Columbia River Water Use Plan

Addendum

for

Mica Generating Unit 5 and

Generating Unit 6

BChydro

April 2010
Preface

The joint water use planning and environmental assessment consultative process for BC Hydro’s Mica Generating Station Unit 5 and Generating Station Unit 6 Projects was initiated in January 2008 and a final report issued in June 2009.

The proposed conditions in this Columbia River Water Use Plan Draft Addendum, for the operation of Mica hydroelectric facilities, reflect the draft consensus recommendations of the Mica Generating Unit 5 and Generating Unit 6 Core Committee.

As part of the Environmental Assessment process, these conditions were also reviewed and by the EA Technical Working Group in November 2009.

BC Hydro thanks all those who participated in the process that led to the production of this Water Use Plan Addendum, for their effort and dedication.
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1.0 INTRODUCTION

1.1 Background

The Mica Generating Unit 5 and the Mica Generating Unit 6 projects propose to install additional generating units in the empty bays in the Mica Generating Station. The Mica Dam was completed in 1973 and construction of the Mica Generating Station was completed in 1977. It was designed, constructed and licensed as a six unit facility; four units came into service by 1977 and the installation of the fifth and sixth units was deferred until additional capacity was required. BC Hydro has maintained the right to install Units 5 and 6 by paying annual water fees to the province since licensing.

The environmental assessment process for Mica Generating Unit 5 and Generating Unit 6 project was started in January 2008 when BC Hydro initiated engagement and consultation. The project Environmental Assessment Certificate Applications were submitted to the provincial Environmental Assessment Office in July 2009. The Environmental Assessment Certificate Application met the requirements of the provincial environmental assessment review process. The Environmental Assessment certificate was granted on 8 April 2010.

The Columbia River Water Use Plan (Columbia WUP) process was conducted from 2000 to 2004 and resulted in a Consultative Committee Report and Draft Water Use Plan. In January 2007, the Comptroller of Water Rights sent BC Hydro an Order under Section 88 of the Water Act directing the implementation of operating parameters and procedures for the Columbia River WUP. The Columbia River WUP process included a recommendation whereby the addition of a turbine unit at the Mica Dam would “trigger” a review of those parts of the Columbia WUP that might be affected by potential incremental impacts and/or operational changes that could occur due to the operation of additional units at Mica.
The purpose of this draft Columbia River WUP Addendum is to recommend changes and/or additions to the existing Columbia River WUP conditions to address incremental operational impacts resulting from the Mica Generating Unit 5 and the Mica Generating Unit 6 projects. The associated engagement and consultative process combined 1) the requirements of the environmental assessment process, 2) water use plan processes and 3) the environmental effects of an additional discharge of 3000 cubic feet per second flow through the Mica Generating Station. A Core Committee, consisting of regulatory agencies, First Nations, former Columbia WUP Consultative Committee members, former Revelstoke Unit 5 committee member, Environmental Non-Governmental Organizations (ENGO) and interested community representatives, was formed in January 2008 to participate in the review of the impacts of the Mica Generating Unit 5 and Mica Generating Unit 6. Both the Comptroller of Water Rights (CWR) and the Environmental Assessment Office (EAO) accepted this process as a suitable and efficient approach to engagement and consultation.

1.2 Addendum to the Columbia River Water Use Plan Columbia WUP

The conditions proposed in this Water Use Plan Addendum are to be added to the conditions of the Columbia WUP, which was ordered under Section 88 of the Water Act on January 26, 2007. These additional conditions reflect the June 2009 recommendations of the Mica Units 5 and 6 Project Engagement Process and the outcome of the environmental assessment process.

The proposed additional terms and conditions to be authorized under the Water Act for the beneficial use of water at the Columbia River hydroelectric facilities are set out in this document. In terms of overall scope, the geographic area of influence of Mica Generating Unit 5 and Mica Generating Unit 6 has been determined to include the Kinbasket Reservoir, Mica Generating station tailrace and the Revelstoke Reservoir. Modelling of system operations with the 5th and 6th units at Mica has shown to have negligible effects on other parts of the Columbia system, e.g., downstream of Revelstoke dam and Arrow Lakes Reservoir.

