Upper Lillooet Hydro Project

Weekly Environmental Monitoring Report #100

Reporting Period: July 31 - August 13, 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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Owner Construction Permits and Approvals

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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 & Modification Agreement (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)
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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. 349424 (Renewal 2) 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 Section 7 Explosives Act - Magazine Licence (U76018) Renewal April 30, 2016

ACRONYMS:

AMBNS	Active Migratory Bird Nesting Survey	HWM	High water mark
Andritz	Andritz Hydro Canada Inc.	IE	Independent Engineer (True North Energy)
ANFO	Ammonia nitrate fuel oil (industrial explosive)	IEM	Independent Environmental Monitor
ARD M/L	Acid Rock Drainage and Metal Leaching	INX	Innergex Renewable Energy Inc.
BCEAO	British Columbia Environmental Assessment Office	ISW	Instream Works
BCCOS	British Columbia Conservation Officer Service	ITM	Environmental Issue Tracking Matrix
BCWQG	British Columbia Water Quality Guidelines	JEM	JEM Energy Ltd. (Delegate Independent
BDRHEF	Boulder Creek Hydroelectric Facility		Engineer)
BEBO	ULRHEF Intake Concrete Arch & Foundation Wall	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	· ·
EAO	Environmental Assessment Office	SES	Riparian Vegetation Management Area Sartori Environmental Services
Ecofish	Ecofish Research Ltd.	SLRD	
Ecologic	Ecologic Consulting	_	Squamish-Lillooet Regional District
EIR	Environmental Incident Report	TX Line	Transmission Line
ESC	Erosion and Sediment Control	ULRHEF	Upper Lillooet Hydroelectric Facility
FAM	Field Advice Memorandum	UWR	Ungulate Winter Range
FSR	Forest Service Road	VC	Valued Component
Golder	Golder Associates	WEL	Westpark Electric Ltd.
GWR	Mountain Goat Winter Range	WEMR	Weekly Environmental Monitoring Report
Hedberg	Hedberg and Associates Ltd.	WHA	Wildlife Habitat Area



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
July 31 – August 6, 2016	SE, MC, SS	Construction Camp, Laydown Areas and the Lillooet River FSR Road maintenance on the Lillooet River FSR (ditching from KM44,7 – 45.5) Conduit installation from KM46.5 – 48.5 ULRHEF Intake & Upstream Tunnel Installation of stop logs Preparations for cofferdam removal Tunnel breakthrough ULRHEF Downstream Tunnel Orilling, blasting, shotcrete and tunnel stabilization Concrete works (water protection wall and slab) Tunnel breakthrough ULRHEF Perstock Welding and coating works Backfill, compaction and reclamation Rebar and formwork at Truckwash Creek crossing ULRHEF Powerhouse & Tailrace Mechanical and electrical works Concrete works (tailrace, penstock/manifold) Tailrace excavation, rip rap placement (in the dry) BDRHEF Intake & Upstream Tunnel Portal Rebar and formwork Concrete works (superstructure) BDRHEF Downstream Tunnel Portal Rebar and formwork Concrete works (superstructure) BDRHEF Powerhouse & Tailrace (above the HWM) Electrical work Rip-rap placement (tailrace) Concrete works (tailrace rip-rap grouting) TX-Line Segment 9a Pole framing and pole placement via helicopter Segment 91 Pole placement via helicopter Ground preparations Segment 11 Bunchit of the proparation Pole placement via helicopter Segment 12 Timber management (Hoe-chucking and RoW timber removal) Burying of debris piles Ground preparation (including blasting) Anchor drilling



Perso	Key Monitoring Locations & Activities
	 Construction Camp, Laydown Areas and the Lillooet River FSR Road maintenance on the Lillooet River FSR
	 Conduit installation KM46.5 – 48.5 and capping
	ULRHEF Intake & Upstream Tunnel
	Installation of stop logs
	BEBO concrete works
	ULRHEF Downstream Tunnel
	Final lining and rock support (including shotcrete)
	Concrete works (slab)
	Maintenance of primary water treatment system
	ULRHEF Penstock
	Welding and coating works Packfill compaction and reclamation
	Backfill, compaction and reclamation Congrete works (Truckweek Creek sleb and second stage)
	Concrete works (Truckwash Creek slab and second stage) ULRHEF Powerhouse & Tailrace
	Mechanical and electrical works
	Generator delivery
	BDRHEF Intake & Upstream Tunnel Portal
	Rebar and formwork
August 7 – 13, 2016 SE, N	Conduit installation along TX Line alignment between the BDRHEF powerhouse and BDRHEF intake access road
2010	Concrete works (superstructure, stop logs and sluice gate)
	BDRHEF Downstream Tunnel Portal
	Drilling, blasting and tunnel stabilization
	BDRHEF Powerhouse & Tailrace (above the HWM)
	Tailrace rip rap placement and grouting (in the dry)
	Electrical work
	Switchyard installation
	TX-Line
	Segment 9b
	• Framing structures
	Segment 10 • Addressing of deficiencies
	Segment 11
	Pole framing
	Pulling conductors
	Bucking non-merchantable timber, slashing and clearing of re-growth
	Segment 12
	Ground preparation (including blasting)
	Segment 13
	Bucking non-merchantable timber and removing merchantable timber)

