



Upper Lillooet Hydro Project

Weekly Environmental Monitoring Report #80

Reporting Period: November 15 – 21, 2015

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)

Distribution List		Prepared By
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Owner Construction Permits and Approvals

- Environmental Assessment Certificate No. E13-01 (Amendment 1, 2, 3, 4, 5 & 6)
- 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 No. L49717 (ULRHEF Amendments 1, 2, 3, 4, 5, 6, 7)
 - Occupant Licence to Cut No. L49698 (BDRHEF – KM 38 laydown)
 - Occupant Licence to Cut No. L49816 (BDRHEF Amendments 1, 2, 3)
 - Occupant Licence to Cut No. L49697 (TX Line Amendment 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

ACRONYMS:

AMBNS	Active Migratory Bird Nesting Survey	INX	Innergex Renewable Energy Inc.
Andritz	Andritz Hydro Canada Inc.	ISW	Instream Works
ANFO	Ammonia nitrate fuel oil (industrial explosive)	ITM	Environmental Issue Tracking Matrix
ASMP	Archaeological Sites Management Plan	JEM	JEM Energy Ltd. (Delegate Independent Engineer)
ARD M/L	Acid Rock Drainage and Metal Leaching	LTC	Leave to Construct
BCEAO	British Columbia Environmental Assessment Office	MFLNRO	Ministry of Forests, Lands and Natural Resource Operations
BCWQG	British Columbia Water Quality Guidelines	MOE	Ministry of Environment
BDRHEF	Boulder Creek Hydroelectric Facility	MOTI	Ministry of Transportation and Infrastructure
BG	Background	NCD	Non Classified Drainage
BKL	BKL Consultants Ltd.	OLTC	Occupational License to Cut
CE	CRT-ebc Construction Inc.	PAG	Potentially Acid Generating
DFO	Fisheries and Oceans Canada	ROW	Right of Way
DS	Downstream	RVMA	Riparian Vegetation Management Area
EAC	Environmental Assessment Certificate	SES	Sartori Environmental Services
EAO	Environmental Assessment Office	SLRD	Squamish-Lillooet Regional District
Ecofish	Ecofish Research Ltd.	Stringer Line	Temporary Backfeed Transmission Line
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.	WQ	Water Quality
HWM	High water mark		
IE	Independent Engineer (True North Energy)		
IEM	Independent Environmental Monitor		

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	Weather Conditions	Key Monitoring Locations & Activities
Sunday, November 15	BA, AS	Overcast	<p>Construction Camp, Laydown Areas and the Lillooet River FSR</p> <ul style="list-style-type: none"> • Road maintenance on the Lillooet River FSR and site access roads <p>ULRHEF Intake & Upstream Tunnel Portal</p> <ul style="list-style-type: none"> • Standpipe installation in preparation for tunnel grouting • Dewatering to sediment basins <p>ULRHEF Downstream Tunnel Portal</p> <ul style="list-style-type: none"> • Closed due to Two-week Mountain Goat Shutdown Period <p>ULRHEF Penstock</p> <ul style="list-style-type: none"> • Installation, excavation, fitting and coating works <p>ULRHEF Powerhouse</p> <ul style="list-style-type: none"> • Superstructure construction • Manifold coating <p>BDRHEF Intake Access Ramp and Diversion Tunnel</p> <ul style="list-style-type: none"> • Demobilization of tunneling equipment from diversion tunnel • Cleaning of diversion tunnel floor <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"> • Component installation inside the powerhouse <p>TX-Line</p> <ul style="list-style-type: none"> • No activity
Monday, November 16	SE, AS	Heavy snow	<p>Construction Camp, Laydown Areas and the Lillooet River FSR</p> <ul style="list-style-type: none"> • Snow clearing on the Lillooet River FSR <p>ULRHEF Intake & Upstream Tunnel Portal</p> <ul style="list-style-type: none"> • Standpipe installation in preparation for tunnel grouting • Dewatering to sediment basins <p>ULRHEF Downstream Tunnel Portal</p> <ul style="list-style-type: none"> • Closed due to Two-week Mountain Goat Shutdown Period <p>ULRHEF Penstock</p> <ul style="list-style-type: none"> • Installation, excavation, fitting and coating works <p>ULRHEF Powerhouse</p> <ul style="list-style-type: none"> • Superstructure construction • Manifold coating <p>BDRHEF Intake Access Ramp and Diversion Tunnel</p> <ul style="list-style-type: none"> • Demobilization of tunneling equipment from diversion tunnel • Cleaning of diversion tunnel floor <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"> • Component installation inside the powerhouse <p>TX-Line</p> <ul style="list-style-type: none"> • Segment 12 <ul style="list-style-type: none"> ➢ Grading access roads • Segment 13 <ul style="list-style-type: none"> ➢ Groundworks for pole foundations