The Mica Units 5 and 6 Core Committee Report was completed in June 2009 following conclusion of the final Core Committee meeting. A summary of the Core Committee recommendations is provided in Appendix 1.
2.0 DESCRIPTION OF WORKS

2.1 Existing Works

2.1.1 Mica Project

Mica Generating Station is located at Mica Dam, approximately 135 kilometers north of Revelstoke. The dam impounds Kinbasket Reservoir and Revelstoke Reservoir backs up to the downstream toe of the dam. Mica Dam and Generating Station are part of BC Hydro’s Columbia River hydroelectric system, with Revelstoke Dam and Generating Station and Hugh L. Keenleyside Dam and Arrow Lakes Reservoir located approximately 135 km and 319 km downstream, respectively. Mica Unit Generating 5 and Mica Generating Unit 6 would be located in existing empty bays at the Mica Generating Station. The underground Mica Generating Station was completed in 1977. The current powerhouse has four operating units with a total peak generating capacity of 1805 MW.

2.1.2 Kinbasket Reservoir

Mica Dam impounds Kinbasket Reservoir, which has a storage volume of 12 million-acre-feet (MAF), of which seven MAF are operated under the terms of the Columbia River Treaty. The remaining balance of the total storage has been operated through the Non-Treaty Storage Agreement (NTSA). With expiry of the release provision of the NTSA in June 2004, BC Hydro has been refilling this storage, which is scheduled to be re-filled by June 2011.

The licensed operating range of the reservoir is between El. 754.38 m (2475.0 ft) and 706.96 m (2319.42 ft). However, applications may be made to the Comptroller of Water Rights for additional storage surcharge for environmental or other purposes if there exists a high probability of spill.

2.1.3 Addition of the 5th and 6th Generating Unit at Mica

Each of the additional units would add approximately 500 megawatts (MW) of capacity, bringing the Generating Station’s total installed capacity to approximately 2,800 MW.

After the fifth and sixth units are operational, the Mica plant will continue to operate under the existing water licences. However, the fifth and sixth units will be physically slightly larger and hydraulically more efficient than the existing four units. With six units operating at near full load, the plant would be capable of exceeding the current instantaneous diversion rate of the existing Water Licence, which is 65,000 cubic feet a second (cfs). While the operation of the Generating Station will be limited to the existing diversion rate, BC Hydro may apply for an additional water licence for an additional diversion of 3,000 cfs to allow operation at 68,000 cfs.
3.0 OPERATING CONDITIONS

3.1 Proposed Conditions for the Operation of Works for Diversion and Use of Water

BC Hydro proposes to operate the Mica hydroelectric facilities in accordance with the conditions outlined in the Columbia Water Use Plan and the Addendum, subject to requirements of the Columbia River Treaty. BC Hydro may not be able to operate within these conditions during extreme hydrological events.

3.1.1 Kinbasket Reservoir

The Core Committee did not recommend any operational constraints on Kinbasket Reservoir. Rather, the emphasis is placed on implementing new or augmenting existing Columbia WUP monitoring programs in order to better inform future operational decisions and to ensure that the upper elevations of the reservoir drawdown areas will not be adversely affected by any incremental changes in reservoir storage operation attributable to the fifth and sixth units.

3.1.2 Mica Generating Station

The Core Committee did not recommend any operational constraints on Mica Generating Station discharges but did recommend continuation of the fish monitoring programs in the reach of the Revelstoke Reservoir from Mica Village north to the toe of the Mica Dam (the tailrace). It was also recommended that the monitoring be carried out for two more seasons prior to the in-service date of the units and for three seasons after the units are in-service. The program should also be adaptive in the event of a change of in-service date for the sixth unit.

The Core Committee recommended conducting an assessment study of the Nagle Creek wetland with an assessment prior to operation of the fifth unit and if recommended in the assessment, monitoring of the wetland after the in-service date of the units.