IEM Team Personnel: TH – Tom Hicks; SS – Stephen Sims; SE – Stephanie Ellis; MC – Mike Champion



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.
July 31	Email	CE, INX, SES	RE: Tunnel breakthrough - Upper Lillooet Tunnel – CE provided an email summary of mitigation measures to prevent environmental issues during and after tunnel breakthrough scheduled for August 1.	-
August 1	Email	WEL, INX, SES	RE: Bird nesting window – WEL's environmental manager informed the IEM that he conducted several AMBNS surveys, at varying elevations, and did not observe any active nests or breeding behaviour. Based on the August 1, and earlier (July 21 & 27), surveys WEL's environmental manager requested that the 2016 AMBNS season be considered substantially complete, and that future works proceed without AMBNS surveys. The IEM replied to WEL stating that the 2016 nesting bird window is considered complete as of July 31, 2016.	-
	Email	WEL, INX, SES	WEL provided confirmation that the wildfire in Talbots woodlot near Segment 14 (non-project related wildfire) was completely put out by BC wildfire services and Mumleqs. No damages to the TX Line ROW were reported.	-
Email		CE, INX, SES	CE provided confirmation that the ULRHEF tunnel breakthrough occurred successfully and without environmental/water quality issues.	-
August 2	Email	INX, SES, IE	INX forwarded a revised ULR-Tunnel emergency evacuation procedure to be appended to the Landslide Risk Management Plan. The emergency procedure was reviewed with all tunnel personnel and a trial was performed to test the procedure prior to tunnel breakthrough.	-
August 2 – 8	Emails	WEL, INX, Hedberg, SES	Communications regarding the burial of waste wood along the TX Line in areas where burning or chipping was not possible to reduce the fuel hazard. Hedberg (forestry QP) outlined best management practices to be followed surrounding the burial of wood waste and confirmed that a Waste and Residue assessment was completed prior to burying any wood waste along the TX Line. WEL is responsible for collecting burial site location data and for performing the works to minimize fuel hazard as outlined by the QP.	•
August 4	Email	CE, SES, INX	RE: Bird nest Surveys – end of the survey period – CE provided the IEM and INX with an email from their QP (Ecofish) stating that AMBNS surveys are no longer required prior to clearing vegetation.	
August 6	Email	CE, SES, INX	RE: Boulder tailrace work – CE notified the IEM and INX that they would begin placing riprap on the upstream side of the BDRHEF tailrace. The works were not instream, but a portion of the isolation berm will be removed to allow enough room for construction to occur.	-
	Email	CE, INX, SES	RE: Deer at Upper Lillooet Intake – CE notified the IEM and INX that workers observed a panicked fawn run	-



Date	Communication Type	Participants	Issues Discussed	ITM ID No.
			along the ULRHEF intake access road, through the construction site, and jump off of the cofferdam near the obermeyer structure. It is unknown what distressed this fawn, and caused it to jump in the river.	
	Email	CE, SES	RE: Unscheduled pour this morning – CE notified the IEM that there was an unscheduled pour occurring at the BDRHEF tailrace (grouted riprap), the IEM visited site as soon as possible following notification and found no environmental concerns.	-
August 8	Email	CE, INX, SES	RE: CE informed INX and the IEM of their intent to install a drainage culvert near a conduit pull box at KM45.25. INX informed CE that the design did not appear to follow the requirements of the MFLNRO Works Permit (specifically sections 5 and 6), and that any changes to the approved Works Permit would require MFLNRO's review and approval. Additionally, these works are proposed within 200m of the Truckwash Creek mountain goat migration corridor; INX requested more detail on what effects these works would have on goat migration. The culvert installation did not occur.	-
	Email	WEL, SES	RE: Monitoring Request – 232, 255 Hazard Tree Falling – WEL requested the IEM monitor the felling of hazard trees in segment 10 and felling near structure 255 within in the OGMA.	
August 9	Email C		RE: Trench works under the transmission line – CE notified the IEM that trenching for BDRHEF conduit installation under the transmission lines would begin today.	
	Email	SES, INX, CE	The IEM circulated an update to the ITM highlighting two new issues to be addressed.	ULR#59 and ULR#60
August 10	Email	CE, SES	RE: 2016-08-10 ULHP Leak in pump hose at ULRHEF powerhouse fixed JMP.JPG – CE provided the IEM with a photo showing the repair of the leaking 10" hose from the clean water sump at ULRHEF powerhouse.	ULR#59
August 10 & 11	near CTF streams and near structure 232 as works works working the RVMA. The IEM confirmed that monitor will be available for these works.			
August 12	Email	INX, WEL, SES	RE: Structure 140 access and reinforcement work plan – INX provided WEL and the IEM with the LTC for reinforcement works at structure 140.	