Date	IEM Team Personnel	Weather Conditions	Key Monitoring Locations & Activities
Tuesday, November 17	SE, AS	Heavy snow	<p>Construction Camp, Laydown Areas and the Lillooet River FSR</p> <ul style="list-style-type: none"> • Snow clearing on the Lillooet River FSR <p>ULRHEF Intake & Upstream Tunnel Portal</p> <ul style="list-style-type: none"> • Standpipe installation in preparation for tunnel grouting • Dewatering to sediment basins <p>ULRHEF Downstream Tunnel Portal</p> <ul style="list-style-type: none"> • Closed due to Two-week Mountain Goat Shutdown Period <p>ULRHEF Penstock</p> <ul style="list-style-type: none"> • Closed due to heavy snowfall <p>ULRHEF Powerhouse</p> <ul style="list-style-type: none"> • Closed due to heavy snowfall <p>BDRHEF Intake Access Ramp and Diversion Tunnel</p> <ul style="list-style-type: none"> • Closed due to heavy snowfall <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"> • Component installation inside the powerhouse <p>TX-Line</p> <ul style="list-style-type: none"> • Segment 12 <ul style="list-style-type: none"> ➢ Grading access roads • Segment 13 <ul style="list-style-type: none"> ➢ Groundworks for pole foundations
Wednesday, November 18	SE, AS, TH, SS, DA	Overcast	<p>Construction Camp, Laydown Areas and the Lillooet River FSR</p> <ul style="list-style-type: none"> • Snow clearing on the Lillooet River FSR <p>ULRHEF Intake & Upstream Tunnel Portal</p> <ul style="list-style-type: none"> • No activity <p>ULRHEF Downstream Tunnel Portal</p> <ul style="list-style-type: none"> • Closed due to Two-week Mountain Goat Shutdown Period <p>ULRHEF Penstock</p> <ul style="list-style-type: none"> • Installation, excavation, fitting and coating works <p>ULRHEF Powerhouse</p> <ul style="list-style-type: none"> • Superstructure construction • Manifold coating <p>BDRHEF Intake Access Ramp and Diversion Tunnel</p> <ul style="list-style-type: none"> • Demobilization of tunneling equipment • Cleaning of diversion tunnel floor <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"> • Component installation inside the powerhouse <p>TX-Line</p> <ul style="list-style-type: none"> • Segment 12 <ul style="list-style-type: none"> ➢ Grading access roads • Segment 13 <ul style="list-style-type: none"> ➢ Groundworks for pole foundations
Thursday, November 19	SE, AS, TH	Sunny	<p>All ULRHEF and BDRHEF worksites</p> <ul style="list-style-type: none"> • Closed due to work related accident <p>TX-Line</p> <ul style="list-style-type: none"> • Segment 12 <ul style="list-style-type: none"> ➢ Grading access roads