As an outcome of the environmental assessment, a recommendation was made to undertake a Total Gas Pressure (TGP) evaluation study three years post in-service to identify any changes in zero discharge operation to help determine the incremental effect of Mica Generating Unit 5 and Mica Generating Unit 6 operation on gas supersaturation in the tailrace and potential effects on aquatic life.
3.1.3 Revelstoke Reservoir

The Core Committee did not recommend any operational constraints on the Revelstoke reservoir. Rather, the emphasis was placed on additional reservoir water temperature data collection to better inform the WUP reservoir productivity program of any incremental changes in reservoir storage operation attributable to the fifth and sixth units.

3.1.4 Revelstoke Generating Station

The Core Committee did not recommend any operational constraints on the Revelstoke generating station. It was recognized that temperature information to be collected for the reservoir productivity program will be a useful contribution to the White Sturgeon recovery program as it evolves under the Columbia River WUP prior to and after the in-service dates of the projects.

4.0 PROGRAMS

As part of this Mica Generating Unit 5 and Mica Generating Unit 6 consultative process, the provisions of the on-going Columbia River WUP program were reviewed for the need to take into account the incremental change in operations expected with the implementation of the Mica Generating Unit 5 and Mica Generating Unit 6 projects. These recommendations can be reviewed in Appendix 1. Table 4-1 provides a summary of the new programs and the additions to existing programs that are already included in the Columbia River WUP.

Accordingly, it is recommended that the Comptroller of Water Rights direct BC Hydro to undertake the programs listed in Table 4-1.
### Table 4-1: New Programs, Additions to Existing Programs and their Key Objectives

<table>
<thead>
<tr>
<th>Program</th>
<th>Key Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kinbasket Vegetation</td>
<td>Augment the existing Columbia WUP monitoring program for Kinbasket Reservoir: <em>Kinbasket Reservoir Inventory of Vegetation Resources</em> (CLBMON-10) to include a modelling component to evaluate effects of inundation changes on plant communities in the 753 m to 754 m elevation range. The duration of the study will also be extended by one year to collect one additional data set post-Mica Unit 5 in-service date. Develop a new Columbia WUP Monitoring Program to investigate the potential for effects on the different representative wetland types that exist across the reservoir in the upper elevation band. The design of this program will incorporate the results of the existing WUP monitoring programs: <em>Kinbasket and Arrow Lakes Revegetation Management Plan</em> (CLBMON-10) and the <em>Kinbasket &amp; Arrow Amphibian and Reptile Life History and Habitat Use Assessment Study</em> (CLBMON-37). As part of this program, a selection of representative wetlands in Kinbasket Reservoir will be identified and monitored. This program will be used to assess the potential effects of water level changes within the 753 m to 754 m elevation band on wetland vegetation. Study design will include two years pre-Mica Unit 5 in-service date and three years post-Mica Unit 5 in-service date monitoring.</td>
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<tr>
<td>Kinbasket Wildlife</td>
<td>Augment the WLR Kinbasket Amphibian Life History study by implementing the study annually for the full 11-year duration of the program (current design is for monitoring to only occur every 2nd year during the latter years of the program).</td>
</tr>
<tr>
<td>Reservoir Productivity</td>
<td>Augment the existing Columbia WUP Ecological Productivity Study with the addition of moored thermistor stations to assess the potential effect of Mica Unit 5 and Mica Unit 6 on the thermal strata and ecological productivity of Kinbasket and Revelstoke reservoirs. The temperature monitoring will occur over the duration of the existing WUP study.</td>
</tr>
<tr>
<td>Mica Dam Tailrace</td>
<td>Develop and implement a new WLR program of community fish indexing and temperature / habitat monitoring that builds on the results of the study undertaken during the Mica Unit 5 and Mica Unit 6 Environmental Assessment in 2008. The program should include two years pre-Mica Unit 5 and Mica Unit 6 in-service dates and two years post-Mica Unit 5 and Mica Unit 6 in-service dates. The program should be designed to be adaptive in nature, with the post-period monitoring taking into account results from the pre-period monitoring, and all monitoring designs taking into account the outcome of the forthcoming studies in the Entrainment Strategy. Undertake a new Columbia River TGP study of the Mica plant operating record at three years post in-service date of Mica Unit 5 and Mica Unit 6 to identify any changes in synchronous condense operation. If the synchronous condense operation is significantly greater than historic, then BC Hydro will undertake a TGP monitoring program to confirm that the current Best Management Practices are still applicable.</td>
</tr>
</tbody>
</table>
### Program Key Objective