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
All Project Areas	TX Line, ULRHEF, & BDRHEF	Active Migratory Bird Nesting Period	AMBNS must occur prior to clearing vegetation in all Project areas according to the survey schedule and methods outlined in the Project's Active Migratory Bird Nest Survey Plan during the nesting period (May 1 – July 31). All nests identified as active must be protected by a no disturbance buffer until the nest is no longer deemed to be active by a QP (buffer distances vary by species and location; further details are provided in the AMBNS Plan).
	ULRHEF intake & tailrace, BDRHEF tailrace, and fish accessible tributaries of the Lillooet River	Reduced Risk Project Specific Instream work windows for the protection of Bull Trout, Cutthroat Trout and Pacific Salmon (Coho, Sockeye), during sensitive life stages	All instream work will be conducted within Project specific timing windows. They are as follows: ULRHEF intake: August 1 – October 31 ULRHEF and BDRHEF powerhouses: July 15 – September 15
Lillooet River FSR, ULRHEF, & BDRHEF intake	Access roads above the lower limit of the 200m buffer to the Truckwash Creek Migration Corridor to the ULRHEF intake, as well as a portion of BDRHEF intake access road and intake structure within UWR u-2-002 UL 12	Mountain Goat UWRs & Migration Corridor	If a mountain goat is observed within 500m line of sight of construction operations, construction must cease for at least 48 hours. Approval from the IEM must be obtained prior to recommencing construction activities, and the IEM must record and submit all goat observations to MFLNRO within 48 hours.
		Mountain Goat UWRs SO-04 & SO-08	If a mountain goat is observed within 500m line of sight of construction operations, construction must cease for at least 48 hours. Approval from the IEM must be obtained prior to recommencing construction activities, and the IEM must record and submit all goat observations to MFLNRO within 48 hours.
TX Line	Segments 8 - 16	Suitable Class 1 & 2 Grizzly Bear forage habitat	IEM monitoring is required when clearing within identified Class 1 & 2 Grizzly Bear forage habitat, to ensure clearing areas are minimized.
		Riparian Vegetation Management Areas (RVMA)	IEM monitoring is required during clearing within RVMAs.
		Ryan River Drainage	Construction of the TX Line into and across the Ryan River drainage will occur during the less critical Grizzly Bear summer foraging period (June 1 – September 1).
		Within 150m of wetlands or 100m of Coastal Tailed Frog Streams	IEM presence is required when clearing within 150m of wetlands or 100m of CTF Streams, to ensure clearing areas are minimized.



4.0 Upper Lillooet River HEF - Monitoring Results

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

Construction Activities:

- CE continued routine fuel management and maintenance of construction equipment within the mechanic shop at the KM38 laydown. CE temporarily stored all hazardous substance materials (waste oil, contaminated soil, used oil/hydraulic fluid containers, etc.) in a designated area at the laydown prior to off-site disposal. The materials were all well contained and protected from the weather.
- CE continued to apply water to the Lillooet River FSR and construction access roads to minimize fugitive dust production throughout the reporting period (Photo 1).
- CE dug trenches to install electrical conduit along the Lillooet River FSR from KM46.5 48.5 (Photo 2).

Environmental Summary:

 During the conduit trench backfill and road reconstruction, the grader pushed a portion of the trenching material over the downslope side of the Lillooet River FSR from KM46.5 – 48 (Photo 3). The material sloughed over understory vegetation, however it did not damage trees. The IEM recommends that this material be pulled off of the slope, where possible, or hydroseeded areas of exposed loose soil to prevent erosion during rain events (ITM ULR#60).

Photos:



Photo 1 – Dust suppression application on the Lillooet River FSR (August 11, 2016).



Photo 2 – Conduit trenching and installation on Lillooet River FSR (July 31, 2016).





Photo 3 – Trenching material pushed to the downslope of the Lillooet River FSR between KM46.5 – 48 (August 8, 2016).

