



April 20, 2016

File: 76975-35/Bridge

Maureen DeHaan
Water Resource Specialist
BC Hydro
9-6911 Southpoint Dr
Burnaby BC V3N 4X8

Via Email: Maureen.DeHaan@bchydro.com

Dear Ms. DeHaan:

Re: Section 93 Order – Terzaghi Target Flow Release and Annual Water Budget

This Order supersedes the Order issued to BC Hydro on March 14, 2016.

British Columbia Hydro and Power Authority is the operator of the Terzaghi Dam. A Section 87 & 88 Order dated March 30, 2011 under the *Water Act* directs the implementation of the operating parameters and procedures of the Bridge River Water Use Plan.

Clause 8 of the Order reads as follow:

8. For the period between May 1, 2011 and April 1, 2015, the licensee shall discharge from Terzaghi Dam to the Bridge River the equivalent to an annual water budget of 6.0 cubic metres per second (cms) and target the following monthly flows:

<i>DATE</i>	<i>TARGET FLOW (CMS)*</i>	<i>DATE</i>	<i>TARGET FLOW (CMS)*</i>
<i>Jan 1</i>	<i>1.5</i>	<i>Aug 2</i>	<i>11.0</i>
<i>Feb 1</i>	<i>2.0</i>	<i>Aug 8</i>	<i>9.3</i>
<i>Mar 1</i>	<i>3.0</i>	<i>Aug 9</i>	<i>7.7</i>
<i>Apr 1</i>	<i>6.0</i>	<i>Aug 16</i>	<i>6.4</i>
<i>Apr 15</i>	<i>8.5</i>	<i>Aug 17</i>	<i>5.1</i>
<i>Apr 23</i>	<i>11.0</i>	<i>Aug 23</i>	<i>4.1</i>
<i>May 1</i>	<i>11.0</i>	<i>Aug 24</i>	<i>3.0</i>
<i>May 7</i>	<i>13.0</i>	<i>Sept 1</i>	<i>3.0</i>
<i>May 21</i>	<i>14.0</i>	<i>Oct 1</i>	<i>1.5</i>
<i>Jun 1</i>	<i>15.0</i>	<i>Nov 1</i>	<i>1.5</i>
<i>Jul 1</i>	<i>15.0</i>	<i>Dec 1</i>	<i>1.5</i>
<i>Aug 1</i>	<i>12.9</i>		

**The transition between target monthly flows may occur up to ±5 days of the beginning of each month. Target monthly flows less than 5.0 cms may vary instantaneously by ±0.25cms from the target flow. Target monthly flows greater than 5.0cms may vary instantaneously by ±5%. The total annual flow will be determined on a calendar year basis and may vary ±5%.*

Ministry of Forests, Lands & Natural Resource Operations

Resource Stewardship Division

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Water Management Branch

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A variance order was granted to BC Hydro on May 8, 2012, which gave BC Hydro the approval to implement the above target flow schedule at Terzaghi Dam, which has an annual water budget of 6.0cms. BC Hydro has been directed by the Comptroller of Water Rights, in a letter dated May 28, 2015, to operate under this annual water budget until a decision under Clause 9 of the Bridge WUP Section 87 & 88 Order dated March 30, 2011 under the *Water Act* is made. Clause 9 requires the determination of a long term flow release strategy for Terzaghi Dam.

In a letter dated March 2, 2016, Ms. Maureen DeHaan requested a variance order to the Bridge WUP Order (March 30, 2011) Clause 8 to modify the discharge from Terzaghi Dam to the Bridge River outside the boundaries of an annual water budget of 6.0cms. A variance Order was issued on March 14, 2016, which identified a range of annual average flows between a budget of 6cms and 22cms.

In a letter dated April 14, 2016, Ms. Maureen DeHaan requested an amendment to the variance order that was issued on March 14, 2016 to increase flows to 55 cms sooner than anticipated, due to the current inflow forecasts being above normal, and to modify the upper limits of the annual flow range to meet a 22cms annual water budget. I understand that the March 2, 2016 request did not reflect the distinction between flow requirements for the January to March 2016 period and January to March 2017 period.

As was taken into consideration in issuance of the March 14, 2016 variance order, I recognize that BC Hydro is modifying the operations at Downton Reservoir by lowering the maximum Normal Reservoir level from elevation 749.8m to elevation 734m. I recognize that this is being implemented as an interim dam safety risk reduction measure to address seismic and seepage deficiencies at La Joie Dam until capital improvements can be initiated in 10-15 years.

In addition, I understand that since February 2015 a number of Bridge 1 and 2 Generating Station units have been de-rated and, without a bypass, this has restricted the discharge capacity from 160cms to about 110cms. I acknowledge that upgrades to these units are planned to occur over the next 5-6 years. I recognize that due to the reduction in generating station discharge capacity and the higher than normal reservoir levels at Downton and Carpenter Reservoirs through the fall of 2015, increased discharges in 2016 at Terzaghi Dam down the Lower Bridge River are required in order to move water out of Downton and Carpenter Reservoirs to maintain Downton Reservoir at or below 734 m.

Under the Bridge WUP Order issued March 30, 2011, Section 18 identifies the priorities that BC Hydro is to follow when implementing operations. Dam safety requirements are the first priority, followed by flood routing requirements, and thirdly the Terzaghi target flow schedule. I recognize that the proposed increase to the Terzaghi flow releases differs significantly from that described under Section 9 of the Bridge WUP order which contemplated a recommended long term flow release strategy from Terzaghi Dam to be not less than annual water budget of 3.0cms and not to exceed an annual water budget of 6.0cms. I note that due to the requirements to manage the dam safety risk at LaJoie Dam and the reduced discharge capacity at Bridge 1 and 2 Generating Stations, the recommended flow strategy as required by Clause 9 of the Bridge WUP Order will need to be deferred.

