximum resulting from blasting activities. Adaptive drilling/blasting noise mitigation strategies will be developed and implemented should activities show persistent exceedances of the noise level threshold.</p> <p>Mountain Goat monitoring activities will occur daily throughout the winter and spring (November 1 – June 15) when construction activities are occurring at the ULRHEF lower tunnel portal and/or the ULRHEF intake.</p> <p>If a mountain goat is observed within 500m line of sight of construction operations, construction must cease for at least 48 hours. The IEM must record and submit all goat observations to FLNR within 48 hours.</p>
BDRHEF intake	Portion of intake access road and crane pad within UWR	Mountain Goat UWR	<p>During winter months (November 1 – April 30), access to BDRHEF intake must be gated at least 500m from UWR to restrict motorized use within the UWR, unless otherwise directed by MFLNRO.</p> <p>If a mountain goat is observed within a 500m line of site of a construction activity within UWR u-2-002 UL 12, construction activities will cease for at least 48 hours. Approval from the IEM must be obtained prior to recommencing construction activities.</p>

4.0 Upper Lillooet River HEF – Monitoring Results

4.1 Construction Camp, KM38 Laydown, Access Roads & Lillooet River FSR

Activities:

- Routine maintenance of construction equipment within the mechanic shop and fuel management continued at the KM38 laydown. All hazardous substance materials (waste oil, contaminated soil, used oil/hydraulic fluid containers, etc.) were stored temporarily for off-site disposal in a designated area at the laydown. The materials were all well contained and protected from the weather.
- On April 15, CE installed a culvert on the Pebble Creek Mainline Road to prevent runoff from the camp road from eroding the road and to address road drainage concerns presented by MFLNRO via email to INX. On April 18, the IEM inspected the culvert installation and found

deficiencies, which included oversized riprap used to armor the culvert inlet (Photo 1); the outlet of the culvert was perched approximately 1 meter above the slope (Photo 2), and inadequate armoring of the culvert outlet (Photo 2). SES requested these deficiencies to be rectified. This issue is tracked as ITM ULR#52.

Environmental Summary:

- On April 12, MFLNRO emailed INX presenting concerns regarding substantial flow in the roadside ditch between KM42.5 and KM41.5 of the Lillooet River FSR. On April 18, CE indicated that they would review the permanent drainage plan for the area and distribute a plan to the IE, IEM, and INX for approval once the permanent design is prepared. The drainage does not currently present significant risk to the environment; however, the concern will be tracked until a permanent drainage plan is presented.

Photos:



Photo 1 – Over-sized riprap on slope above culvert inlet (April 18, 2016).



Photo 2 – Perched culvert with inadequate outlet armoring (April 18, 2016).

4.2 Intake (North & South Sides), and Upstream Tunnel Portal

Construction Activities:

- Grout injection operations and canopy tube instillation at the ULRHEF upstream tunnel portal continued from April 10-23, 2016 (Photo 3).
- Rock hammering and blasting for BEBO (precast arch) wall construction occurred throughout the monitoring period (Photo 3 & Photo 4).
- Rebar, formwork, and concrete works continue on the intake structure throughout the monitoring period (Photo 5).

Environmental Summary:

- During grout injection, and tunnel excavation rounds in the upstream tunnel, all seepage water was directed to the ULRHEF intake sediment basins for treatment (Photo 6). CE's environmental management team ensured that the active treatment system was functioning and well maintained.

- On April 16, mountain goats on the north slope adjacent to Keyhole falls (UWR UL-11) displayed level 3 disturbance behaviour in response to a blast for the BEBO (precast arch) wall excavation. No evidence of disturbance behaviour has been noted during prior blasts. In communication with the IEM, CE agreed to implement additional blast mitigation measures for all future BEBO (precast arch) wall blasts, including smaller charge weight, fewer holes per blast, longer delays per blast, blast hole stemming, and the use of additional blast mats to muffle the sound. These mitigation measures were implemented and followed subsequent blasts, and no mountain goats disturbance behaviour was observed. .
- The ULRHEF upstream tunnel portal water treatment system was functioning properly during this monitoring period and no environmental issues were identified (Photo 7).

Photos:



Photo 3 – ULR Upstream tunnel portal and BEBO wall excavation (April 10, 2016).



Photo 4 – Blasting at the BEBO wall (April 17, 2016).