4.2 Intake, Concrete Arch Foundation Walls, and Upstream Tunnel

Construction Activities:

- No activities occurred at the ULRHEF intake from July 31 August 1 or August 12-13, 2016 due to elevated landslide risk according to the conditions of the Landslide Risk Management Plan.
- CE began installation of slop logs, sluice gate, and trash racks at the ULRHEF intake (Photo 4).
- CE began final concrete and shotcrete lining of the ULRHEF tunnel on August 7 and continued through the monitoring period.
- CE continued with BEBO wall formwork and rebar (Photo 5).

Environmental Summary:

- CE relocated the discharge of the active water treatment system to facilitate the removal of the upstream cofferdam (Photo 6). The IEM did not observe any environmental issues associated with these works.
- CE successfully completed tunnel breakthrough on August 1, 2016. After connection, CE poured a dividing wall to ensure that all construction waste water could be treated separately by the upstream and downstream active water treatment systems. After the completion of the wall, CE began final lining of the tunnel including installation of new wire mesh and shotcrete on the roof and sides of the tunnel and the placement of a concrete slab on the floor of the tunnel.
- During concrete slab pours and final tunnel lining in the upstream tunnel, CE directed all seepage water to the ULRHEF intake sediment basins for treatment (Photo 7). CE's environmental management team ensured that the active water treatment system was functioning and well maintained. Additional water quality sampling results are available upon request.



Photos:



Photo 4 – Preparation for sluice gate installation (August 8, 2016).



Photo 5 - ULRHEF upper tunnel portal and BEBO wall (August 2, 2016).



Photo 6 – Discharge of ULRHEF upper active water treatment system relocated upstream of the cofferdam (August 6, 2016).



Photo 7 - ULRHEF upper tunnel water treatment system, pond 7 (August 9, 2016).

4.3 Downstream Tunnel Portal

Construction Activities:

 Final lining and rock stabilization of the ULRHEF tunnel began on August 7, and continued through the monitoring period (Photo 8).

Environmental Summary:

 The IEM monitored the discharge from the active water treatment system for compliance with BCWQG. Water discharged to ASTR-03 did not exceed > 8 NTU above background turbidity during the reporting period. Additional water quality sampling results are available upon request.



CE used the second active water treatment system, at Truckwash Creek, from August 1-2 and 12-13. However, one treatment system was sufficient to treat the volume of water from tunneling activities. The second system will remain in place as a backup, until further notice.

Photos:



Photo 8 - Lower tunnel portal (August 5, 2016).

4.4 Penstock and Truckwash Creek Penstock Crossing

Construction Activities:

- Welding, coating, backfill, and compaction of penstock east of Truckwash Creek (Photo 9).
- Rebar, formwork, and concrete works for the Truckwash crossing protection slab (Photo 10).

Environmental Summary:

 The IEM monitored construction activities throughout the monitoring period and observed no environmental issues.



Photos:



Photo 9 – Backfill and compaction of the penstock east of Truckwash Creek (August 13, 2016).



Photo 10 – Concrete pour for the Truckwash Creek crossing protection slab (August 11, 2016).

4.5 Powerhouse, Tailrace & Access Road

Construction Activities:

- Excavation, rip rap placement, and grouting of rip rap in the ULRHEF tailrace. All works were completed behind the natural earth berm and in the dry (Photo 11 Photo 12).
- Andritz mechanical works in the ULRHEF powerhouse (Photo 13).

Environmental Summary:

- CE continued excavation, rip rap placement, and grouting of rip rap (Photo 11 -Photo 12) throughout the monitoring period. CE conducted all works in the dry, behind the natural earth berm. The IEM did not observe any issues associated with these works.
- On August 10, CE repaired the leaking hose from the 10" clean water sump (Photo 14; *ULR#59*)



Photos:



Photo 11 – Excavation and grouted rip rap at ULRHEF tailrace (July 31, 2016).



Photo 12 – Final pour of the ULRHEF grouted rip rap (August 2, 2016).



Photo 13 – Andritz mechanical works in the ULRHEF powerhouse (August 5, 2016).



Photo 14 – Leaking hose repaired by CE to address ITM *ULR#59* (August 10, 2016).



4.6 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 IEM selected the regular monitoring 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 of an exceedance of *in-situ* WQ (turbidity and/or pH) because of 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, an asterisk (*) will be used to denote it.

