



IMO Staff Recommendation to Panel on Exemption Application (Specified facilities and equipment prior to market opening)

PART 1 – GENERAL INFORMATION

Market Participant Name: **Bruce Power Inc.**

Location/Site: Bruce B GS

Exemption Application ID: 01-1015

Market Participant ID:

Description of Exemption Requested: **The *exemption applicant* is requesting an *exemption* from the requirement to automatically disable control systems that inhibit governor response during frequency deviations greater than 100 mHz above the normal system frequency of 60 Hz.**

Date Exemption Application Received: January 31, 2001

Date all relevant application information supplied by applicant: September 7, 2001

Management Approvals Obtained (YES or NO): YES

Section of the *Exemption Application and Assessment Procedure* under which the Exemption Application is made:

- *Section 1.5.1 (Application for Exemptions for Facilities and Equipment prior to Market Opening)*

Market Rule(s) or related Market Manual(s) from which exemption is requested (copy of Market Rule(s) or related Market Manual(s) attached): “Market Rules” *Baseline 6.6, Chapter 4, Appendix 4.2, Reference 16.*

Third Party Submissions Received (YES or NO):

Supplemental Assessment Information Attached (YES or NO): NO

Related Historical Exemption Application(s) or Related Exemption Application(s) in Process (YES or NO): YES

N. B. If YES, see attached History of Exemption Applications

Role of applicant in the market as it relates to this exemption application: *Generator*

Part 2 - Recommendation

Recommendation: GRANTED with conditions

Criteria Used in Assessment of Exemption Applications Prior to Market Opening (Section 1.5.2 of Exemption Application and Assessment Procedure):

(If X appears in a box, the criterion is applicable to this exemption application and is evaluated in Part 3 – Details of Assessment; if X does not appear in a box, the criterion is not applicable to this exemption application.)

Whether the exemption that is the subject-matter of the exemption application would, if granted, materially:

- impact the ability of the IMO to direct the operations and maintain the reliability of the IMO-controlled grid; ☒

Comment: See "Assessment" Section

- affect the ability of the IMO to operate the IMO-administered markets in an efficient, competitive and reliable manner; ☐

This exemption application does not affect the ability of the IMO to operate the IMO-administered markets in an efficient, competitive and reliable manner.

Whether the cost or delay to the exemption applicant of complying with the obligation or standard to which the exemption application relates is reasonable, having regard to the nature of the obligation or standard, the nature of the exemption application and the anticipated impact of non-compliance by the exemption applicant in terms of the elements referred to above. ☒

PART 3 – DETAILS OF ASSESSMENT

Exemption Request:

The *exemption applicant* is requesting an *exemption* from the requirement to automatically disable control systems that inhibit governor response during frequency deviations greater than 100 mHz “above” the normal system frequency of 60 Hz for the life of the equipment.

Market Rule Requirement:

Reference 16 of Appendix 4.2 in the “Market Rules” requires that, for frequency deviations greater than 100 mHz above or below the normal system of 60 Hz, control systems that inhibit governor response shall be automatically disabled.

Assessment:

Bruce B units can be operated under the “turbine -leading ” mode (reactor power adjusted to follow a turbine power change) or the “reactor -leading” mode (turbine power adjusted to follow a reactor power change). The reactor-leading mode is Bruce Power’s preferred mode of operation under normal conditions. During major disturbances resulting in a large unbalance of generation and load,

PART 3 – DETAILS OF ASSESSMENT

the reactor-leading mode becomes the only stable mode of operation. The reactor-leading mode automatically matches the electrical output of the turbine/*generator* to the power being produced by the reactor.