Photo 5 – Rebar, formwork, and concrete works at the ULHEF intake (April 18, 2016).



Photo 6 – Pond 6 and 7 of ULR upstream tunnel portal treatment system (April 17, 2016).



Photo 7 – Discharge of ULRHEF upstream tunnel water treatment system (April 16, 2016).

4.3 *Downstream Tunnel Portal*

Construction Activities:

- Drilling, blasting, mucking and stabilization works (shotcrete application) within the tunnel.
- Removal of snow and sediment plowed into mountain goat UWR replacement area at lower portal parking area (Photo 8).
- Maintenance and sediment removal from the active water treatment system at installed at along the penstock access road (Truckwash 2 road; Photo 9).

Environmental Summary:

- Water quality discharged from the downstream tunnel portal water treatment system was monitored daily for compliance with BCWQG. Water quality at the mixing zone of ASTR – 03 remained within BCWQG during this monitoring period with the exception of one event. On April 21, the IEM recorded an exceedance of BCWQGs for turbidity at the mixing point in ASTR-03 (Background in ASTR-03 = 1.41NTU and mixing zone turbidity = 23.7NTU). The exceedance was communicate to CE and it was determined that flocculent injection rates were too high which resulted in the discharge of residual material. CE adjusted the injection rate and turbidity levels of the discharge dropped within 24hours of the initial observation. Additional water quality sampling results are available upon request.
- On April 19, CE began using an excavator to remove snow and sediment that was pushed/plowed into the mountain goat UWR replacement area (Photo 8). Not all material could be removed safely due to the presence of a high voltage powerline. An assessment of impacts to the area will be completed once the snow melts.

Photos:



Photo 8 – Removal of snow and sediment from Mountain Goat replacement area (April 19, 2016).



Photo 9 – Vacuum truck cleaning sediment from the active water treatment system along the penstock access road (April 15, 2016).

4.4 **Powerhouse & Access Road**

Construction Activities:

- Excavation of tailrace behind the natural earth berm at the ULHEF powerhouse.
- Backfill and compaction for tailrace footing.
- Rebar, formwork, and concrete works for the tailrace.

Environmental Summary:

- On April 16 and 17th, the IEM was onsite full time to monitor water quality during excavation of the tailrace behind the earth berm and backfill works (Photo 10). Water quality samples were collected at 15 minutes interval throughout the work to ensure that the excavation did not affect water quality within the clean water sump or cause unmitigated water quality exceedance in the Lillooet River. Water quality in the Lillooet River remained within BCWQGs throughout the work. See Section 4.5 for detailed water quality results.
- On April 21, CE poured the northwest tailrace footing. A recirculating CO₂ bubbler was installed within the clean water sump (Photo 11), a sand bag berm placed, and a pre-pour inspection of the formwork was completed as precautionary measures prior to the pour. The IEM was onsite prior to the pour to inspect the sump and observed no gaps in the formwork. Additional bracing was installed to shore the formworks prior to the pour. No concrete or wash water was observed near the clean water sump and water quality in the sump and Lillooet River remained unaffected. Water quality sampling results are available upon request.



Photo 10– Concrete pour for the ULRHEF tailrace footing (April 21, 2016).



Photo 11 – Tailrace footing at ULRHEF powerhouse behind the natural earth berm (April 21, 2014).

4.5 Water Quality Results

The following table presents the results of the routine WQ sampling program for the ULRHEF. The IEM is undertaking a weekly monitoring program according to the conditions outlined in the Surface Water Quality Protection Plan. The regular monitoring sites have been selected to quantify WQ conditions within the Lillooet River upstream and downstream of active construction areas. The IEM acknowledges the natural variability of instream WQ conditions in the Lillooet River due to seasonal fluctuations in snowmelt. In the event that an exceedance of *in-situ* WQ (turbidity and/or pH) is deemed to be caused by project-related activities, the IEM will highlight the exceedance, discuss the cause, and outline measures undertaken by the Contractor to correct the issue. When an exceedance cannot be attributed to project related activities, the exceedance will be marked by an asterisk (*). The table also presents the results of WQ sampling collected at both the ULRHEF intake and downstream tunnel portal water treatment systems.