Date	Time	Time Sample Location Description		Turbidity (NTU)	Cond (uS)	Temp (°C)
		Routine Water Quality				
	14:37	ULR Background – ULRHEF Intake	7.4	62.1	35	10.5
	14:54	ULR #0.5 – Downstream of ULRHEF intake at Keyhole Bridge	7.6	53.7	35	10.2
	11:29	ULR # 1 – Upstream of ULRHEF Powerhouse	7.6	50.0	48	8.4
August 3, 2016	11:40	ULR #2 – Downstream of ULRHEF Powerhouse between KM 40.5 and KM 41	7.6	48.8	50	7.5
	15:33	ULR #3 – Lillooet River FSR KM 38 Laydown – D/S of Boulder confluence	7.8	35.6	37	9.2
	8:30	ULR #4 – Lillooet River FSR KM 24 – D/S of all works and Meager confluence	7.7	33.9	37	9.0
	12:54	ULR Background – ULRHEF Intake	7.94	49.9	-	9.6
	13:08	ULR #0.5 – Downstream of ULRHEF intake at Keyhole Bridge	7.71	56.6	-	9.5
	13:50	ULR # 1 – Upstream of ULRHEF Powerhouse	7.61	67.6*	-	8.2
August 10, 2016	14:03	ULR #2 – Downstream of ULRHEF Powerhouse between KM 40.5 and KM 41	7.80	57.3	-	8.7
	15;40	ULR #3 – Lillooet River FSR KM 38 Laydown – D/S of Boulder confluence	7.61	45.2	-	10.0
	18:45	ULR #4 – Lillooet River FSR KM 24 – D/S of all works and Meager confluence	7.66	56.0	ı	10.8

4.7 Recommendations

IEM recommendations for the ULRHEF are as follows:

- CE should continue to convey all water from the ULRHEF upstream tunnel heading 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 provide a QP's assessment of the mountain goat UWR replacement area affected by last winter's snow clearing operations (ITM *ULR #49*; FAM#11), and provide recommendations for remediation.



- CE should remove material deposited on the downslope of the Lillooet River FSR between KM46.5 – 48 and hydroseed exposed areas to prevent erosion during fall rains (*ULR#60*).
- CE should perform regular inspections at all parking areas and ensure all spilled fuel and/or oil is cleaned up and disposed of in the proper disposal container, as per the Human-Bear Conflict Management Plan, and Hazardous Materials Management Plan.
- CE should continue to remind crews of proper food and wildlife attractant management, as per the Human Bear and Human Wildlife Interaction Management Plans.

4.8 Upcoming Works

New and/or environmentally sensitive construction activities scheduled to occur at the ULRHEF:

- Final lining, rock support and concrete floor slab of the ULRHEF tunnel.
- Rebar, formwork, and concrete works on the Truckwash Creek protection slab.
- Instream works to connect the ULRHEF tailrace to the Lillooet River.
- Generator installation in the ULRHEF powerhouse.
- Use of the ULRHEF intake sediment basins will continue.

5.0 Boulder Creek Hydroelectric Facility - Monitoring Results

5.1 Access Road & Intake

Construction Activities:

- Formwork, rebar, and concrete works began on the intake and sluiceway structures (Photo 15 Photo 16)
- Conduit trenching on the BDRHEF intake access road and along the Tx Line alignment between the intake access road and the BDRHEF powerhouse.

Environmental Summary:

- The IEM did not observe any environmental issues associated with construction activities at the BDRHEF intake during this monitoring period.
- The IEM monitored the discharge from the active water treatment system for compliance with BCWQG. Water discharged to Boulder Creek did not exceed > 8 NTU above background turbidity during the reporting period. Additional water quality sampling results are available upon request.
- On August 8, 2016, the IEM observed that conduit trenching had blocked the outlet of a
 drainage culvert at KM0.5 of the Boulder Intake access road (Photo 17). The IEM
 requested that CE remove the material blocking the outlet of the culvert and armour it with
 non-erodible material.



Photos:



Photo 15 – Formwork, rebar, and concrete works at BDRHEF intake (August 1, 2016).



Photo 16 – Formwork and rebar at BDRHEF intake (August 9, 2016).



Photo 17 – Culvert outlet blocked by excess conduit trenching material at KM0.5 of the BDRHEF intake access road (August 8, 2016).

5.2 Downstream Tunnel Portal and Powerhouse

Construction Activities:

- Drilling, blasting, and tunnel stabilization in the downstream tunnel portal.
- Excavation, rip rap placement, and rip rap grouting (Photo 18 Photo 19).
- Andritz electrical work in the BDRHEF powerhouse.
- Cleanup of spilled oil at the BDRHEF powerhouse designated parking area (Photo 20; ULR#58).
- BDRHEF switchyard installation (Photo 21).