Date	IEM Team Personnel	Weather Conditions	Key Monitoring Locations & Activities
			<ul style="list-style-type: none"> • Segment 13 <ul style="list-style-type: none"> ➤ Groundworks for pole foundations
Friday, November 20	SE, TH, AS	Sunny	<p>Construction Camp, Laydown Areas and the Lillooet River FSR</p> <ul style="list-style-type: none"> • Snow clearing on the Lillooet River FSR <p>ULRHEF Intake & Upstream Tunnel Portal</p> <ul style="list-style-type: none"> • Standpipe installation in preparation for tunnel grouting • Dewatering to sediment basins <p>ULRHEF Downstream Tunnel Portal</p> <ul style="list-style-type: none"> • Closed due to Two-week Mountain Goat Shutdown Period <p>ULRHEF Penstock</p> <ul style="list-style-type: none"> • Winterization activities • ASTR04 crossing construction <p>ULRHEF Powerhouse</p> <ul style="list-style-type: none"> • Superstructure construction • Manifold coating <p>BDRHEF Intake Access Ramp and Diversion Tunnel</p> <ul style="list-style-type: none"> • Demobilization of tunneling equipment <p>BDRHEF Downstream Tunnel Portal</p> <ul style="list-style-type: none"> • Closed due to work related accident and follow-up investigation <p>BDRHEF Powerhouse</p> <ul style="list-style-type: none"> • Component installation inside the powerhouse <p>TX-Line</p> <ul style="list-style-type: none"> • Segment 12 <ul style="list-style-type: none"> ➤ Grading access roads • Segment 13 <ul style="list-style-type: none"> ➤ Groundworks for pole foundations
Saturday, November 21	SE, AS, TH, MN	Sunny	<p>Construction Camp, Laydown Areas and the Lillooet River FSR</p> <ul style="list-style-type: none"> • Snow clearing on the Lillooet River FSR <p>ULRHEF Intake & Upstream Tunnel Portal</p> <ul style="list-style-type: none"> • Standpipe installation in preparation for tunnel grouting • Dewatering to sediment basins <p>ULRHEF Downstream Tunnel Portal</p> <ul style="list-style-type: none"> • Closed due to Two-week Mountain Goat Shutdown Period <p>ULRHEF Penstock</p> <ul style="list-style-type: none"> • Winterization activities • ASTR04 crossing construction <p>ULRHEF Powerhouse</p> <ul style="list-style-type: none"> • Superstructure construction • Manifold coating <p>BDRHEF Intake Access Ramp and Diversion Tunnel</p> <ul style="list-style-type: none"> • Demobilization of water treatment system • River diversion works and start of upstream cofferdam construction <p>BDRHEF Downstream Tunnel Portal</p> <ul style="list-style-type: none"> • Closed due to work related accident and follow-up investigation <p>BDRHEF Powerhouse</p> <ul style="list-style-type: none"> • Component installation inside the powerhouse <p>TX-Line</p> <ul style="list-style-type: none"> • Segment 12 <ul style="list-style-type: none"> ➤ Grading access roads

IEM Team Personnel: TH – Tom Hicks; SS – Stephen Sims; BA – Blake Aleksich; DA – Danita Abraham; SE – Stephanie Ellis; AS – Anne Sutherland; MN – Mike Nichol

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.
November 16	<i>Email</i>	SES, CE, INX	SES informed CE of two noise level exceedance events (>75 dBA) recorded at the BDRHEF intake noise meter on Nov. 11 and 13. SES acknowledged that all possible mitigation measures had been implemented and that diversion tunnel blasting had been completed preventing future exceedances.	-
	<i>Email</i>	SES, CE, INX	SES informed CE of two noise level exceedance events (>75 dBA) recorded at the lower Truckwash Creek noise meter on Nov. 10. SES informed CE the exceedance was likely generated by the initiation of the detonation cord.	-
	<i>Email</i>	SES, CE, INX, Ecofish	The IEM informed recipients that four Mountain Goats were sighted crossing the Lillooet River FSR at the KM 46 marker at 14:00. The goats were travelling downslope towards Keyhole Falls. The IEM ensured no traffic passed through that section of road after the sighting and checked the road for Mountain Goats prior to traffic resuming.	-
	<i>Email</i>	SES, CE, INX	SES distributed an email follow-up to field discussions held during the Erosion and Sediment Control and Winterization site inspection. SES acknowledged the completion of ITM items and confirmed that new items discussed in the field had been added to the matrix. Garbage clean-up and general site cleanliness was highlighted in the email.	-
November 17	<i>Email</i>	INX, SES, CE, JEM	INX distributed the MFLNRO Section 8 - Special Use Permit issued for the operation of an avalanche weather station on Crown land (File No. S25988)	-
November 19 & 20	<i>Email</i>	INX, MFLNRO, DFO, EAO, SES, JEM	INX informed the project team and regulatory agencies of a work related accident involving two CE employees. INX indicated that all site activity was on hold pending RCMP and WorkSafeBC investigations. WorkSafeBC released the site stop work on November 20 with the exception of any work involving blasting and all BDRHEF tunneling works. The Lillooet River FSR will remain closed to the public until the investigations are complete.	-
November 21	<i>Email</i>	CE, SES, INX	CE sent SES the MSDS and data sheets for Specton Rapid H100 Polyurethane a new product to be used onsite in the ULRHEF upstream tunnel during standpipe installation.	-
	<i>Pre-work meeting</i>	SES, CE, INX	A pre-work meeting was held to discuss environmental concerns, safety issues and the work plan for the BDRHEF intake diversion and cofferdam construction.	-