Date	Time	Sample Location Description	pH	Turbidity (NTU)	Cond (µS)	Temp (°C)
Routine Water Quality						
April 13, 2016	10:30	ULR Background – ULRHEF Intake	7.33	9.3	80	5.6
	12:44	ULR #0.5 – Downstream of ULRHEF intake at Keyhole Bridge	7.34	10.07	76	4.6
	9:50	ULR # 1 – Upstream of ULRHEF Powerhouse	7.89	14.7	80	3.9
	16:33	ULR #2 – Downstream of ULRHEF Powerhouse between KM 40.5 and KM 41	6.95	11.7	84	6.2
	15:37	ULR #3 – Lillooet River FSR KM 38 Laydown – D/S of Boulder confluence	6.67	8.26	78	5.6
	14:55	ULR #4 – Lillooet River FSR KM 24 – D/S of all works and Meager confluence	6.8	9.88	89	6.8
April 18, 2016	12:45	ULR Background – ULRHEF Intake	7.50	15.8	-	5.5
	13:35	ULR #0.5 – Downstream of ULRHEF intake at Keyhole Bridge	7.69	21.3	-	5.5
	16:35	ULR # 1 – Upstream of ULRHEF Powerhouse	7.74	21.3	-	6.5

Date	Time	Sample Location Description	pH	Turbidity (NTU)	Cond (µS)	Temp (°C)
	16:45	ULR #2 – Downstream of ULRHEF Powerhouse between KM 40.5 and KM 41	7.50	22.7		7
	17:31	ULR #3 – Lillooet River FSR KM 38 Laydown – D/S of Boulder confluence	7.54	29.1	-	7.5
	19:33	ULR #4 – Lillooet River FSR KM 24 – D/S of all works and Meager confluence	7.28	78.3	-	7

Water Quality for Specific Works						
Date	Time	Sample Location Description	pH	Turbidity (NTU)	Cond (µS)	Temp (°C)
ULHEF Powerhouse Tailrace excavation and backfill						
April 16, 2016	08:44	Background (ULR # 1 upstream of the ULHEF powerhouse)	-	9.46	-	-
	08:58	Downstream from clean water sump discharge to the Lillooet River (~17 meters)	-	7.98	-	-
	09:13		-	7.53	-	-
	09:28		-	7.86	-	-
	09:43		-	8.49	-	-
	09:50	Background (ULR # 1 upstream of the ULHEF powerhouse)	-	7.85	-	-
	09:58	Downstream from clean water sump discharge to the Lillooet River (~17 meters)	-	8.65	-	-
	10:13		-	7.98	-	-
	10:28		-	7.77	-	-
	10:43		-	7.61	-	-
	10:58		-	7.29	-	-
	11:13		-	9.09	-	-
	11:28		-	8.40	-	-
	11:43	-	8.74	-	-	
	11:58	-	8.55	-	-	
	12:08	-	9.89	-	-	
	12:13	-	8.10	-	-	
	15:00	Background (ULR # 1 upstream of the ULHEF powerhouse)	-	8.35	-	-
	15:28	Downstream from clean water sump discharge to the Lillooet River (~17 meters)	-	12.3	-	-
	15:36		-	8.99	-	-
	15:43		-	8.41	-	-
	15:58		-	7.65	-	-
16:13	-		9.99	-	-	
16:28	-		14.3	-	-	
16:43	-		12.1	-	-	
16:58	-		11.7	-	-	
18:25	-	8.23	-	-		

Water Quality for Specific Works						
Date	Time	Sample Location Description	pH	Turbidity (NTU)	Cond (µS)	Temp (°C)
April 17, 2016	07:52	Background (ULR # 1 upstream of the ULHEF powerhouse)	-	8.59	-	-
	08:02	Downstream from clean water sump discharge to the Lillooet River (~17 meters)	-	9.85	-	-
	08:17		-	8.60	-	-
	08:32		-	9.64	-	-
	08:47		-	8.32	-	-
	09:02		-	8.02	-	-
	09:17		-	8.38	-	-
	07:32		-	11.8	-	-
	09:48		-	7.46	-	-
	10:02		-	8.76	-	-
	10:17		-	7.92	-	-
	10:32		-	8.39	-	-
	10:47		-	9.47	-	-
	11:02		-	7.8	-	-
	11:17		-	7.71	-	-
	11:32		-	8.50	-	-
	11:47		-	8.35	-	-
	12:02		-	8.29	-	-

4.6 Recommendations

ITEM recommendations for the ULRHEF are as follows:

