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British Columbia
Ministry of Forests and Range

Rationale for Increase in
Allowable Annual Cut (AAC)

Innovative Forestry Practices Agreement

Issued to
Tolko Industries Ltd.

Effective
August 2, 2007

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Regional Manager
Southern Interior Forest Region

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Executive Summary

Section 59.1 of the *Forest Act* enables the Ministry of Forests and Range (MFR) regional manager to increase the current allowable annual cut (AAC) associated with the licence of an innovative forestry practices agreement (IFPA) holder. An increase in AAC must be justified based on the IFPA-holder documenting their innovative forestry practices or activities in a Forestry Plan approved by the regional manager and demonstrating the impacts of the practices on timber supply by methodology approved by the chief forester.

Lignum Limited entered an innovative forestry practice agreement with the Minister of Forests on June 19, 1997 for a 10 year period. The agreement applied to two forest licences, one in the Williams Lake TSA and one in the 100 Mile House TSA. These licences and the IFPA are now held by Tolko Industries Ltd. On July 17, 2007 the IFPA was extended to August 31, 2011.

Tolko Industries Ltd. in a letter dated September 27, 2006 requested that the regional manager consider an increase of 185 649 cubic metres per year to their licences under the IFPA. This is the first request for an allowable annual cut increase under this agreement. For this decision, I have reviewed the application, the associated information, and consulted with First Nations.

In this rationale, I determine that it is reasonable for a 35 000 cubic metres increase in the allowable annual cut of the IFPA-holders' forest licences. In this decision, I recognize uncertainty related to several of the innovative forestry practices and therefore make the increase subject to several conditions.

The 35 000 cubic metres awarded under Section 59.1 will be allocated as follows:

> A20003 – in 100 Mile House TSA by 10 000 cubic metres per year
> A20018 – in Williams Lake TSA by 25 000 cubic metres per year.

The determination is effective August 2, 2007 and will remain in effect until August 31, 2011 unless otherwise determined.

Objective of this Document

This document is intended to provide an accounting of the factors that I, as regional manager of the Southern Interior Forest Region, have considered, and the rationale that I have used in making my determination, under Section 59.1 of the *Forest Act*, of a request to increase the current allowable annual cut (AAC) of the replaceable forest licences under an Innovative Forestry Practices Agreement (IFPA). Specifically, on September 27, 2006 Tolko Industries Ltd made an application to increase the AAC of their licences FL A20003 and A20018 that are under an innovative forestry practices agreement.

The document outlines the background of the Tolko IFPA, statutory framework, guiding principles for the determination, the role of timber supply analysis in the process, the consideration of factors influencing the timber supply analysis, impacts on other licensees, First Nations' considerations, reasons for decision, determination, conditions and recommendations. The appendices contain the IFPA legislation and memorandum from the chief forester on timber supply methodology. This rationale does not identify all the work completed by the IFPA-holder, but is intended to address the AAC increase application and resulting determination needs.

Innovative Forestry Practices Agreement

Lignum Limited was issued an innovative forestry practice agreement on June 19, 1997 for a ten-year term for their replaceable forest licences A20003 in the 100 Mile House TSA and for A20018 in the Williams Lake TSA. Tolko Industries Ltd. is the current holder of these replaceable forest licences.

Tolko Industries Ltd. applied to the Regional Manager on March 28, 2006 requesting that the IFPA be extended 5 years to June 9, 2012. In February the Minister of Forests and Range identified a willingness to extend agreements only until August 31, 2011 and delegated to the regional manager the authority to extend existing agreements upon application by the agreement holder. On July 17, 2007 the innovative forestry practice agreement for licences A20003 and A20018 was extended until August 31, 2011.

Description of Innovative Forestry Practices Agreement Area

The IFPA covers 610 810 hectares within the Central Cariboo, 100 Mile House, and Chilcotin Forest Districts in central British Columbia and is also within the area of the Cariboo-Chilcotin Land-Use Plan. The IFPA is divided into two separate units. The larger section is east of the Fraser River and extends from McLeese Lake and Horsefly in the north down the western side of the 100 Mile House TSA as far south as west of Clinton. The other section is located west of the Fraser River and is primarily northwest of Alexis Creek.

The IFPA features varied landscape, though generally consists of flat or gently rolling terrain and covers 8 biogeoclimatic zones ranging from the very dry Bunchgrass zone to the cool wet Engelmann Spruce Sub-alpine Fir zone. However, over 90% of the area falls within 3 zones: the Interior Douglas-fir (57%), Sub-boreal Pine Spruce Zone (27%), and Sub-boreal Spruce Zone (10%). Lodgepole pine dominates the forests of the Chilcotin and Cariboo Plateaus. Douglas-fir, generally in mixtures with Lodgepole Pine, is found in the Chilcotin and Fraser Valleys. The inventory is comprised of about 52% lodgepole pine, 40% Douglas-fir, and 8% other species.

Statutory Framework

Section 59.1 of the *Forest Act* enables the regional manager to increase the current allowable annual cut associated with the licence of an innovative forestry practices agreement holder. Prior to such approval, the regional manager must have approved a Forestry Plan in which the innovative forestry practices or activities are identified.

Eligible categories of innovative forestry practices and activities are described in the Innovative Forestry Practices Regulation. These categories include improvements due to harvesting or silvicultural systems, silvicultural treatments, collection and analysis of new data on forest composition and expected growth, and management activities to enhance and protect other resource values. To be eligible, the practices and activities must be within the Forestry Plan approved by the regional manager. The collection and analysis of new data must be in accordance with the available specifications of the chief forester.

An increase in AAC must be justified based on timber supply analysis methodology approved by the chief forester. The chief forester has made known his approved timber supply analysis methodology in a memorandum dated April 6, 2001 to the regional managers. This memorandum provides the general principles of the timber supply analysis methodology that is required to justify an increase in allowable annual cut to the licence of an innovative forestry practices agreement holder.

Under section 59.1 of the *Forest Act*, the regional manager can limit an AAC increase to a period of time, area of land, type of timber or any other condition. The regional manager can also reduce or eliminate an increase at any future time given new information or for non-compliance with the Forestry Plan or the conditions set. Further, the regional manager is enabled to suspend or cancel an innovative forestry practices agreement if the holder is not complying with the agreement, Forestry Plan, conditions, *Forest Act*, or *Forest and Range Practices Act*.

Section 59.1 of the *Forest Act*, the Innovative Forestry Practices Regulation, and the memorandum on timber supply methodology from the chief forester, are reprinted in the appendices.

Guiding Principles

As a number of decisions with respect to innovative forestry practices agreements under section 59.1 of the *Forest Act* were expected to be made, I, as regional manner, outlined the following guiding principles for these decisions. These principles assist me in ensuring administrative fairness and consistency in how I approach my decisions.