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
TX Line	Segments 7 – 16	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.
		Riparian Vegetation Management Areas (RVMA)	IEM monitoring is required during clearing within RVMAs.
		Surface Water Quality	IEM monitoring is required during culvert installation activities in non-fish bearing waters to document adherence to the Surface Water Quality Protection Plan objectives.
		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.
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>IEM was onsite to oversee daily construction equipment shutdowns (November 1 - 30) beginning one hour before and two hours after sunrise as well as two hours before and one hour after sunset.</p> <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>A two-week shutdown of all construction at the ULRHEF lower tunnel portal began on November 13, due to snowfall accumulations measured within the Truckwash Creek Migration Corridor, according to the Project's Mountain Goat Management Plan.</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>

Component	Location	Wildlife/Archeology Concern	Construction/Timing Restrictions & Mitigations
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 500 m from UWR to restrict motorized use within the UWR, unless otherwise directed by MFLNRO.</p> <p>An Exemption to the General Wildlife Measures for UWR u-2-002 UL 12 permits the following works to occur at the BDRHEF intake works beyond November 15, 2015.</p> <ul style="list-style-type: none"> • Helicopter activity can occur up until December 15. • Blasting activity, including avalanche control, can occur up until December 15. • All other construction related activities can occur up until December 21. <p>If a mountain goat is observed within a 500 m 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, KM 38 Laydown, Access Roads & Lillooet River FSR

Activities:

- Routine maintenance of construction equipment within the mechanic shop and fuel storage continued at the KM 38 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.
- The electric fences surrounding the construction camp were maintained and operational throughout this reporting period.
- Snow clearing on the Lillooet River FSR and site access roads continued during this reporting period (Photo 1).
- Ditch maintenance from KM 41.5 – 42 on the Lillooet River FSR (Photo 2).

Environmental Summary:

- No environmental issues were observed or reported at the construction camp, the KM 38 laydown, the access roads or the Lillooet River FSR during this reporting period.

Photos:



Photo 1 – Snow clearing on the BDRHEF intake access road (November 17, 2015).



Photo 2 – Ditch maintenance at KM 41.75 on the Lillooet River FSR (November 18, 2015).

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

Construction Activities:

- Winterization of the ULRHEF intake structure began
- Preparation for grouting works in the tunnel including standpipe installation (Photo 3).
- Dewatering to ULRHEF intake sediment basins (Photo 4).

Environmental Summary:

- All turbid or alkaline water resulting from activities at the ULRHEF intake or upstream tunnel portal is pumped to the ULRHEF intake sediment basins (Photo 4). A dedicated CE crewmember is present to monitor the pumps within the intake work area and tunnel portal during active construction works. This person has the responsibility of directing all turbid or alkaline water to the sediment ponds and must verify with CE environmental staff or the IEM prior to directing any water to the Lillooet River.
- The IEM conducted regular water quality sampling at the ULRHEF intake sediment basin discharge location during this reporting period.

Photos:



Photo 3 – Current conditions at the ULRHEF upstream tunnel portal (November 20, 2015).



Photo 4 – Dewatering ULRHEF upstream tunnel seepage to the intake sediment basins (November 20, 2015).