- All water from the ULRHEF upstream tunnel heading should be conveyed to the sediment basins for treatment. CE should perform regular monitoring to ensure that the water treatment system is functioning as intended and that discharge to the Lillooet River continues to meet BCWQGs.
- CE should regularly monitor the new water treatment system installed to treat water emanating from the downstream tunnel to ensure the system is functioning as intended and that discharge into ASTR-03 (non-fish bearing and non-CTF) continues to meet BCWQGs. The water treatment system capacity should be regularly assessed to ensure the system can handle the necessary volumes of water and to prevent discharging process water above BCWQGs offsite. An assessment of the Lillooet River Trail should be performed to determine the extent of erosion caused by water discharging offsite once the snow melts from the area.
- CE should continue to remove deposited material within the mountain goat UWR replacement area, as the snow melts. Once CE has removed as much of the deposited material as possible, and the snow is fully melted, the area should be inspected by a QP to determine what remedial actions are needed (ITM ULR#49; FAM#11).

4.7 *Upcoming Works*

The following new and/or environmentally sensitive construction activities are scheduled to occur at the ULRHEF:

- Canopy tube installation, umbrella lattice structure installation, grout injection, drilling, and blasting in class 4CT material will continue at the ULRHEF upstream tunnel portal.
- Drilling, blasting and tunnel stabilization at the ULRHEF downstream tunnel heading.
- Dewatering to the ULRHEF intake sediment basins will continue.

5.0 **Boulder Creek Hydroelectric Facility – Monitoring Results**

5.1 *Access Road, Intake & Diversion Tunnel*

Construction Activities:

- Trenching and permanent conduit installation in the BDRHEF intake access road outside of the UWR 500 m buffer and below the locked gate (Photo 12 & Photo 13).

Environmental Summary:

- No environmental issues were observed or reported during the trenching and permanent conduit installation on the BDRHEF intake access road during this reporting period.

Photos:



Photo 12 – Trenching for conduit installation in the BDRHEF intake access road outside of the UWR 500m buffer (April 22, 2016).



Photo 13 – Conduit installation in the BDRHEF intake access road outside of the UWR 500m buffer (April 22, 2016).

5.2 *Downstream Tunnel Portal and Powerhouse*

Construction Activities:

- Drilling, blasting and tunnel stabilization in the downstream tunnel portal.
- Electrical component installation in the BDRHEF powerhouse (Photo 14).

Environmental Summary:

- All wastewater related to the BDRHEF tunnelling works continued to be contained and conveyed to the downstream portal settling ponds for treatment (Photo 15).

Photos:



Photo 14 – Current conditions at the BDRHEF powerhouse (April 21, 2016).



Photo 15 – BDRHEF downstream portal settling ponds (April 21, 2016).

5.3 Water Quality Results

The following table presents the results of the routine WQ sampling program for the BDRHEF. The IEM is undertaking a weekly monitoring program according to the conditions outlined in the Surface Water Quality Protection Plan. The regular monitoring sites have been selected to quantify WQ conditions within Boulder Creek upstream and downstream of active construction areas. The IEM acknowledges the natural variability of instream WQ conditions in Boulder Creek due to seasonal fluctuations in snowmelt. In the event that an exceedance of *in-situ* WQ (turbidity and/or pH) is deemed to be caused by project-related activities, the IEM will highlight the exceedance, discuss the cause, and outline measures undertaken by the Contractor to correct the issue. When an exceedance cannot be attributed to project related activities, the exceedance will be marked by an asterisk (*).

Date	Time	Sample Location Description	pH	Turbidity (NTU)	Cond (uS)	Temp (°C)
Routine Water Quality						
April 13, 2016	-	BDR BG – Upstream of BDRHEF intake *not accessible*	-	-	-	-
	-	BDR #1 – Downstream of BDRHEF intake *not accessible*	-	-	-	-
	16:12	BDR #2 – Upstream of BDRHEF Powerhouse	6.89	1.72	65	5.3
	15:50	BDR #3 – Downstream of BDRHEF Powerhouse at Pebble Creek Bridge	6.78	1.81	65	5.1

Date	Time	Sample Location Description	pH	Turbidity (NTU)	Cond (uS)	Temp (°C)
Routine Water Quality						
April 19, 2016	-	BDR BG – Upstream of BDRHEF intake *not accessible*	-	-	-	-
	-	BDR #1 – Downstream of BDRHEF intake *not accessible*	-	-	-	-
	16:45	BDR #2 – Upstream of BDRHEF Powerhouse	7.58	23	-	6.5
	17:13	BDR #3 – Downstream of BDRHEF Powerhouse at Pebble Creek Bridge	7.54	25.7	-	6.5

5.4 Recommendations

IEM recommendations for the BDRHEF are as follows:

- All wastewater related to the BDRHEF tunnelling works should continue to be contained and conveyed to the downstream portal settling ponds for treatment. Regular inspections of the treatment ponds should be performed to ensure the necessary maintenance activities outlined in the work plan are performed.