- For an innovative practice or activity to be considered in an AAC increase decision, the practice or activity must be either currently implemented or the plans for the practice must be clear, practical, and feasible. Given the nature of innovative practices, I accept that some innovative activities presented may be at an initiation stage rather than a current practice stage.
- Innovative practices or activities identified in the approved Forestry Plan, but which are not addressed in an AAC increase request, need to be considered in the AAC increase determination. It is my expectation that the IFPA-holder will work towards implementing the Forestry Plan as approved. My approval is based on the whole plan, not simply components that might result in increased timber supply. As such, I may weigh the risks of practices not yet carried out against identified increases presented to me.
- Any AAC increase decision should be made in the context of current government policy. While I may be aware of proposed policy changes that could impact an AAC increase decision, I must be mindful of the ever changing nature of proposed policy and not speculate on the acceptance of proposed policy. Similarly, it would be inappropriate for me to speculate on the impacts of strategic land-use or treaty processes before the decisions have been made by government and the appropriate implementation details have been determined.
- The most recent timber supply review for the management unit in which the IFPA is located provides the basis for describing current practice. This base may be updated with new information or management practices that are not innovative practices or activities. While I will not credit the IFPA-holder for increases in harvest flow associated with practices that are not defined as innovative in the Forestry Plan and regulation, I must consider impacts on the harvest flow of these updates in relation to the base allowable annual cut and to any benefits derived from innovative practices and activities.
- The right of the IFPA-holder's licence to access timber volume within the timber supply area is not affected by the IFPA unless otherwise agreed upon. I expect that any increase in AAC will be harvested from within the IFPA boundaries in accordance with the information and practices identified in the IFPA review.
- An AAC increase awarded under the IFPA must not cause a negative impact on non-IFPA licensees operating within the IFPA boundaries without the approval of the non-IFPA licensees. The non-IFPA licensees can agree to manage their operating areas within the IFPA area in accordance with the IFPA Forestry Plan but are not eligible for any AAC increase. However, any AAC increase associated with innovative practices carried out under the IFPA Forestry Plan within the IFPA area can be attributable to the IFPA-holder, even if the activities are undertaken by a non-IFPA licensee.

- IFPA practices and activities can be assumed to apply to areas that are temporally excluded from the IFPA (e.g., timber licences, partitions outside of the IFPA-holder's licence) only after they have reverted to timber supply area status. Any increases in harvest flow identified on these stands before they revert will not be eligible under the IFPA. However, I recognise that these areas, when they revert to TSA status, are subject to licensee negotiations and, while the IFPA-holder does not have a specific right to harvest from such future stands, the IFPA-holder is as likely as others to obtain such rights. As such, I will consider these stands to be within the IFPA area at the time they revert.
- Uncertainty exists in the data and management practices presented and modelled in a review of timber supply. In my decision, I must consider this uncertainty and associated risks and, where necessary, I can account for such.
    - One method to reduce risk is to periodically review the determination. As such, I will specifically assign a time period for which an AAC increase is applicable. Nevertheless, if prior to this time period, new information or an assessment of the innovative practices indicates that the increment is not justified, or the licensee is not complying, I have the right to remove or decrease any AAC increase that I may have determined.
    - A second method to reduce risk associated with an increased harvest flow is to award a lower AAC increase than the timber supply analysis suggests. The level of caution that I exercise will depend on the uncertainty of the timber supply increase being attributed to an innovative practice, which is normally related to the quality of the information on the practice, and to inherent uncertainties in ecological dynamics and biophysical factors.

With respect to First Nations' issues, I am aware of the Crown's legal obligations resulting from recent court decisions including those in the British Columbia Court of Appeal and the Supreme Court of Canada. The AAC increase that I may determine should not in any way be construed as limiting those obligations under these decisions.

In my decision, I have considered all information brought forward respecting First Nations' interests, including information from the chief forester resulting from his Section 8 determinations for the Williams Lake TSA and 100 Mile House TSA. If, subsequent to my determination, I become aware of information respecting First Nations' interests that was not available to me at the time of this decision, and indications are that all or part of the allowable annual cut increase was not justified, I will re-visit my determination.

My acceptance of information on practices within this decision does not supersede or fetter other statutory decision-making authorities, and is not to be construed as approval required by any other authority or agency. My determination is also independent of any decision by the Minister of Forests and Range with respect to subsequent allocation of the wood supply.

In making my decision, I am aware of my obligations as a steward of the forests of British Columbia and of the mandate of the Ministry of Forests and Range as set out under the relevant legislation.

Information Sources

In making this decision, I have considered information from a variety of sources. Many of these sources were used to compile a technical summary of the application that was presented to me on April 20, 2007. This document was my primary source for reviewing the application.

- Ministry of Forests and Range (unpublished). Technical Summary of Tolko (Lignum) IFPA AAC Increase Application. April 20, 2007. Kamloops, British Columbia

The allowable annual cut increase application and associated timber supply analysis documents submitted by Tolko Industries Ltd. provide much of the input into the technical summary:

- Tolko Industries Ltd. Proposal for the IFPA volume uplift. October 2, 2006 – Version 7 plus 12 appendices.
- Cortex Consultants Ltd. 2006. Analysis report for the Tolko IFPA Timber Supply Analysis. Draft. August 2006. Prepared by Michael Buell, R.P.F. Updated September 28, 2006.
- Cortex Consultants Ltd. 2006. Data package for the Tolko IFPA Timber Supply Analysis. Draft. July 2006. Prepared by Michael Buell, R.P.F.

I have also reviewed 2006 allowable annual cut determinations made by the chief forester and associated timber supply review information for the Williams Lake TSA and 100 Mile House TSA.

- MOFR. 2006. 100 Mile House Timber Supply Area: Rationale for Allowable Annual Cut (AAC) Determination. Effective September 6, 2006.
- MOFR. 2006. Williams Lake Timber Supply Area: Rationale for Allowable Annual Cut (AAC) Determination. Effective April 18, 2007.
- MOFR. 2006. Williams Lake TSA Urgent Timber Supply Area Review. Allowable Annual Cut Determination Meeting October 11 & 12, 2006
- MOFR. 2006. 100 Mile House TSA Urgent Timber Supply Area Review. Binder for the Allowable Annual Cut Determination Meeting June 20-21, 2006.
- MOFR. 2006. Urgent timber supply review for Williams Lake timber supply area. Public Discussion Paper. Forest Analysis and Inventory Branch..
- MOFR. 2006. Urgent timber supply review for 100 Mile House timber supply area. Public Discussion Paper. Forest Analysis and Inventory Branch. April 2006
- MOF Timber Supply Branch. 2001. Timber supply review: Williams Lake Timber Supply Area analysis report. September 2001.

- MOF Timber Supply Branch. 2001. Timber supply review: 100 Mile House Timber Supply Area analysis report. July 2001.

Tolko Industries Ltd. provided clarification information of their application through correspondence with my staff including:

- Tolko Industries Ltd. February 13, 2007 email from Dave Greenley. Provides responses from Dave Greenley and Michael Buell to questions posed about analysis and application.
- Tolko Industries Ltd. March 1, 2007 email from Dave Greenley. Provides February 23, 2007 responses from Dave Greenley and Michael Buell to questions posed about analysis and application.
- Tolko Industries Ltd. Various email in response to questions including but not limited to email from Dave Greenley, Mike Gash, Michael Buell.