4.3 ***Downstream Tunnel Portal***

Construction Activities:

- No tunneling activity due to two-week Mountain Goat Shutdown Period.
- Dewatering to downstream tunnel portal settling ponds.

Environmental Summary:

- No environmental issues were observed or reported at the downstream tunnel portal during this reporting period.

4.4 ***Penstock***

Construction Activities:

- Penstock excavation, installation, fitting and coating continued.
- Penstock winterization works commenced (Photo 5).
- ASTR04 crossing construction continued (Photo 6).

Environmental Summary:

- The IEM and CE completed a follow-up inspection of the ASTR-04 road works completed during the last reporting period on November 16, 2015. A few loose rocks were removed during the inspection and the IEM deemed that the material on the downstream side of the culvert crossing was stable and on top of existing riprap, marking the completion of recommended mitigation measures for ITM item *ULR#39* (see Section 9.0). The area should

be re-examined in the spring to ensure that the material remains stable and does not contribute sediment to ASTR04.

Photos:



Photo 5 – Fence installed at end of penstock for winterization (November 20, 2015).



Photo 6 – ASTR04 crossing construction (November 20, 2015).

4.5 *Powerhouse & Access Road*

Construction Activities:

- Manifold installation and superstructure construction (Photo 7 and Photo 8).
- Dewatering clean seepage water to Lillooet River.

Environmental Summary:

- No environmental issues were observed or reported at the ULRHEF powerhouse during this reporting period.



Photo 7 – Current conditions at the ULRHEF powerhouse (November 15, 2015).



Photo 8 – ULRHEF powerhouse superstructure construction (November 20, 2015).

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 regular monitoring sites 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 melt fluctuations and large tributary inputs. 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 with an asterisk (*).

Date	Time	Sample Location Description	pH	Turbidity (NTU)	Cond (µS)	Temp (°C)
Routine Water Quality						
November 20, 2015		ULR Background – ULRHEF intake **Not accessible due to heavy snowfall**	-	-	-	-
	13:30	ULRHEF Intake sediment basin discharge (Sampling conducted at discharge due to inaccessibility of background and Keyhole Bridge stations)	7.84	0.98	-	-
		ULR #0.5 – Downstream of ULRHEF intake at Keyhole Bridge **Not accessible due to heavy snowfall**	-	-	-	-
	14:45	ULR # 1 – Upstream of ULRHEF Powerhouse	7.0	11.8	136	2.3
	15:15	ULR #2 – Downstream of ULRHEF Powerhouse between KM 40.5 and KM 41	7.2	10.6	160	2.3
		ULR #3 – Lillooet River FSR KM 38 Laydown – D/S of Boulder confluence **Not accessible due to accident closures**	-	-	-	-
	10:30	ULR #4 – Lillooet River FSR KM 24 – D/S of all works and Meager confluence	7.6	1.7	-	-

4.7 Recommendations

IEM recommendations for the ULRHEF are as follows:

- All seepage water in the intake excavation and portal should be conveyed to the sediment basins unless approved for discharge directly to the Lillooet River by the IEM or CE environmental manager.
- The IEM recommends that the access roads and tributaries on the penstock alignment be monitored regularly to ensure that no ESC issues develop with the continued installation works and traffic.
- The ULRHEF powerhouse sump water should be monitored regularly. Alkaline or turbid water should be pumped to the settling ponds for treatment.

4.8 *Upcoming Works*

The following new and/or environmentally sensitive construction activities are scheduled to occur at the ULRHEF in the upcoming reporting period(s):

- Tunnel grouting activities will continue at the ULRHEF intake portal.
- Dewatering to the ULRHEF intake sediment basins will continue.
- ASTR04 crossing construction will continue.
- Superstructure construction will continue at the ULRHEF powerhouse.

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

5.1 *Intake Access Ramp & Diversion Tunnel*

Construction Activities:

- Demobilization of diversion tunneling equipment and water treatment system.
- Cleaning of the intake diversion tunnel (Photo 9 and Photo 10).
- Diversion and upstream cofferdam construction (Photo 11 to Photo 15).