5.5 Upcoming Works

The following new and/or environmentally sensitive construction activities are scheduled to occur at the BDRHEF once the work areas are re-opened in 2016:

- BDRHEF downstream portal tunnelling works will continue.
- Electrical component installation will continue at the BDRHEF powerhouse.
- Trenching and permanent conduit installation will continue on the BDRHEF intake access road outside of the 500m UWR buffer and below the locked gate.

6.0 Transmission Line – Monitoring Results

6.1 Transmission Line Construction Activities

- No activities occurred on the TX Line during this reporting period.

7.0 Wildlife Sightings

As per the CEMP, a wildlife sightings record has been implemented and will be updated regularly by Project Personnel. It is mandatory for all personnel to report wildlife sightings including, but not limited to bears, cougars, mountain goats and deer. Wildlife sighting will be reported and recorded by the contractor(s). Wildlife Observation forms will be included in first reporting period following month end. Observation or detection of the following species will trigger notification to identified parties according to the following table.

Species Observed or Detected	Notification Period	Agencies to be Notified
Northern rubber boa	Immediately	IEM, Owner
Grizzly bear	24hrs	IEM, Safety Officer, Conservation Officer, Owner
Wolverine den	24hrs	IEM, MFLNRO, Owner
Spotted owls	24hrs	IEM, MOE, Owner
Mountain goats	48hrs	IEM, MFLNRO, Owner

8.0 Mountain Goat Monitoring Program

The following mitigation measures related to mountain goats were implemented during this monitoring period:

- Access to the BDRHEF intake is gated and will now be locked fulltime to restrict motorized use within the UWR until April 30, 2016.
- Noise level monitoring data continued to be collected and used to adaptively manage construction noise and ensure that the 75db noise level threshold is not exceeded as outlined in the Mountain Goat Management Plan. The noise monitoring equipment was removed on December 15 and will be re-installed when works resume in 2016.
- The IEM or designate was on site to monitor Mountain Goat activity within 500m of construction activities at the ULRHEF intake and the ULRHEF downstream tunnel portal. Mountain goats were monitored from four sites:
 - Truckwash Creek viewing river right of the Migration Corridor– MG-OBS01 (10U 467955 5612773):
 - Keyhole Falls viewing the south side u-2-002 UL11 – MG-OBS02 (10U 466593 5613988); and,
 - Garibaldi Pumice mine site viewing u-2-002 UL 19 – MG-OBS03 (10U 467388 561408); and,
 - Salal Creek monitoring site viewing u-2-002 UL 8 – MG-OBS04 (10U 466133 5613991).

Monitoring effort was split between all sites during daylight hours, unless safety concerns or weather conditions interfered. The order of site visits rotated daily. Construction activities must cease if (a) goat(s) is/are observed moving towards the ULRHEF intake and/or if (a) goat(s) are observed within a 500m line of site of a construction activity. No goats were observed within 500m line of sight of construction activities and no work stoppages were required.