Environmental Summary:

- CE conveyed all wastewater related to the BDRHEF tunnelling works to the downstream settling ponds for treatment.
- To gain access to the upstream section of BDRHEF tailrace to place and grout rip rap, CE built an access ramp along the edge of the tailrace concrete slab and the bank of Boulder Creek (Photo 22). CE completed all works in the dry, above the high water mark. The IEM monitored the construction of the access ramp and observed no environmental issues during construction.

Photos:



Photo 18 – Placement of rip rap at BRDHEF tailrace (August 8, 2016).



Photo 19 - Grouting riprap at BDRHEF tailrace (August 8, 2016).



Photo 20 – Worker cleaning up oil spills at BDRHEF powerhouse designated parking area (August 9, 2016).



Photo 21 – Construction of the BDRHEF switch yard (August 11, 2016).





Photo 22 – Construction of access ramp at BDRHEF tailrace (August 7, 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 IEM selected the regular monitoring 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 of an exceedance of *in-situ* WQ (turbidity and/or pH) because of 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, an asterisk (*) will be used to denote it.

Date	Time	Sample Location Description	рН	Turbidity (NTU)	Cond (uS)	Temp (°C)
		Routine Water Quality				
	12:54	BDR BG – Upstream of BDRHEF intake	7.94	49.9	-	9.6
August 3,	13:08	BDR #1 – Downstream of BDRHEF intake	7.71	56.6	-	9.5
2016	13:50	BDR #2 – Upstream of BDRHEF Powerhouse	7.61	67.6*	-	8.2
	14:03	BDR #3 – Downstream of BDRHEF Powerhouse at Pebble Creek Bridge	7.80	57.3	-	8.7
	14:39	BDR BG – Upstream of BDRHEF intake	7.79	34.3	-	8.2
August 10,	14:45	BDR #1 – Downstream of BDRHEF intake	7.74	30.6	-	8.2
2016	15:15	BDR #2 – Upstream of BDRHEF Powerhouse	7.57	36.7	-	10.2
	15:25	BDR #3 – Downstream of BDRHEF Powerhouse at Pebble Creek Bridge	7.48	31.2	-	10.1



5.4 Recommendations

IEM recommendations for the BDRHEF are as follows:

- CE should continue to direct all construction related wastewater to the active water treatment systems/settling ponds. CE should continue to monitor the newly constructed settling/infiltration pond to ensure that it remains in good working condition, and preform all maintenance activities as outlined in the work plan. If water begins to discharge from the newly constructed channel, CE should conduct regular inspections to ensure that it meets BCWQG prior to infiltration near or connection to with the Boulder Creek side channel.
- CE should regularly monitor the BDRHEF intake active water treatment system to ensure
 the system is functioning as intended and that discharge into Boulder Creek is within
 BCWQGs. The water treatment system capacity should be regularly assessed to ensure
 the system can handle the necessary volumes of water.
- CE should continue to maintain the BDRHEF intake access road, and continue excavation/maintenance of ditch lines as discussed after the BC EAO site tour on June 9, 2016 and subsequent environmental meetings.
- CE should ensure that all culvert inlets and outlets are free of sediment and other construction related debris and armoured with non-erodible materials.

5.5 Upcoming Works

New and/or environmentally sensitive construction activities scheduled to occur at the BDRHEF:

- BDRHEF downstream tunnelling works will continue.
- Electrical component installation will continue at the BDRHEF powerhouse.
- Rebar, formwork, and concrete works will continue for the Intake structures.
- Instream works to tie in the BDRHEF tailrace to Boulder Creek.
- Switch yard installation will continue.

6.0 Transmission Line - Monitoring Results

6.1 Transmission Line Construction Activities

Construction Activities:

Segment 9

• Pole framing and placement via helicopter throughout the segment.

Segment 11

- Timber management (bucking felled timber, slashing and clearing of vegetative re-growth)
- · Deficiency work and ditch cleaning
- Pole framing and placement via helicopter throughout the segment

Pulling conductors

Segment 12

- Timber management (Hoe-chucking and merchantable timber piling)
- Burying of debris piles
- Ground preparation (including blasting)
- Anchor drilling

Segment 13

Anchor drilling

Environmental Summary:

- On August 10, Mumleqs felled hazard trees near structures 232 and 255 (Photo 23). The IEM monitored these works and did not observe any environmental issues.
- On August 12, Mumleqs began cleaning ditches around structures 230 258 (Photo 24).
 The IEM monitored water quality and observed no impacts to the nearby CTF stream (230a) during these works.

Photos:



Photo 23 – Felled hazard trees and vegetation management in Segment 11 (August 10, 2016).



Photo 24 - Ditch cleaning near structure 230 (August 12, 2016).