Environmental Summary:

- On November 16 and 17, crews worked within the BDRHEF intake diversion tunnel to clean sediment and debris from the tunnel floor and walls prior to diversion works (Photo 9). Cleaning occurred to prevent the introduction of suspended sediment to Boulder Creek when flows were introduced into the tunnel during the diversion works (see below). On November 18, the IEM and CE's environmental management team inspected the tunnel to ensure it was as clean as possible given the conditions (Photo 10).
- On November 21, a pre-work meeting was held to discuss the work plan, safety concerns and environmental issues for the BDRHEF intake diversion activities and upstream cofferdam construction. Prior to diversion works, the IEM established water quality monitoring stations approximately 15m downstream of the diversion tunnel (mixing zone) and approximately 250m upstream of the BDRHEF powerhouse (compliance station). During works, sampling for turbidity was conducted every 10 minutes at both stations (Photo 16 and Photo 17) until works were completed and the flows had cleared to within 8 NTU of background (See Section 5.3 Water Quality Results)
- On November 21, works commenced with the excavation of the diversion tunnel pad and breaking of a boulder using a hand drill and rock splitter (due to blasting restrictions) that lay in the path of the diversion channel trench. The pad excavation resulted in intermittent pulses of turbidity at the mixing zone beginning at 12:00 with the first increase in turbidity recorded at the compliance station occurring at 15:50. A notable increase in turbidity was measured at the mixing zone beginning at 14:40 and clearing by 17:30. The increase was due to pad excavation releasing some flows to the tunnel and the removal of a large boulder at approximately 16:20 (Photo 12 to Photo 15). During this period, turbidity in the mixing zone ranged from 65.5 – 99.2 NTU with a short pulse (<15 minutes) with a peak of 758 NTU

(following boulder removal). The mixing zone turbidity peaked at 26.1 NTU at the compliance point upstream of the powerhouse (See Section 5.3 Water Quality Results). The IEM worked closely with CE during the initial excavation to ensure the duration of instream works were minimized, and executed according to the work plan. Based on the turbidity levels measured downstream (max = 26.1 NTU) at the compliance point and the short duration of exceedance of BCWQGs (approximately one hour), the IEM concluded that this phase of river diversion works was unlikely to have resulted in serious harm to fish or fish habitat in Boulder Creek.



Photo 9 – Cleaning BDRHEF intake diversion tunnel prior to diversion works (November 17, 2015).



Photo 10 – BDRHEF intake diversion tunnel floor during inspection (November 18, 2015).



Photo 11 – BDRHEF intake diversion tunnel plug excavation works (November 21, 2015).



Photo 12 – Flow introduced slowly to the BDRHEF intake diversion tunnel (November 21, 2015).



Photo 13 – Turbid water visible downstream of diversion tunnel after release of water to diversion tunnel (November 21, 2015).



Photo 14 – Large boulder restricting flow to BDRHEF intake diversion tunnel (November 21, 2015).



Photo 15 – Turbidity visible downstream following removal of boulder and increased flow in diversion tunnel (November 21, 2015).



Photo 16 – The IEM conducting water quality sampling downstream of the diversion tunnel (November 21, 2015).



Photo 17 – The IEM recording water quality data downstream of the diversion tunnel (November 21, 2015).

5.2 *Downstream Tunnel Portal and Powerhouse*

Construction Activities:

- Drilling, blasting, mucking and stabilization works within the tunnel were suspended on the evening of November 18 following a work related accident.
- Dewatering of the tunnel and powerhouse to the oil water separator and settling ponds continued (Photo 18).
- BDRHEF powerhouse component installation (Photo 19).

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 18).

Photos:



Photo 18 – BDRHEF downstream portal settling ponds
(November 17, 2015).



Photo 19 – View inside the BDRHEF powerhouse
(November 17, 2015).