9.0 Environmental Issues Tracking Matrix (ITM)

9.1 Hydroelectric Facilities (ULRHEF & BDRHEF)

ITM Tracking Legend:		Work Item Open		Work Item Complete		Issue Closed	
Issue Tracking		Environmental Issue		Mitigation Measures			
ID No.	Status	Location	Issue Description	Action Taken/Recommended	Date of Identification	Targeted Date for Completion	Date Completed
ULR#43	CLOSED	Road Drainage along the Lillooet River FSR between KM44.5 – KM49	Road run-off caused by rain and snowmelt is not being directed to roadside ditches and is eroding the running surface/contributing sediment to watercourses.	<ol style="list-style-type: none"> 1. Address road drainage concerns between KM47.5 and KM48 to prevent further turbid water inputs to the fish-bearing stream at KM48. Update: CE installed a temporary cross-ditch to divert water away from the watercourse on February 19. 2. Address road drainage concerns between KM44.5 - KM46 and along the ULRHEF downstream tunnel portal access road to prevent further turbid water inputs to Truckwash Creek. March 6: A ditch and cross ditching has been installed along the downstream tunnel portal access road and drainage is being directed to the ditch, oil/water separator and water treatment system. 3. Address road drainage concerns between KM48 and KM49 to prevent further turbid water inputs to the Lillooet River at Keyhole Bridge. Update: March 6 CE has installed a sump adjacent to the Keyhole Bridge; however turbid water discharge at this location continues to result in exceedance of the BCWQGs. Update March 16 – The IEM issued FAM#10 to address this outstanding concern. Ditch armoring remains outstanding and turbid water continues to discharge to the Lillooet River during period of heavy rain or increased snowmelt. April 9: Ditch armoring remains outstanding. Update April 14, 2016: CE has armoring ditch lines between KM48.5 to KM49 	February 19, 2016	February 26, 2016	April 14, 2016
ULR#50	OPEN	ASTR04 Woodbox Culvert at penstock access road crossing	A failure of the outside edge of the road has occurred and the whole woodbox structure appears to be compromised. Water is now ponding on the upstream side of the crossing.	Assess the woodbox culvert and develop a plan to replace it with QP designed crossing structure during the instream work window or according to the recommendations of a QP if it has been compromised.	April 7, 2016	April 21, 2016	-

Issue Tracking		Environmental Issue		Mitigation Measures			
ID No.	Status	Location	Issue Description	Action Taken/Recommended	Date of Identification	Targeted Date for Completion	Date Completed
ULR#51	OPEN	Woodbox Culvert at KM41.2 of the Lillooet River FSR	The watercourse over topped the woodbox culvert requiring emergency works to install an additional culvert next to the woodbox to handle the additional flow. The woodbox culvert may have been compromised by the additional flows and the temporary culvert installed as an emergency measure may need to be extended.	Assess the woodbox culvert and develop a plan to replace it with QP designed crossing structure during the instream work window or according to the recommendations of a QP if it has been compromised.	April 8, 2016	April 22, 2016	-
ULR#52	OPEN	Pebble Creek Main Road & KM42.5 to KM41.5 of the Lillooet River FSR	<ol style="list-style-type: none"> The first 100m of the Pebble Creek Main Road, where it leaves the camp road, is quite eroded - cut slope, road surface and fill are damaged. MFLNRO is concerned with the substantial amount of flow in the ditch between KM42.75 & KM41.5 of the Lillooet River FSR. 	<ol style="list-style-type: none"> Protect slopes from erosion caused by run-off from the camp road ditch line and install an appropriate permanent crossing structure where the road surface has been eroded. Once completed repair the road surface as needed. Update April 18, 2016 – Installed culvert and armouring was not executed according to best management practice and requires repair work before the IEM considers the repairs completed to the Forest Road Engineering Guidebook, CEMP and EPPs. Assess drainage patterns in this section to ensure ditch lines and crossing structures are appropriately sized to accommodate additional flows now that two previously installed road crossing structures have been removed to accommodate the penstock installation. Update April 18 – CE indicated that they will be reviewing the permanent drainage plan in this area and will distribute the plan to the IE, IEM, and INX for approval once the permanent design is finalized. 	April 12, 2016	April 26, 2016	-
ULR#53	OPEN	ULRHEF tailrace excavation water treatment ponds	On April 14, 2016 the IEM directed CE to cease pumping to the ULRHEF tailrace excavation water treatment ponds as significant piping out of the side walls was observed.	Provide the IE with confirmation from a QP on the stability of the ponds as well as sign-off from a QP on the design of the ponds for the purposes of sediment retention prior to resuming their operation.	April 14, 2016	April 21, 2016	-
<i>No outstanding environmental issues (next ITM – BDR#28 & ULR#54)</i>							

9.2 Transmission Line

ITM Tracking Legend:	<i>Work Item Open</i>							
	<i>Work Item Complete</i>							
	<i>Issue Closed</i>							
Issue Tracking		Environmental Issue			Mitigation Measures			
ID No.	Status	Location	Issue Description	Action Taken/Recommended	Date of Identification	Targeted Date for Completion	Date Completed	
<i>No outstanding environmental issues (next ITM – Tx#3)</i>								