Electrical disturbances can result in the power system separating into sections (defined as electrical islands) where the generation contained in a section does not match the load to be supplied in the section. An electrical system disturbance can result in an electrical island containing more generation than load; this island is known as an over-generated island. Over-generated island frequency deviations can be greater than 100 mHz above the normal system frequency of 60 Hz. In these conditions, each *generator* will initially respond to the governor signal to reduce the electrical output, to reduce frequency. Operating in the reactor-leading mode, the boiler pressure control system will slowly (at about 1% of reactor power per second) restore the electrical output of the turbine/*generator* to match the power being produced by the reactor, thus driving up the frequency of the island. If the frequency of the island remains greater than 100 mHz above the normal system frequency, the reactor output must be adjusted such that the electrical output matches the load in the electrical island through manual intervention from the nuclear operator under *IMO* direction. This manual intervention has the same effect on the power system as would the automatic disabling of the control systems that inhibit governor response.

The reactor-leading mode provides more stable operation, from the perspective of nuclear station operation. If the *exemption* is denied, Bruce Power would revert their mode of operation of the Bruce B units back to the turbine-leading mode, which will significantly hamper the units' capability to remain connected to the *IMO-controlled grid* during major disturbances, thus resulting in a potential adverse impact on system *reliability*.

If the system is deficient in generation as a result of a major disturbance, the frequency will fall below 60 Hz. In all under-frequency situations, the boiler pressure control system will not interfere with normal speed governing control.

Recommendation:

It is recommended that this *exemption application* be GRANTED from the requirement to automatically disable control systems that inhibit governor response during frequency deviations greater than 100 mHz above the normal system frequency of 60 Hz for the life of the equipment.

Proposed Operation: A plan will be developed by Bruce Power and the *IMO* regarding manually controlling the reactor production and electrical output of Bruce B units in over-generated islanding situations when the island frequency deviation is greater than 100mHz above the normal system frequency of 60 Hz.

PART 4 – TERMS AND CONDITIONS

Effective Date of Exemption (or event causing exemption to be become effective)	Date Exemption Application received
Date of Expiration of Exemption <ul style="list-style-type: none"> • If greater than 5 years, the Panel must be satisfied that the circumstances justify a later date • Circumstances which will cause the exemption to immediately expire 	Lifetime of the equipment
Market Rule (s) or related Market Manual(s) from which the Exemption is granted	Chapter 4, Appendix 4.2, Reference 16.
Restrictions on the manner of operation and/or additional obligations to be met during the term of the Exemption, if any	Manner of operation or restrictions, if any, will be identified in the plan developed by Bruce Power and the <i>IMO</i> regarding manually controlling the reactor production and electrical output of Bruce B units in over-generated islanding situations.
Monitoring Information Required <ul style="list-style-type: none"> • Information required to be provided by the Exemption Applicant for monitoring by the IMO 	
Payment of Costs <ul style="list-style-type: none"> • Processing Costs (when introduced) • Incremental Exemption Costs • Settlement amounts to be withheld or repaid 	None

PART 4 – TERMS AND CONDITIONS

<p>Reconsideration/ Removal</p> <ul style="list-style-type: none"> • Date on which the Exemption will be reconsidered (<i>if applicable</i>) • Circumstances under which the Exemption will be reconsidered (<i>if applicable</i>) other than unforeseen future change in circumstances 	<p>Circumstances under which this <i>exemption</i> should be reconsidered are:</p> <ul style="list-style-type: none"> • Replacement of the Bruce B turbine-reactor control systems.
<p>Transferability</p> <ul style="list-style-type: none"> • List the terms and conditions that need to be met to allow for a transfer of this exemption to be approved by IMO staff 	<p>Approval to transfer this <i>exemption</i> may occur once the following criteria have been met:</p> <ul style="list-style-type: none"> • the transfer meets applicable terms and conditions set forth in the <i>exemption</i> itself and whether the transfer would affect the ability of the proposed transferee to comply with all of the terms and conditions of the <i>exemption</i>; • the proposed transferee is a <i>market participant</i> or undertakes in writing to the <i>IMO</i> to apply for authorization as a <i>market participant</i>; and • the extent to which the transfer of the <i>exemption</i> will impact the timely implementation of the plan to become compliant with the exempted obligation (such plan may be the <i>exemption</i> plan, modified as required by the Panel as part of the terms and conditions of the <i>exemption</i>).
<p>Other:</p>	<p>Not Applicable</p>