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 the Lillooet River 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						
November 20, 2015	8:00	BDR BG – Upstream of BDRHEF intake	7.1	0.1	95	0.6
	8:36	BDR #1 – Downstream of BDRHEF intake	7.1	0.6	98	0.2
	15:40	BDR #2 – Upstream of BDRHEF Powerhouse	7.3	5.0	110	1.3
	15:50	BDR #3 – Downstream of BDRHEF Powerhouse at Pebble Creek Bridge	7.4	5.6	109	0.9
BDRHEF Intake Upstream Cofferdam Construction and Diversion November 21, 2015						
Time (24hr)	Turbidity (NTU)		Notes			
	Mixing Zone (15m downstream of diversion tunnel)	Compliance Station (240m upstream of BDRHEF Powerhouse)				
7:30	0.06 (Background)	-				
8:30	0.6	-	Preparation for diversion pad excavation and rock drilling			
9:30	0.1	-				
9:40	-	1.75 (Background)				
9:50	-	-				
10:00	0.9	-				
10:10	1.63	-				
10:20	0.86	-				
10:30	0.16	-				
10:40	0.9	-				
10:50	0.56	-				
11:00	0.87	-				
11:10	0.54	-				
11:20	1.2	-				
11:30	0.57	-				

Time (24hr)	Turbidity (NTU)		Notes
	Mixing Zone (15m downstream of diversion tunnel)	Compliance Station (240m upstream of BDRHEF Powerhouse)	
11:40	1.3	-	
11:50	0.87	-	
12:00	30	-	Rocks tumbled into Boulder Creek while flattening the diversion tunnel pad causing a pulse of turbidity at the mixing zone
12:10	17.1	-	
12:20	3.46	3.75	Water quality sampling commenced at compliance station when increase in turbidity was reported at the mixing zone
12:30	3.81	2.79	
12:40	4.41	3.35	
12:50	2.35	2.24	
13:00	10.47	2.81	
13:10	2.08	2.82	
13:20	2.55	2.62	
13:30	0.59	2.58	Small turbid flow visible downstream of diversion tunnel with little effect on downstream water quality
13:40	1.35	2.55	
13:50	5.57	2.19	
14:00	1.97	2.17	
14:10	2.19	2.41	
14:20	3.91	2.3	
14:30	2.53	2.02	
14:40	65.5	2.17	Increase in turbidity at mixing zone due to pad excavation and release of flow to diversion tunnel
14:50	53.6	2.72	
15:00	29.9	2.21	
15:10	13	2.24	
15:20	48.9	1.41	
15:30	51.2	2.48	Diverted majority of flow to diversion tunnel causing increase in downstream turbidity
15:40	49.2	2.63	
15:50	99.2	4.9	Completed instream excavation at diversion tunnel and first notable increase in turbidity measured at compliance station
16:00	72	5.28	
16:10	87.4	7.54	
16:20	758	8.68	Excavator moved large boulder above diversion tunnel causing pulse of turbidity
16:30	109	9.06	
16:40	72	8.85	
16:50	22.3	8.56	
17:00	20.5	8.88	

Time (24hr)	Turbidity (NTU)		Notes
	Mixing Zone (15m downstream of diversion tunnel)	Compliance Station (240m upstream of BDRHEF Powerhouse)	
17:10	12.1	6.63	
17:20	12	7.75	
17:30	11.1	13.5	
17:40	8.4	15.5	
17:50	3.38	14.2	IEM stopped sampling at mixing zone because sample was <8 NTU over background
18:00	-	21.1	
18:20	-	26.1	
18:30	-	13.5	
18:40	-	8.68	
18:50	-	5.55	
19:00	-	3.63	IEM stopped sampling at compliance station because sample was measured to be <8 NTU over background

5.4 Recommendations

IEM recommendations for the BDRHEF are as follows:

- All wastewater related to the BDRHEF tunnelling works portal 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 in the upcoming reporting period(s):

- Diversion works and cofferdam construction will continue at the BDRHEF intake.
- BDRHEF downstream portal tunnelling works will resume once the investigations related to the work related accident are completed.
- Powerhouse component installation will continue at the BDRHEF powerhouse.

6.0 Transmission Line – Monitoring Results

6.1 Transmission Line Construction Activities

Right-of-Way Clearing:

- No activity.

Existing Road Upgrades and Access Road Construction

- Road maintenance in Segment 12.