**Nagle Creek Wetland**

Undertake a scoping study to determine the elevation of the Nagle Creek wetland area and the probability that Mica Unit 5 and Mica Unit 6 operation could affect the area. If there is a significant risk of an operational effect, an inventory of potentially affected aquatic/terrestrial organisms and vegetation in the wetland area will be conducted. Discussions will be held with the MOE regarding the specific nature of the study prior to commencement.

## 5.0 IMPLEMENTATION OF RECOMMENDATIONS

The operating conditions and the monitoring programs proposed in this Water Use Plan Addendum will be implemented after BC Hydro receives direction from the Comptroller of Water Rights.

## 6.0 RECORDS AND REPORTS

### 6.1 Compliance and Non-compliance Reporting

There are no proposed changes to the compliance and non-compliance reporting provisions of the Columbia River Water Use Plan as a result of this Addendum.

### 6.2 Monitoring Program Reporting

Reporting procedures will be determined as part of the detailed terms of reference for each study or undertaking.

## 7.0 PLAN REVIEW

There are no proposed changes to the review provisions of the Columbia River Water Use Plan as a result of this Addendum.
APPENDIX 1
SUMMARY OF CORE COMMITTEE RECOMMENDATIONS
<table>
<thead>
<tr>
<th>TOPIC</th>
<th>CORE COMMITTEE RECOMMENDATIONS</th>
<th>M5 M6 PROJECTS</th>
<th>WUP ADDENDUM **</th>
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</thead>
<tbody>
<tr>
<td><strong>ENVIRONMENT</strong></td>
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<tr>
<td>Construction Phase</td>
<td>Ensure the <em>Environmental Management Plans</em> developed to guide construction phase activities utilize all Best Management Practices and adopt and implement all recommendations from the technical Environmental Assessment Review.</td>
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<tr>
<td>Fish Entrainment</td>
<td>Ensure that any potential incremental fish entrainment and related environmental consequences that result from the addition of Units 5 and 6 at Mica Dam will continue to be addressed as part of the implementation of the Fish Entrainment Strategy for the Columbia River.</td>
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<tr>
<td>Reservoir Productivity</td>
<td>Expand the WLR Kinbasket and Revelstoke Ecological Productivity monitoring program with the addition of moored thermistor stations to improve the capacity to assess any potential effects on thermal strata and ecological productivity in the reservoirs.</td>
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</tbody>
</table>
| Kinbasket Vegetation | 1 – Augment the existing WLR Kinbasket Vegetation Inventory program with: A) a modelling exercise to simulate the potential effect of increased water levels into the upper elevation band; and B) an additional year of vegetation inventory post Mica 5 installation in 2018.  
2 – Develop a new WLR study to investigate the potential for effects on the different representative wetland types that exist across the reservoir in the upper elevation band. Detailed design will incorporate the results from the existing, related WLR studies (Kinbasket Vegetation Inventory and Kinbasket Amphibian Life History) and will include at least 2 years pre and 3 years post the Mica 5 installation. | √ | |
<p>| Kinbasket Wildlife | Increase the frequency of monitoring in the WLR Kinbasket Amphibian Life History study to occur annually for the full 11-year duration program. This is an increase of 3 additional field seasons of study (the current design is for monitoring to only occur every 2nd year during the latter years of the program). | √ | |</p>
<table>
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<tr>
<th>TOPIC</th>
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</tr>
</thead>
</table>
| Mica Dam Tailrace      | 1 – Develop and implement a new WLR program of community fish indexing and temperature/habitat monitoring that builds on the results of the study undertaken during the Mica 5 & 6 Environmental Assessment. The program should include two years pre-installation (2011, and 2012) and two years post-installation (2015 and 2016). The program should be designed to be adaptive in nature, with the post-period monitoring taking into account results from the pre-period monitoring, and all monitoring designs taking into account the forthcoming studies in the Entrainment Action Plan.  
2 – Repeat the mountain whitefish egg stranding study in the fall/winter of 2009/2010. If a significant risk is determined by DFO, then BCH will work with DFO on appropriate mitigation or compensation.                                                                                                                                                                                                                       |                | √               |