6.2 Recommendations

IEM recommendations for the Transmission Line are as follows:

 WEL's Environmental Manager continues to provide regular scheduling updates that permits the IEM to assess environmental risks and coordinate monitoring requirements.
 WEL should continue to provide the IEM with a minimum of 48 hours' notice if IEMs presence is required or expected for construction activities.

6.3 Upcoming Works

New and/or environmentally sensitive construction activities scheduled to occur along the Transmission Line alignment:

Segment 6

Temporary bridge installation and shoring for structure 140

Segment 9

Framing poles

Segment 10

Ditching, spreading piles, pole corrections, and slashing/bucking

Segment 11

Framing poles

Segment 12

- Ground preparation by hand for structures 280 & 282
- Mechanical ground preparation (including blasting) for structures 285 296

Segment 13

Ground preparation by hand for structure 314

Segment 14

Mechanical ground preparation (including blasting) for structures 323-327



7.0 Wildlife Sightings

As per the CEMP, the IEM implemented a wildlife sightings record. Project Personal are required to regularly update the record and it is mandatory for all personnel to report wildlife sightings including, but not limited to bears, cougars, mountain goats and deer. 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

The Owner, Contractors, and IEM team reported the following wildlife sightings in July 2016:

	Upper Lillooet Hydro Project - Wildlife Observation Form						
Date	Time	Observer (Company)	Species or Description	Location	Comments		
7/3/2016	8:30	Gaetan Turgeon	Black bear	Near camp	fleeing		
7/3/2016	11:10	Gabriel	Black bear	KM 46	Mum and 3 cubs		
7/4/2016	8:30	Eric Ayotte	Black bear	KM 1 camp road	juvenile		
7/4/2016	3:45	Lianne Leblond	Black bear	KM 46.5	Mum and 3 cubs		
7/4/2016	16:35	Sheena Wallace	Black bear	KM 37.7	fleeing		
7/4/2016	20:40	Angel Orejas	Black bear	KM 28	fleeing		
7/4/2016	9:40	Angel Orejas	Coyote	KM 42.2	fleeing		
7/4/2016	17:05	Eric Coderre	Black Bear	KM 38.3	fleeing		
7/5/2016	7:20	Zoltan Szarka	Black bear	KM 46	Mum and 2 cubs		
7/5/2016	9:57	Thunder Grandbois	Cougar	41.5 KM FSR	fleeing		
7/5/2016	16:30	Gary	Black bear	0.2KM Camp Road	fleeing		
7/6/2016	11:00	Julien Gagnon	Black Bear	48.5 KM behind spoil pile	fleeing		
7/6/2016	14:00	Eric Coderre	Black Bear	km 46	Young		
7/6/2016	17:00	Maxime Bergeron	Coyote	KM 38 FSR	fleeing		
7/7/2016	11:00	Sheena Wallace	Black Bear	KM 47.5	Juvenile		
7/7/2016	15:00	Stephanie Ellis	Black Bear	Pebble Creek Bridge	Juvenile		
7/8/2016	11:30	Patrick Hubert	Black Bear	KM 46.5	Cinnamon black bear		
7/9/2016	9:05	Claude Lacroix	Moose	KM 42	fleeing		
7/10/2016	18:30	Stephanie Ellis	Coyote	KM 35	On the road		
7/10/2016	12:00	Roger Pelletier	Bald Eagle	Peeble Creek Bridge	fleeing		
7/10/2016	10:00	David Gagnon	Coyote	KM 41.5 FSR	Sitting and observing		
7/11/2016	7:30	Frank (w/ Ross morrison)	Black Bear	KM 47.5	Cinnamon juvenile		
7/11/2016	10:00	Frank (w/ Ross morrison)	Black Bear	KM 47	Two Juvenile blacks on road		