Transmission Line Pole Installation, Line Stringing and Clipping

- Groundworks for pole foundations in Segment 13.

Environmental Summary:

- The IEM was present as required when clearing activities occurred within 150m of wetlands, 15m RVMAs (30m for CTF streams), 100m of Coastal Tailed Frog Streams, Class 1 & 2 suitable Grizzly Bear WHA and/or suitable forage habitat, moose and deer UWR, legally designated Old Growth Management Areas (OGMAs) or within Northern Goshawk, Spotted Owl or Western Screech-Owl nesting habitat (during breeding season). All flagged boundaries were respected during clearing activities. No environmental issues were observed.

6.2 Water Quality Results

Date	Time	Sample Location Description	pH	Turbidity (NTU)	Cond (uS)	Temp (°C)
No construction activities involving water management were conducted during this reporting period.						

6.3 Recommendations

- The IEM has no recommendations at this time.

6.4 Upcoming Works

- Groundworks for pole foundations in Segment 16.

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 locked or guarded fulltime to restrict motorized use within the UWR from November 1 – April 30.
- IEM was onsite to audit daily construction equipment shutdowns (November 1 - 30) beginning one hour before and two hours after sunrise as well as two hours before and one hour after sunset.
- On November 13, the IEM enacted the Two-week Mountain Goat Shutdown Period as per the Mountain Goat Management Plan. The shutdown period will be end November 27, 2015. CE's environmental management team ensured that Mountain Goat corridor travel restrictions, snow removal guidelines and shutdown of all works at the ULRHEF downstream tunnel portal were enforced within 24 hours of the notification from the IEM as per the Mountain Goat Management Plan.
- On November 16 at 14:00, four Mountain Goats were sighted crossing the Lillooet River FSR at the KM 46 marker. The goats were travelling downslope towards Keyhole Falls. The IEM ensured no traffic passed through that section of road after the sighting and the daily sunset corridor closure prevented traffic beginning at 14:26. Following the corridor closure at 17:26 the IEM checked the road and surrounding area for Mountain Goats prior to traffic resuming.
- The Mountain Goat sighting on November 16 at KM 46 on the Lillooet River FSR confirmed goat presence within 500m of Project activities. The IEM began sending goat sighting updates to MFLNRO as per Human-Wildlife Interaction Management Plan and EAC Condition #15.
- Noise level monitoring data continues to be collected and used to adaptively manage construction related noise levels to the extent possible within 500m of established UWRs. CE is required to minimize construction related noise levels to the satisfaction of the IEM (below the 75dba noise level threshold) as outlined in the Mountain Goat Management Plan. Although construction related noise levels exceeded the 75dba limit for two brief instances at the BDRHEF intake and once at the ULRHEF lower portal, CE successfully mitigated construction related noise to the satisfaction of the IEM during this reporting period.
- 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) 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#36	OPEN	Covered Stockpiles at KM44.5 of the Lillooet River FSR	The stockpile tarp coverings are deteriorating and are no longer serving their original intent as a potential PAG rock temporary storage measure.	<ol style="list-style-type: none"> Remove the tarps if they are no longer required. Update November 6, 2015 – The IEM has been provided with verbal confirmation that the stockpiles are non-PAG and do not require a tarp covering to protect the material from contact with water/snow. This item will be closed once a QP provides confirmation. OR <ol style="list-style-type: none"> Repair the tarps if they are still required (pending clarification on PAG vs non-PAG status) 	Oct. 27, 2015	Nov. 30, 2015	-
ULR#39	CLOSED	ASTR04 – Downstream side of Haul road crossing	Material placed on the embankment surrounding the culvert outlet is unconsolidated and requires armoring or other form of ESC stabilization.	<ol style="list-style-type: none"> Assess the material place around the culvert outlet, determine the appropriate form of ESC stabilization, and installed stabilization measures with the IEM present to monitor the work. UPDATE: A few loose rocks with the potential to fail into the watercourse were removed. Site conditions are stable for the time being and will be reassessed in the spring. 	November 14, 2015	November 16, 2015	November 16, 2015

9.2 Transmission Line

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
No outstanding environmental issues (next ITM – Tx#3)							