I have also considered other information sources that include:

- Walton A., Hughes J., Eng, M. Fall, A., Shore, T., Riel, B., and Hall.P. 2007. Provincial-Level Projection of the Current Mountain Pine Beetle Outbreak:Update of the infestation projection based on the 2006 Provincial Aerial Overview of Forest Health and revisions to the "Model" (BCMPB.v4). Ministry of Forests and Range, Research Branch, Victoria, BC.

- Coleman, R. Letter to IFPA holders about agreement extensions. January 19, 2007

- Snetsinger, J. Guidance on landscape- and stand-level structural retention in large-scale Mountain pine beetle salvage operations. December 2005.

With respect to First Nations my staff have prepared a summary of the consultation in which the correspondences received are noted. Additional information and sources of information considered are identified within the above technical summary.

- O'Sullivan, S. 2007. Consultation Summary – Tolko Industries Inc. – Uplift and Extension proposed for the IFPA in the Williams Lake (Chilcotin and Central Cariboo districts) and 100 Mile TSAs. Memorandum to Phil Zacharatos, Regional Executive Director, Southern Interior Forest Region. June 29, 2007.

I have also received information through a technical review and evaluation of current and expected operating conditions through comprehensive discussions with BC MFR staff, including a meeting held in Kamloops on April 20, 2007.

Forestry Plan

Prior to awarding an AAC increase under Section 59.1, the regional manager must have approved a Forestry Plan in which the innovative forestry practices or activities are identified.

The Forestry Plan for this agreement was initially approved on June 29, 2000. This plan was subsequently extended to May 31, 2007, just prior to the original expiry of the agreements.

Tolko Industries Ltd. in submitting an application for an allowable annual cut increase is also making an application to amend the Forestry Plan. As such, within my determination I will be considering first the approval of the application as a Forestry Plan amendment.

Allowable Annual Cut Increase Application

In a letter dated September 13, 2006 Tolko Industries Ltd. applied to the regional manager for an increase in the allowable annual cut of their 2 forest licences with innovative forestry practices agreements in the Williams Lake TSA and 100 Mile House TSA. In a revised request dated September 27, 2006, Tolko Industries Ltd. requested that the regional manager consider an increase of 185 649 cubic metres per year to their licences. This is the first request for an allowable annual cut increase under the IFPA.

The application identified the proposed innovative forestry practices and presented a supporting timber supply analysis for an allowable annual cut increase of 185 649 cubic metres. The application also contained background on the communication of the application, proposes that up to 100% of an awarded increase will be offered for harvest to First Nations whose traditional territories overlap the IFPA area, and identifies that any increase will be harvested in mountain pine beetle infested stands.

The Role of Timber Supply Analysis

Section 59.1(7) of the *Forest Act* identifies that an increase in allowable annual cut must be justified according to timber supply analysis methodology approved by the chief forester. The chief forester has made known this methodology in a memorandum dated April 6, 2001. The memorandum provides the general principles, not detailed procedures, of timber supply analysis required to assist my decision.

The timber supply analysis consists of two components. The first component is an information package that includes information from three categories: land base and inventory; timber growth and yield; and management practices. The second component is a suite of timber supply forecasts based on the information package that investigates different harvest flow options and data uncertainty.

To determine an increase in AAC requires that I have both knowledge of timber supply based on current practices and of the changes associated with the IFPA innovative practices and activities. As such, the timber supply analysis provides separate forecasts without and with the innovative forestry practices and activities.

For the current AAC increase application, I made use of timber supply analysis provided by Tolko Industries Ltd within the application of September 27, 2006.

The timber supply analysis with which I am provided is an integral component to my review of the AAC increase application. However, the determination itself is not a calculation but a synthesis of judgement and analysis in which numerous risks and uncertainties are weighed. Analytical methods such as forest estate models cannot incorporate all the social, cultural, and economic factors that are relevant when making forest management decisions. As such, depending upon the outcome of these considerations, the increase in AAC determined may or may not coincide with harvest flows identified in the timber supply analyses.

In this rationale, I will not discuss in detail many of the timber supply analysis assumptions or factors where I am satisfied that such is appropriately considered and is documented within the timber supply analysis and data package reports.

Consideration of Factors

I have reviewed the IFPA-holder's application including the timber supply analysis for the proposed allowable annual cut increase. My decision process for an allowable annual cut increase consists of two steps. The first step is the confirmation that the proposed practices can be considered innovative forestry practices as defined by regulation. The second step is to determine, as justified by the timber supply analysis methodology, an increase in harvest flow attributable to the innovative forestry practice.

Below I follow the above 2 steps where I first discuss my interpretation of the innovative forestry practices proposed and then secondly I comment on the timber supply analysis that was used to assess increases in harvest flow. For the analysis assessment, I will only discuss factors that affect the decision or need elaboration due to concerns expressed.

Innovative Forestry Practices

The application identifies a variety of practices that the IFPA-holder is or wishes to undertake. I have discerned from the application and the supporting documentation (including the timber supply analysis) eight proposed practices that the IFPA-holder is presenting as innovative forestry practices. These proposed practices are:

1. A rehabilitation harvest of Mountain pine beetle attacked stands that are not currently identified for harvest that have less than 100 cubic metres per hectare.
2. A rehabilitation harvest of Mountain pine beetle attacked stands that are currently problem forest types with less than 65 cubic metres per hectare.
3. A rehabilitation harvest of plantations between 30 and 60 years killed by Mountain pine beetle whose volume is less than 65 cubic metres per hectare.
4. Utilization to 12.5 cm for all coniferous species.
5. The use of practices consistent with approved stocking standards and the use of genetically approved seed where possible
6. Douglas-fir stands will be thinned from below removing MPB attacked pine and Douglas-fir less than 12.5 cm and subsequently fertilized
7. In recognition of studies, road disturbance impact is reduced from 5% to 4%. Provide an updated estimate of the timber harvesting land base loss due to future roads.
8. Determine site indices for stands greater than 80 years by a SIBEC assessment.

My guiding principles infer that activities proposed as innovative forestry practices be identified within the approved Forestry Plan. While the Forestry Plan approved in 2000 does not specifically identify all of the above, most of the above do fall within the general practice areas identified within the plan or are a logical progression. As such, I am willing to accept, except as identified below, that these practices have been included within the Forestry Plan.

My considerations for each of the proposed practices are discussed below.

1. A rehabilitation harvest of Mountain pine beetle attacked stands that are not currently identified for harvest that have less than 100 cubic metres per hectare

To compartmentalize the proposed practices, I have interpreted this practice as consisting of stands with a current inventory value less than 100 cubic metres per hectare and at least 65 cubic metres per hectare. Stands below 65 cubic metres per hectare are discussed within subsequent proposed innovative forestry practices.

The IFPA-holder indicates that these are stands are not currently identified for harvest by licensees and if harvested for rehabilitation result in less risk (i.e., obligation) to the Ministry of Forests and Range. Detailed description of these stand types was not provided in the application. Within recent timber supply reviews by the chief forester for the Williams Lake TSA and 100 Mile House TSA, stands greater than 65 cubic metres per hectare are generally included within the modelled forest management. As such, Ministry staff believe that these stand types would be considered harvestable as standard practice under the current allowable annual cut determinations. However, it is recognized that such stands are less likely to be harvested given current harvest priorities around the Mountain pine beetle infestation. West Fraser Mills Ltd. commented that as economics dictates where harvesting will occur it is likely that harvesting may only occur where cut block blending occurs.