	Upper Lillooet Hydro Project - Wildlife Observation Form						
Date	Time	Observer (Company)	Species or Description	Location	Comments		
7/11/2016	11:00	Stephanie Ellis	Black Bear	KM 47	Cinnamon sow with 1 cub		
7/12/2016	19:00	Chase Reid	Black Bear	KM 47	Juvenile Black Bear		
7/17/2016	7:35	Jean M. Pelletier	Black Bear	KM 46.2	Juvenile Black Bear		
7/18/2016	20:30	Catie Waters	Black Bear	KM 46.2	Juvenile Black Bear		
7/19/2016	14:30	Luc Hudon	Black Bear	KM 46	Cinnamon black bear		
7/21/2016	9:27	Julia Mancinelli	Western Toad	ryan river fsr	near structure 242		
7/22/2016	20:50	Catie Waters	Coyote	KM 38.3	Crossing the road		
7/22/2016	21:00	Martin Allard	Cougar	2 KM Boulder	fleeing		
7/23/2016	15:00	Stephanie Ellis	Black Bear	KM 47	Black bear cub on spur road		
7/24/2016	13:38	Aaron	Black Bear	KM 48	Cinnamon Juvenile		
7/26/2016	17:00	Simon Munneke	Moose	Penstock Astr03	fleeing		
7/26/2016	19:10	Stephanie Ellis	Coyote	KM 0.3 Camp Road	Running on side of road, not afraid		
7/27/2016	11:00	Angel Orejas	Black Bear	KM 39	Ran across road		
7/28/2016	21:20	Claude Lacroix	Black Bear	KM 23	fleeing		
7/28/2016	21:30	Eric	Moose	Truckwash 2	by upper water treatment system		
7/28/2016	5:40	Mick O'Siddhachain	Cougar	KM 42	Female with 2 cubs		
7/28/2016	5:45	Mick O'Siddhachain	Moose	KM 44	fleeing		
7/29/2016	0:05	Catie Waters	Moose	Truckwash 2	by lower water treatment system		
7/29/2016	6:30	Wellie Ferguson	Lynx	KM 41.7	fleeing		
7/29/2016	16:35	Martin Allard	Black Bear	Truckwash Creek	Female with 2 cubs		

8.0 Mountain Goat Monitoring Program

The spring 2016 Mountain Goat Monitoring Program is complete as of June 15, 2016 according to conditions of the Mountain Goat Management Plan. The mountain goat monitoring program will resume in November 2016.

To mitigate potential impacts to mountain goats during the summer months, Construction activities will cease if a mountain goat(s) is (are) observed moving towards the ULRHEF intake and/or if a mountain goat(s) is (are) observed within a 500m line of site of a construction activity. No mountain goats were observed within 500m line of sight of construction activities and no work stoppages were required during this monitoring period.



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		
	OPEN	All work areas	BCEAO Compliance and Enforcement Officer Inspection noted noncompliance with regard to wildlife attractant management.	 Develop, implement and document internal waste and attractant management auditing tool. Tool will be available for use by the IEM and CE's EM Team. Records of inspections and noted noncompliances should be tracked internally with clean-up documented in each report. This tracking tool will be available to agencies upon request. This tool should be used similarly to the Spill Reporting tool currently being employed onsite. Repair and adjust the electric fences and charged entrance mats at 	July 6, 2016	July 9, 2016	July 8, 2016		
ULR#58				the construction camp (perimeter fence, camp kitchen fence, and waste compactor fence) and surrounding the septic field.			July 21, 2016		
				3. Install self-closing door hinges in all site lunchrooms and anywhere food is being stored temporarily (lunch rooms, kitchen storage area) OR adjust how food is transported, stored and consumed onsite to eliminate the possibility of food and food waste attractants onsite.			July 21, 2016		
				Perform maintenance to clean-up grease and liquid waste around and underneath the garbage compactor			July 21, 2016		
				5. Install berms surrounding parking areas that are lined with impermeable fabric in areas where tunneling equipment is parked. All leaks could be considered wildlife attractants; therefore all leaky equipment should be repaired and leaks or spills to ground in parking areas must be cleaned up daily and be disposed of in appropriate contaminated soil bins. Update August 9, 2016: CE continues to park equipment on designated parking areas lined with geotextile. However, equipment parked in these areas continues to leak. CE should ensure that the removal of contaminated soil from parking areas is documented and should continue regular maintenance of the equipment as needed.			-		



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#59	CLOSED	ULRHEF Powerhouse	Maintenance is required on a section of the 10" discharge hose for the clean water sump at the ULRHEF powerhouse. A hole has developed in the discharge hose resulting from normal wear.	1.	The section of hose with a hose should be replaced or patched to prevent enlargement and potential sediment and erosion issues at the ULRHEF.	August 8, 2016	August 14, 2016	August 10, 2016	
ULR#60	OPEN	Lillooet River FSR from 46 – 48 Km	The road fill slope of the Lillooet River FSR between KM46 – KM48 requires ESC measures to ensure slope stability and prevent rill erosion from transporting material into the forested area below.	2.	Assess the road fill slope conditions following conduit installation in the Lillooet River FSR in this section. Provide a plan to protect the slope from an erosion and sediment transport perspective and/or a plan to initiate reclamation of the impacted area.	August 8, 2016	August 16, 2016	-	
			area below.		No outstanding environmental iss	sues (next IT	M – BDR#28	3 & ULR;	

9.2 Transmission Line

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