| Nagle Creek Wetland    | Implement a study of the wetland boundaries in 2011 to determine the potential for operational influence. If a significant risk is determined by MOE, then develop a study for monitoring of changes to habitat Pre- and Post-installation of the new units.                                                                                                                                                                                                                                                                                                                                             |                | √               |
| COMMUNITY              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                |                 |
| Employment             | 1 – Utilize the CHC agreement to support local and equity hire for First Nations, and use contracting language to encourage all contractors to extend the principles of local and equity hiring to non-CHC hiring practices.  
2 – Implement a program to better inform the public regarding hiring processes through newspaper advertising and providing notification and information to local employment centres (Revelstoke, Golden, Valemount, Nakusp, Sicamous, Salmon Arm) and interested First Nations in the Columbia region.  
3 – Work with interested local First Nation and community groups as requested to develop specific project employment and contracting strategies.                                                                                                                                                                                                                                          |                | √               |
<p>| Training               | 1 – Create a fund ($50K for Mica 5 and $50K for Mica 6) to support and enhance the accessibility to trades training programs offered by post-secondary institutions in                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                | √               |</p>
<table>
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</table>
| Accommodation | 1 – Monitor for potential rental housing impacts during the construction periods. Should either the Mica Unit 5 Project or Mica Unit 6 Project be found to have a significant negative effect on the cost or availability of rental accommodation in the City of Revelstoke, provide a contribution to a local affordable rental housing initiative commensurate with the level of impact. The level of impact will be discussed and agreed upon between the City of Revelstoke and BC Hydro.  
2 – Arrange with contractors to offer used accommodation units at Mica townsite to the City of Revelstoke after construction.  
3 – At times during the construction period when accommodation spaces are unused by project personnel, continue to provide accommodation at Mica townsite for non-construction people (e.g., forestry operators or WLR contractors). | √              |                 |
| Traffic       | 1 – Develop an information package for construction employees regarding traffic safety, wildlife accident risks, etc. Review the package with local government and the Ministry of Environment staff prior to use.  
2 – Develop improved road signage (e.g., speed limits, wildlife crossings, etc.).  
3 – Communicate traffic schedules (e.g., shift changes, major deliveries) to local RCMP and other road users.  
4 – Enhance RCMP traffic enforcement on Highway 23 by funding additional overtime shifts for existing officers through the City of Revelstoke’s contract with the RCMP.  
5 – Encourage car-pooling.                                                                                           | √              |                 |
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<tbody>
<tr>
<td>Recreation</td>
<td>1 – Develop an information package for construction employees regarding recreation regulations, opportunities and safety (e.g., fishing regulations, caribou winter habitat areas, avalanche awareness, etc.).</td>
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<tr>
<td></td>
<td>2 – Monitor fishing and other recreation site use near Mica Dam and townsite and as necessary: a) provide funding to the MOE Conservation Officer Service to enable periodic site visits; b) ensure regular clean-up of garbage.</td>
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<tr>
<td>MITIGATION OR COMPENSATION RESPONSE</td>
<td>In the event that future monitoring programs uncover incremental impacts from the operation of the 5th or 6th Units at Mica, and dependent on the severity of the impact, mitigation or compensation response will occur in a timely manner using one of more of the following actions:</td>
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<tr>
<td></td>
<td>▪ Mitigation or compensation via new or existing programs and budgets.</td>
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<td>▪ Mitigation or compensation via new or expanded projects that could fall within the Columbia Fish and Wildlife Compensation Program.</td>
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<td>Integration into the current Columbia River Water License Requirement (WLR) programs or into the next round of Columbia River Water Use Planning.</td>
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