I have reviewed the authorized innovative forestry practices and activities identified under regulation. In some cases, a broad interpretation of the regulation and conjecture on what is the actual practice might suggest this practice as innovative. However, based on the information presented to me within the application I concur with my staff opinion that harvesting of the above stands is not beyond standard practice as such I do not consider the rehabilitation harvesting of these stands as an innovative forestry practice.

2. A rehabilitation harvest of Mountain pine beetle attacked stands that are currently problem forest types with less than 65 cubic metres per hectare

I have interpreted this practice as being mature (>60 years old) pine leading stands that have a current merchantable volume of less than 65 cubic metres per hectare as identified in the inventory. These are not stands that have or will be transitioned to a lower merchantable volume as a result of the beetle infestation but are stands whose current volume in the inventory is less than 65 cubic metres per hectare of merchantable volume. These stands of less than 65 cubic metres per hectare were not considered part of the harvest flow within the recent chief forester allowable annual cut determinations for the Williams Lake TSA and 100 Mile House TSA.

I find that it is plausible to accept the above as an innovative forestry practice under section 59.1 2(a) that involves the implementation of harvesting methods or silviculture systems that may increase the total amount of timber available to harvest in the timber supply area over the amount available under standard practices. While I recognize that recent records show that a few low volume stands have been harvested, I do not consider the harvest of such stands to be standard practice nor did the latest chief forester's timber supply review consider these low volume stands. Harvest of these stands that are impacted by Mountain pine beetle will provide immediately available volume and will through silvicultural obligations likely result in future stands that can be harvested earlier.

Stands greater than 60 years old with less that 65 cubic metres per hectare that are attacked by Mountain pine beetle is a fairly broad definition. I do have concerns that all the stands that fall within this definition will not be accessed for harvest by the IFPA-holder and thus the harvest flow projections are optimistic. Reasons these stands may not be accessed are the economics of such harvest, the work of the Forest for Tomorrow program rehabilitating such stands, and, as noted in comments by West Fraser Mills Ltd., other licensees taking these stands as a blended harvest.

I discuss this practice further in the below section "Rehabilitation of Mountain Pine Beetle Impacted Stands". I will discuss my decision on allowable annual cut increases attributable to this innovative forestry practice within my "Reasons for Decision".

3. A rehabilitation harvest of plantations between 30 and 60 years killed by Mountain pine beetle whose volume is less than 65 cubic metres per hectare

I have interpreted this practice as being 30 to 60 year old pine leading stands, particularly plantations, that due to the mountain pine beetle infestation will have a merchantable volume less than 65 cubic metres per hectare.

I find that it is plausible to accept the above as an innovative forestry practice under section 59.1 2(a) that involves the implementation of harvesting methods or silviculture systems that may increase the total amount of timber available to harvest in the timber supply area over the amount available under standard practices. My assumption is that under standard practice these stands would not be harvested or if harvested would be done so at a later time frame resulting in a lower average mean annual increment from these stands. Alternatively, it is plausible to infer with some conjectures that this practice can be considered an innovative forestry practice under section 59.1 2(b) that states "activities that result in the establishment of free-growing stands on (ii) areas that are below stocking requirements and are not part of the holder's free growing responsibilities". However, my expectation is that most of these stands had likely met stocking requirements and therefore no longer had such requirements.

I do have concerns about the appropriateness of including all stands that fall within the above definition. These concerns are similar to those expressed above for mature stands of less than 65 cubic metres per hectare. Additionally, there will be stands whose normal development may fall within the range of the definition. For example the normal development of a stand on a poor site may not reach this volume level until past 30 years of age or as West Fraser Mills Ltd commented stands may have sufficient understocking stocking and therefore would not benefit from such rehabilitation.

I am willing to accept this practice as an innovative forestry practice but I will be mindful of the above concerns. I discuss this practice further in the below section "Rehabilitation of Mountain Pine Beetle Impacted Stands". I will discuss my decision on allowable annual cut increases attributable to this innovative forestry practice within my "Reasons for Decision".

4. Utilization to 12.5 cm for all coniferous species

I interpret this practice as wishing to obtain credit for using volumes of non-pine species with a diameter at breast height between 12.5 cm and 17.5 cm where 17.5 cm dbh corresponds to the current utilization standard.

I do not find this an innovative forestry practice. The acceptability of a change in utilization was specifically identified as an example of an activity that is ineligible in the April 2000 Innovative Forestry Practices Agreements Handbook.

I will discuss in the below section on "Utilization" how I will handle the inclusion of this lower utilization standard in the timber supply analysis.

5. The use of practices consistent with approved stocking standards and the use of genetically approved seed where possible

I interpret this practice as wishing to obtain credit for the yield difference between the genetic worth of managed stands identified within recent allowable annual cut decisions by the chief forester and the newly identified genetic worth expected to occur from the IFPA-holder's operations.

I do not find this an innovative forestry practice. All licensees are expected as standard practice to use the best available seed possible and to be consistent with approved stocking standards.

I will discuss in the below section on "Genetic Gain" how I will handle the inclusion of improved seed in the timber supply analysis.

6. Douglas-fir stands will be thinned from below removing MPB attacked pine and Douglas-fir less than 12.5 cm and subsequently fertilized

I interpret this practice as the IFPA-holder thinning Douglas-fir leading stands with the removal of Mountain pine beetle infested pine of all sizes and smaller diameter non-pine (<12.5 cm dbh). Based on the analysis, it is suggested that between one quarter and one third of the stand volume would be removed every 30 years. Ministry staff indicate that this thinning is not standard practice

I concur with Ministry staff that such thinning could be considered an innovative forestry practice as identified under regulation in section 2(c) as a silvicultural treatment on free-growing stands.

I will further discuss this factor in the below section on "Douglas-fir Thinning" and my decision on allowable annual cut increases attributable to this innovative forestry practice within my "Reasons for Decision".

7. In recognition of studies, road disturbance impact is reduced from 5% to 4%. Provide an updated estimate of the timber harvesting land base loss due to future roads

I interpret this practice as conducting or analysing field studies on the amount of non-productive land base created in order to operationally access timber volumes and then translating those results to timber supply impacts possibly through improved modelling methodologies.

I find that such a practice could be considered as an innovative forestry practice under regulation section 2(e) for "the collection and analysis of new data … to provide a more accurate representation of the forest composition …".

I will further discuss this factor in the below section "Roads" and I will discuss my decision on allowable annual cut increases attributable to this innovative forestry practice within my "Reasons for Decision".

8. Determine site indices for stands greater than 80 years by a SIBEC assessment

I interpret this practice to be the completion of project work that creates updated estimates of site index. This project work would include the identification of site series (e.g., through predictive ecosystem mapping) and the collection or application of site index and site series relationships (i.e., SIBEC) data.