To manage the variation and uncertainty of inflows to the Downton and Carpenter Reservoirs, which determine the volume of water to be discharged downstream, BC Hydro is requesting a variance order to release between an operationally feasible minimum of about 0.8cms and a maximum of 55cms to the Lower Bridge River. The table below depicts a 6 cms annual water budget ‘bookend’ on the left and a 22 cms annual water budget ‘bookend’ on the right, in which the flows from Terzaghi dam must remain within. The table below outlines the requested Terzaghi hydrograph target flows for an annual budget of a range between 6.0cms and 22cms:

Date	Target Flows (cms): Annual Budget 6 cms	Date	Target Flows (cms): Annual Budget 22 cms	Maximum Flows (cms)
March 1-31	3	March 1-14	3	3
April 1-13	6	March 15-17	25	25
April 14-21	8.5	March 18-20	31	31
April 22- May 5	11	March 21-April 7	37	37
May 6-19	13	April 8-19	47	47
May 20-30	14	April 20-July 9	55	55
May 31- July 30	15	July 10	48	55
July 31	12.9	July 11	41	55
Aug 1-6	11	July 12	35	55
Aug 7	9.3	July 13	29	55
Aug 8-14	7.7	July 14- 21	24	55
Aug 15	6.4	July 22	24	48
Aug 16-21	5.1	July 23	24	41
Aug 22	4.1	July 24	24	35
Aug 23- Sept 29	3	July 25	24	29
Sept 30- Dec 31	1.5	July 26-Aug 9	24	24
Jan 1-31	1.5	Aug 10-18	20	20
Feb 1-29	2	Aug 19-23	18	18
		Aug 24	15	15
		Aug 25	13	13
		Aug 26	11	11
		Aug 27	9.3	9.3
		Aug 28	7.7	7.7
		Aug 29	6.4	6.4
		Aug 30	5.1	5.1
		Aug 31	4.1	4.1
		Sept 1-12	3.5	3.5
		Sept 13-26	2.8	2.8
		Sept 27	1.9	1.9
		Sept 28	1.2	1.2
		Sept 29- Dec 31	0.8	0.8
		Jan1-11	1.5	1.5
		Jan 12-23	2	2
		Jan 24-31	3.5	3.5

		Feb 1-7	10	10
		Feb 8-21	20	20
		Feb 22- Feb 28	25	25

I understand that BC Hydro will operate the Terzaghi flows between a 6.0cms and 22.0cms annual water budget. The transition between target flows will occur as outlined in the table above, in addition to meeting the ramping rates as outlined by Clause 10 of the Bridge Water Use Plan Order (March 31, 2011). The target monthly flows less than 5.0cms may vary instantaneously by ± 0.25 cms from the target flow, whereas target monthly flows greater than 5.0cms may vary instantaneously by $\pm 5\%$. Flow changes from July 9 to August 31 may occur ± 1 day from the dates identified in the table above. Flow changes from September 1 to July 8 may occur ± 3 days from the dates identified in the table above. The maximum flows must not be exceeded and the average target flow must be met. Hydro will contact the Comptroller of Water Rights immediately for flow scenarios that fall outside of 6.0cms and 22.0cms and will notify and/or gain support, when required, from the Department of Oceans and Fisheries and the Ministry of Forest, Lands and Natural Resource Operations (fisheries).

I recognize that the Terzaghi flow range will be used to manage the upper reservoirs per the Downton Interim Risk Management Plan and the Bridge WUP Order Clause 7 for Carpenter Reservoir and is not intended for meeting flood routing requirements per the Bridge Water Use Plan Priority 2 under Clause 18. BC Hydro will still be required to meet the ramping rates as outlined by Clause 10 of the Bridge Water Use Plan Order (March 31, 2011).

I understand that the hydrographs have been developed with input from the Department of Fisheries and Oceans (DFO), Ministry of Forest, Lands and Natural Resource Operations (Fisheries), and the St'at'imc technicians through workshops held January 12, 2016, February 4, 2016, and February 16, 2016. I note that both the Department of Fisheries and Oceans and the Ministry of Forest, Lands and Natural Resource Operations (Fisheries) endorse the variance order, but FLNRO fisheries has concerns with the maximum target flows being at 55cms and extending past July 9, 2016. I understand that BC Hydro had a conference call with the St'at'imc on April 12, 2016 to inform them of the request.

Under Section 93 of the *Water Sustainability Act*, I approve the increase in annual average flow releases at Terzaghi Dam to be between 6.0cms and 22.0cms for the period of April 20, 2016 to February 28, 2017 as per the terms and conditions outlined above. The transition between target flows will occur as outlined above, in addition to meeting the ramping rates as outlined by Clause 10 of the Bridge Water Use Plan Order (March 31, 2011). BC Hydro is required to submit to the Comptroller of Water Rights office by September 30, 2016 a record of the actual flows released from the Terzaghi Dam for the period of January 1 to August 31, 2016. In addition, BC Hydro will be financially responsible for any additional or amended monitoring and habitat rehabilitation needed as a result of these flow changes.

If for some reason any of the terms and conditions outlined in this order cannot be met the Comptroller of Water Rights needs to be notified immediately.

Yours truly,



Pieter Bekker
Deputy Comptroller of Water Rights

pc: Rich McCleary, Regional Aquatic Ecologist, Thompson-Okanagan Region, FLNR
Dan Sneep, Habitat Assessment Biologist, DFO
Chief Don Harris, Chair, St'at'imc Chiefs Council, Lillooet, BC