I find that such a practice could be considered as an innovative forestry practice under regulation section 2(e) for the collection and analysis of new data … to provide a more accurate representation of the forest composition …

I will further discuss this factor in the below section on site productivity and I will discuss my decision on allowable annual cut increases attributable to this innovative forestry practice within my reasons for decision.

Timber Supply Analysis

To support the allowable annual cut increase application, the IFPA-holder provided a timber supply analysis. This analysis presented 7 scenarios. The first scenario created a base line of current practice (status quo) within the IFPA area without the identified innovative forestry practices. Other scenarios looked at the timber supply implications of specific innovative forestry practices. These scenarios are discussed below in the related sections. A final scenario combined all the practices and demonstrated the requested uplift of 185 649 cubic metres per year.

The timber supply analysis was completed by an experienced registered professional forester using the Woodstock/LP/Stanley components of the Remsoft Spatial Modelling System. These model components are recognized by the ministry's Forest Analysis and Inventory Branch as acceptable timber supply analysis tools.

The status quo scenario, that was based on assumptions from the recent 100 Mile House TSA and Williams Lake TSA determinations, suggests that about 890 000 cubic metres per year can be obtained in the first decade after which the level drops to about 445 000 cubic metres for 5 years before dropping to the long-term level of 390 000 cubic metres. The status quo assumed the harvest level in the first decade was elevated and that harvesting was directed to pine leading stands greater than 60 years old. Following the first decade, all stands became eligible for harvest. The minimum operability volume for all stands was 65 cubic metres per hectare.

The methodology used for the application sufficiently meets the needs identified in the chief forester's April 6, 2001 memo on timber supply analysis methodology related to innovative forestry practices agreements.

Mountain Pine Beetle

Mountain pine beetle are part of the natural process of lodgepole pine ecosystems. However, the current Mountain pine beetle outbreak in British Columbia has reached unprecedented levels. In the IFPA area, Tolko identifies that 38% of the landbase has some level of infestation based on 1999-2005 aerial overview surveys. In 2006 the infestation has continued to intensify as seen by increases in the moderate to very severe categories of 42% to 55% for the Williams Lake TSA and 41% to 61% for the 100 Mile House TSA of the annual overview surveys.

The IFPA timber supply analysis captured the Mountain pine beetle infestation and associated timber supply impacts. The analysis assumed that all stands greater than 60 years old with pine would be attacked and that the pine would transition to a dead state with the volume lost if not harvested. The rate at which this transition would occur was based around assumptions related to the current infestation levels (1999-2005 aerial overview surveys) and shelf-life assumptions based on biogeoclimatic subzones and moisture types. The harvest priority within the analysis was to direct harvest in the first decade towards pine leading stands of greater than 60 years.

Ministry staff believed the analysis around Mountain pine beetle to be sufficient but expressed several concerns. These concerns included (1) the rate of volume loss due to mortality may be underestimated, (2) stands younger than 60 years that are not assumed to be infested are also being attacked thus may not be available for mid-term timber supply, and (3) the regeneration dynamics of an unharvested stand following Mountain pine beetle attack is not well understood.

For timber supply, there are 2 concerns related to the impacts of the Mountain pine beetle infestation. The most obvious in the recovery of timber volumes of trees killed or to be killed by the beetle prior to the trees decaying to a non-merchantable state. The second concern is that we retain appropriate and sufficient stands for the mid-term timber supply. The mid-term timber supply is supported by both mature and immature stands. Immature stands are those currently not merchantable but expected to be mature for harvest in the mid-term. Mature stands are those stands that we reserve from harvest in the short-term with the expectation that they will be present for harvest in the mid-term.

For mature stands of mixed species, the concern about minimizing non-recoverable losses and the need to maintain volumes for the mid-term may require tradeoffs. From an economic and operational perspective it may not be possible to recover just the pine component of stands. As such to maintain mature stands for mid-term timber supply, it is necessary to accept the loss of the pine component. The acceptance of such losses are demonstrated in the recent chief forester's determination for the 100 Mile House TSA and Williams Lake TSA.

With respect to the harvest of Mountain pine beetle infested stands, concerns for mid- to long-term term timber supply also exist for pine-leading stands. Work by ministry researchers have demonstrated that in some cases it is also reasonable due to the advanced regeneration present to leave pine-leading stands that have been killed. This advance regeneration is likely to make a greater contribution to timber supply than the rehabilitation through harvest of the currently dead stand.

Even if we are able to "selectively" remove the pine component only of stands, Ministry of Environment staff have expressed a concern that recovering only a small volume from a stand implies that larger areas must be accessed. This was noted as a concern because of concerns around hydrological effects and concerns around wildlife trees maintenance.

The IFPA-holder has proposed the rehabilitation and increased capture of low volume and younger pine stands impacted by Mountain pine beetle as an innovative forestry practice. These practices could assist with future timber supply but I need to be mindful of environmental concerns. I discuss these practices in more detail under the below section "Rehabilitation of Mountain Pine Beetle Impacted Stands".

Rehabilitation of Mountain Pine Beetle Impacted Stands

The IFPA-holder has proposed as innovative forestry practices the rehabilitation harvest in mountain pine beetle attacked stands within problem forest types greater than 60 years old with a volume less than 65 cubic metres per hectare and the rehabilitation harvest in beetle attacked plantations between 30 and 60 years. The objective of these rehabilitations would be to convert low volume stands that might not normally be harvested to fully stocked managed stands that better contribute to future timber supply.

I found that both of these treatments could be considered innovative forestry practices. The timber supply analysis provided by the IFPA-holder provided 2 scenarios to show the timber supply benefits of these practices.

To demonstrate the impact of a change in the minimum operability, the IFPA-holder provided an 'operability' scenario that lowered the minimum operability for all clearcut harvesting regimes from 65 cubic metres per hectare to 40 cubic metres per hectare. This change showed a 10% increase in the harvest level throughout the planning horizon. This scenario resulted in about 1900 hectares per year of stands less than 65 cubic metres per hectare being harvested in the first decade and an average of 500 hectares in later years.

To demonstrate the impact of rehabilitating beetle attacked plantations, the IFPA-holder provided a 'rehabilitation' scenario where pine stands aged 30 to 59 years with a volume as low as 40 cubic metres per hectare could be harvested in the first 15 years. Further in this scenario, after 15 years the lower operability of greater than 40 cubic metres was applied to all pine stands. This scenario showed a 4% increase in harvest flow through all planning horizons.

In the application, the IFPA-holder does not describe the stands that would be rehabilitated beyond the generalities of an age and volume description. I believe that it will be neither possible nor desirable to access all stands that these general descriptions identify within the modelling scenarios. Some of these stands will not be harvested because of reasons that include economics, access timing, and environmental concerns. As such, I find the modelling scenarios only provide me with a bound of the timber supply implications of these practices.

The 'operability' scenario demonstrated an increase in short term harvest flow of 93 052 cubic metres per year in the first decade. This scenario is a wide bound as it includes stands of all leading species and not simply pine.

The 'rehabilitation scenario' that identifies a short term increase of 38 508 cubic metres per year, is likely a narrower bound in that it does limit the harvest to pine leading stands. This scenario applies the lower operability in the first 15 years to pine stands initially 30 to 59 years and after 15 years the lower operability is applied to pine stands greater than 65 years. In this scenario the bound may be slightly higher as operability in mature stands is not applied in the first 15 years but alternatively the bound might be lower as the simple description of the stands based on age and volume is still broader than the stands likely to be accessed operationally.

I find that a "rehabilitation" harvest of lower volume pine stands that have been attacked by Mountain pine beetle to be a reasonable practice where such harvest will improve the contribution to future timber supply without greatly impacting environmental values. However, I do not find that the levels of harvest identified within the models are possible or desirable. I will discuss this further in my "Reasons for Decision".

Operability/Problem Forest Types/Minimum Harvestable Volume

Harvesting does not and is not expected occur on all areas of the IFPA area. To identify the area on which harvesting will occur, typically involves delineating areas that are not expected to be harvested and thus not contribute to timber supply. The modelled area on which timber harvesting is expected is called the timber harvesting land base.

Two common factors used to delineate the timber harvesting land base are operability and problem forest types. Operability is area that has been identified, often by licensees, as area where they would not harvest either due to physical or economic reasons. How this is defined varies greatly among management units. Problem forest types are considered physically operable land base but with stands that are not utilized due to timber quality or low volume. Such forests types are also defined in a variety of ways.

The current IFPA analysis addressed much of its operability and problem forest type identification by having a minimum harvestable volume criteria. Stands that had a volume of less than 65 cubic metres per hectare were ineligible for harvest. Within the

current analysis no problem forest types were specifically excluded other than for the low volume criteria.

In the 100 Mile House TSA operability had been based simply on a slope criteria while the only problem forest type identified was deciduous forests. In the Williams Lake TSA slope was also used for determining operability but in addition to deciduous leading stands there were a few species and location specific problem forest types identified.

Ministry staff felt that the use of a minimum harvestable volume criteria was sufficient for determining operability and the problem forest types except for the deciduous leading stands problem type.

For deciduous stands, harvest statistics from the IFPA area indicate that deciduous is being harvested (4.8% of billed volume was deciduous for 2002-2006). As such, it can be considered reasonable to consider some deciduous is being harvested. In the timber supply analysis for all scenarios slightly less than 16% of the harvest is from deciduous species, with slightly more seen from the innovative forestry practices scenarios as compared to the status quo. This suggests that the model harvest flows will be overestimated due to this deciduous contribution. In terms of my decision around an annual allowable cut, I find that the harvest flow from the deciduous component is about 6000 cubic metres higher in all the innovative forestry practices scenarios as compared to the status quo. As it is unlikely that the higher harvest level of deciduous will occur, I believe that observed increases in harvest flow attributed to the innovative forestry practices may be overestimated.

I recognize that modelling of the land base within a timber supply analysis may be accomplished in a variety of ways. I find that operability and problem forest types have generally been modelled in an acceptable manner. Nevertheless, I am mindful of the potential downward pressure on the identified allowable annual cut increase created from the optimistic harvest of deciduous species. I will discuss my accounting for such under reasons for decision.

Forest Inventory

Through work of the IFPA-holder, a Vegetation Resource Inventory (VRI) has been completed on the IFPA area. This inventory consists of both a Phase 1 project of forest cover mapping based on photo interpretation and a Phase 2 project of ground sampling that are used to adjust photo-interpreted attributes.

The IFPA-holder has not based the current AAC increase application directly on the VRI project which was identified as an innovative forestry practice with the Forestry Plan. Information that compares this project to the previous forest cover inventory was not included in the application.

In my guiding principles I state the need to consider the Forestry Plan as a whole in an allowable annual cut increase application and not simply those components that suggest increase harvest flow. Ideally, I would have wished to see the application and analysis consider more of the work that had been conducted by the IFPA-holder, including the implications of this inventory.

Since the VRI adjustment was completed, Forest Analysis and Inventory Branch have updated the adjustment compilation methods. The new methods have tended to result in slightly higher volume estimates. As such, the use of older compilation methods suggests that the volumes within the IFPA area may be underestimated. However, Forest Analysis and Inventory Branch are not able to confirm that such underestimation is present without recompilation.

For this determination, I accept the use of the new inventory as is. This acceptance, which in part recognizes the IFPA has changed ownership twice since the original projects were completed, infers that I am considering standard practice to coincide with the latest chief forester's allowable annual cut determination.

Douglas-fir Thinning

The IFPA-holder has proposed to implement a thinning treatment where Douglas-fir stands are thinned from below for Mountain pine beetle attacked pine and Douglas-fir less than 12.5 cm diameter at breast height. The IFPA-holder also state that these stands would be fertilized if funding is available. The proposal is to target 500 to 750 hectares per year for this treatment.

In the application analysis, Douglas-fir thinning is enabled in the status quo scenario for stands with a volume greater than 60 cubic metres per hectare. For the Douglas-fir cleaning scenario partial harvesting is permitted in stands as low as 35 cubic metres per hectare (but not in mule deer winter range). To model this thinning scenario, the existing yield table for these stand types was modified by removing a percentage of the stand volume (26-33% dependant on the analysis unit) and in the timber supply model a delay in re-entry was set to a minimum of 30 years. The results show that 750 hectares are cleaned in the first decade followed by 555 hectares in the second decade. This harvest then drops off to an average of 60 hectares over the next 5 decades. Fertilization was not modelled.

I found that this treatment could be considered an innovative forestry practice. However, the information provided in the application is likely only sufficient in providing an upper bound on the incremental impact of the thinning portion of this practice and even at that there is uncertainty. The Douglas-fir cleaning scenario demonstrated about a 5% increase throughout the planning horizon as compared to the status quo scenario.

For my decision around an allowable annual increase on IFPA-holder licences, as did the chief forester in his recent for the allowable annual cut of the Williams Lake TSA and

100 Mile House TSA, I am concerned about the availability of timber volume in the mid-term once mature pine is no longer available either due to harvest or loss of merchantability due to beetle caused mortality. Non-pine, such as Douglas-fir, is expected to be the source of this harvest in the mid-term through the deferral of its harvest in the short-term.

The proposed Douglas-fir thinning will remove some non-pine stems from the mid-term either through direct harvest of the smaller non-pine stems or through extending the next harvest until sufficient growth has occurred for the next entry. As such, I note that harvesting of these stands in the short-term may be inconsistent with recommendations of the chief forester around maintenance for mid-term timber supply. The IFPA-holder suggests that partial cutting should improve these stands from a growth perspective which may enhance the mid-term. However, no specific information on the growth response of these stand types was provided with the application.

In the analysis, the IFPA-holder excludes stands within the mule deer winter range, though in an email to ministry staff the IFPA-holder indicate a belief that low volume cutting can maintain and possibly improve habitat. Ministry of Environment staff identified concerns that accessing small volumes over larger areas could cause ecological difficulties such as for wildlife tree maintenance and that while some areas and treatment types could improve habitat in the long-term such treatments must be appropriately designed and monitored.

In conclusion, I acknowledge that cleaning within Douglas-fir stands could provide incremental harvest flow but that there is uncertainty around the volumes available from these stands, the growth of these stand types, the mid-term contribution of these stands, and the environmental implications. I will further discuss this in my “Reasons for Decision”.

Roads

Access structures such as roads, trails, and landings are a significant component of the land base that does not contribute to forest productivity for timber production or various non-timber values. Accurate information on the size and location of the access network is desirable in order to identify timber supply over time.

The IFPA-holder in their Forestry Plan had identified several projects to investigate the impacts and rehabilitation of roads, trails, and landings. Through these studies the IFPA-holder recognized that the losses due to the road network may be less than had been modelled within the timber supply review. As such, within the allowable annual cut application the IFPA-holder did a spatial assessment of the implication of fewer roads (based on assumption that there was no need for new road if the stand was within 100 metres of an existing road). Based on this assessment, the roads allowance of 5% applied to all natural stand polygons was reduced to 1.8%.

In the AAC application, the IFPA-holder explained the mechanics of the calculation but did not clearly explain the justification for the reduction. The application identifies studies purporting the reduction in productive forest but the application does not provide details around or references to the studies.

In conclusion, I acknowledge that improved knowledge about roads, trails, and landings could provide incremental harvest flow but that there is uncertainty with respect to available information. I will further discuss this in my "Reasons for Decision".

Utilization

Utilization standards are expressed typically as a function of species, stump height, stump diameter, top diameter, and age. Allowable annual cut attributable to a forest licence is based upon the harvest of trees that fall under the utilization standards. These standards are for the "billing" of harvested volumes and are not conservation standards around the characteristics of trees that can be harvested. Unless specifically prohibited a licensee can use volume (e.g., a lower stump height) outside the utilization standards and such volume is not attributed to the allowable annual cut of the licence.

As diameter at stump height is not modelled within the growth and yield models used in the analysis, the utilization standard for stump diameter is translated to a diameter at breast height for modelling purposes. Within the IFPA area the current standards would translate to a lodgepole pine of greater than 12.5 cm diameter at breast height and other species at 17.5 cm diameter at breast height.

Tolko Industries Ltd. in their application has modelled the utilization standard as 12.5 cm diameter at breast height for all species. The AAC increase application suggests that this change should qualify as an innovative forestry practice. However, as noted earlier, I found that this was not an innovative forestry practice.

Within the timber supply analysis of the application, the IFPA-holder has used in all scenarios a utilization standard of 12.5 cm for other species. The lower utilization standard would enable more stands meeting the minimum harvest volume for inclusion in the timber harvesting land base and for stands to be available for harvest earlier. Further, all scenarios where non-pine is harvested would have an increased available timber supply.

For the difference between an innovative forestry practice scenario and the status quo scenario (i.e., the AAC increase), if the only difference is that there is a higher non-pine volume, the difference will cancel itself out. However, an increase will be seen where the innovative forestry practice scenario increases the timber harvesting land base in non-pine types or a change in harvest flow dynamics where non-pine types are harvested earlier and thus become available for harvest earlier.

In April 2005 changes to log grades were implemented for British Columbia's interior. Under the previous system certain dead trees were not charged to the allowable annual cut. As a result of changes to the log grade system, this dead volume must now be considered in the chief forester's allowable annual cut determination and for cut control on licences. The current analysis does not consider this change within its yield tables. However, I believe that for this decision of an allowable annual cut increase attributable to innovative forestry practices that upward pressure in the harvest flow for the status quo scenario would balance upward pressures for the innovative forestry practice scenario. As such, I will not account further for the change in log grade particularly given our current level of ability to model this factor.

While I am mindful that harvest flow in all scenarios is undoubtedly affected by the use of lower utilization for non-pine species, I do not find that this change will significantly affect the modelled differences in the first decade between the status quo and the innovative forestry practice scenarios. In scenarios that change the landbase size, the change is primarily within pine-leading stands and that in all scenarios the first decade the harvest is primarily pine, as such the use of a lower utilization standard will have little implication.

Genetic Gains

In this application the IFPA-holder had inferred that the use of improved seed was an innovative forestry practice. As noted earlier I do not consider this use to be an innovative forestry practice as past requirements under the Forest Practices Code of British Columbia Act required the use of the best genetic quality available and the current chief forester's standard for seed use for the purpose of establishing a stand under section 29 of the Forest and Range Practices Act identifies that a person must use seed that has a genetic worth of at least 5 percent or greater for the species if such is acquirable.

In the timber supply analysis supplied with the application, Tolko did not attempt to quantify the harvest flow benefits of genetic gains but instead used similar genetic gain estimates within all scenarios. I concur that this is a proper approach. Nevertheless, I note that the analysis applied gains of 20% for spruce and 3% for pine throughout the planning horizon. A summary of genetic gain of seedlots ordered for 2007 within the Williams Lake TSA and 100 Mile House TSA by Tolko confirms that a 3% gain is appropriate for pine but an average of 11% (maximum 17%) for spruce is more appropriate. Ministry staff indicate that 20% is possible for future genetic gains but does not reflect the current gains.

For the analysis I find that the genetic gains applied to spruce have been overestimated. However, as genetic gains are only applied to future managed stands (i.e., stands harvested from present forward) and initially harvesting is primarily pine oriented, I recognize that the direct benefits from genetic gain are unlikely in the short term. I discuss my accounting of this factor under reasons for decision.

Innovative Forestry Practices Not Considered

The Forestry Plan identifies many activities that have not been presented within this application for an allowable annual cut increase. Lignum Limited, as the original IFPA-holder, had initiated and completed many of these activities as indicated in annual reports and the May 2007 summary provided by the IFPA-holder.

In my guiding principles I indicate that it is my expectation that the IFPA-holder will work towards implementing the Forestry Plan as approved. The approval is based on the whole plan, not simply on components that may result in increased timber supply and that I may weigh the risks of practices not yet carried out [or not presented] against identified increases presented.

I do recognize that all activities completed by the IFPA-holder cannot (and should not) be included within a timber supply analysis associated with an allowable annual cut increase application. In this decision, I have not been presented with a thorough reporting of the likely implications of all the work completed under this IFPA.

Further, many of the eligible activities identified within the innovative forestry practices regulation are compared against "standard practice". Under the definition of standard practice, I may determine the time frame upon which the standard is based. I am mindful that the licences associated with the IFPA have changed hands twice. As such, I believe that it is reasonable that I do not need to consider the standard to be based from the initiation of the agreement. As noted in my acceptance of the inventory work, I find that standard practice in this application corresponds to the latest chief forester's allowable annual cut determination.

Given the proposed practices that I have accepted, I am satisfied that the risks associated with not considering the full suite of practices identified in the Forestry Plan are low and, particularly, the inclusion of the updated VRI is sufficient.

Archaeological and Cultural Heritage Resources

Within the Williams Lake TSA and 100 Mile House TSA, information from a variety of sources is available around archaeological and cultural heritage resources and values. In 1998 an archaeological overview assessment was completed that indicates the relative potential for archaeological resources to be found. Based on this overview, the need for on-the-ground archaeological impact assessments is determined where development is proposed. A number of traditional use studies and a cultural heritage overview are also available that provide knowledge and insight of cultural heritage resources and values. In terms of timber supply, ministry staff have indicated that archaeological and cultural heritage resources and values have been managed operationally with minimal impacts (e.g., use of existing tools such as wildlife tree patches).

The analysis presented with the increase application did not specifically consider archaeological or cultural heritage resources or values. Given the minimal impacts, this is a reasonable assumption but nevertheless I am mindful that such resources and values exist within the IFPA area and that licensees need to consider these resources and values operationally.

I note that further information review and consultation around specific archaeological and cultural heritage information will occur at the Forest Stewardship Plan stage. The information sources that were identified by my staff for this strategic level decision are not exhaustive and include only the information that resides in the Southern Interior Forest Region office. Much of the specific archaeological and cultural heritage information is located in the district office and would be reviewed at the Forest Stewardship Plan stage by the appropriate Forest District office.

Site Productivity

The productivity of a site largely determines how quickly trees grow. This in turn affects the time seedlings will take to reach green-up conditions, the volume of timber that can be produced, and the ages at which a stand will satisfy mature forest cover requirements and reach a merchantable size. Traditionally inventory data has been used to obtain an estimate of site productivity for each forest stand, expressed in terms of a site index. The site index is based on the stand's height as a function of its age.

In British Columbia it has been found that estimates of site productivity derived from forest cover inventory are reasonably accurate for stands between 30 and 150 years of age. However, estimates derived from older stands have often been found to underestimate site productivity as these stands are often well past the age of maximum height growth and have often been affected by disease, insects and top damage as they reach advanced age. Similarly, younger stands either have estimates based on the previous older stand or have not had enough growth to give reasonable measurements of site productivity. The underestimate of site productivity based on forest inventory estimates for older stands have been verified in several studies (e.g. Old– Growth Site Index or OGSI study) in the province. These studies have confirmed that when old stands are harvested and regenerated, site productivity realized is generally higher than what inventory-based site index estimates of older stands would predict.

Researchers have developed methods to overcome the deficiencies of a forest cover inventory derived site index. As an innovative forestry practice, the IFPA-holder derived site indices for the IFPA area by predicting site series (i.e. Predictive Ecosystem Mapping) from which site indices could be assigned based on known correlations. This is typically called a SIBEC approach. Such an approach has been found acceptable by the ministry to derive estimates of potential site index for use within growth and yield models.

The IFPA-holder provided a scenario in the timber supply analysis where the site indices used as input to future managed stands were replaced with estimates derived from the SIBEC relationships. The resulting harvest flow showed no significant increases related to this change.

Impacts on Other Licensees

Under my guiding principles, I identify that my decision for an allowable annual cut increase to IFPA-holders should have no impact on non-IFPA-holder's rights.

I received a letter from West Fraser Mills Ltd.. In that letter they expressed a number of concerns around the practices and asked that as several of the practices were tied to future activity that the increase be restricted to a maximum of 50% of the volume identified as available. West Fraser has also requested that the increase be targeted at stands located west of the Fraser River where the majority of the identified stands exists and where watershed hydrology issues are less significant.

In my decision, I will be mindful of West Fraser's comments and of my guiding principles. I do not foresee that my decision based on the innovative forestry practices proposed would have negative impact on other licensees.

First Nations Consultation

The following First Nations are considered to have potential interest in the IFPA area: 'Esdilagh (Alexandria Indian Band), Tsi Del Del (Alexis Creek Band), Tl'etinqox (Anaham), Tsq'escen (Canim Lake Indian Band), Canoe Creek Indian Band, Esketemc First Nation (Alkali Lake), High Bar Indian Band, Nazko Band, Red Bluff Band, Lhoosk'uz Dene (Kluskus Indian Band), Xats'ull (Soda Creek Band), Whispering Pines/Clinton Indian Band, T'exelc (Williams Lake Indian Band), Tsilhqot'in National Government, and bordering slightly on the Tsq'escen (Canim Lake Indian Band).

The consultation process consists of 2 components. In the first step, information is shared by the IFPA-holder about their application. In the second step, the ministry consults with First Nations around the decision.

Tolko Industries Inc. initiated information sharing with First Nations. Information sharing was initiated by an initial written contact (August 16, 2006) that included an invitation for a direct meeting. In this first step, most but not all First Nations with potential interest identified above were contacted. Oversights were addressed within the ministry's consultation.

The MFR initiated consultation on December 21, 2006 through a letter to affected First Nations that detailed the decision process around the proposed increase in the allowable annual cut of the licences of the IFPA-holder and that requested First Nations to identify

their concerns around this issue. On February 23, 2007, the ministry further wrote to affected First Nations about another decision around the extension of the innovative forestry practice agreements to August 31, 2011. This latter letter was also sent to the Nazko and Red Bluff First Nations who were not originally identified. A follow up email was sent on April 3, 2007. On April 27, 2007 a letter around both decisions was sent to the Kluskus who initially had not been identified as having potential interest in the IFPA area.

Following the initial consultation letters, some correspondence occurred between First Nations bands and the ministry. From the correspondence and information sharing by the IFPA-holder, specific concerns primarily were around the details of the IFPA-holder's proposed sharing of any awarded allowable annual cut with First Nations. One response expressed concern around hydrological issues associated with an increase in harvest. In some cases, initial requests by First Nations for meetings, were not completed as the ministry follow up did not result in the confirmation of a meeting date.
Ministry staff have advised me that First Nation consultation was completed in accordance with government direction and that at this time there are no directly expressed aboriginal interests that would be directly impacted by an extension to August 31, 2011 of the Tolko Industries Ltd. innovative forestry practices agreement or the proposed increased in allowable annual cut.

I am satisfied that sufficient consultation has occurred to inform my decision around an allowable annual cut increase. However, I note that a commitment in the IFPA-holder's application to offer First Nations the contract opportunity for all awarded volume may have influenced the response letters from First Nations.

In the application and in meetings with First Nations, Tolko Industries Ltd. have stated that "all increases in AAC will be offered to First Nations with traditional territories within the IFPA boundaries". This statement implies that work associated with the uplift harvest would be offered to First Nations contractors. The statement does not imply that tenure for the volume would be offered to First Nations. Letters of support (some conditional) around the proposed AAC increase and subsequent offer to First Nations were sent to the IFPA-holder or the ministry from Xats'ull (Soda Creek Band), Tsilhqot'in National Government, Esketemc, and Williams Lake Indian Band.

Specifically, I recognize that the offer by the IFPA-holder to First Nations is a commitment between Tolko Industries Ltd. and the affected First Nations and is not a commitment by the Ministry of Forests and Range to First Nations. In my decision under Section 59.1, I can only award an allowable annual cut increase on the licence of an IFPA-holder. I cannot award within this decision timber volume to non-IFPA-holders such as First Nations. However, my decision does enable me to make any increase conditional. As such, I identify as a condition that the IFPA-holder must report to me on their follow up with respect to their commitment to First Nations.

Reasons for Decision

In reaching my decision on a request for an increase in allowable annual cut to the two forest licences held by Tolko, I have considered all of the factors presented to me, and I have reasoned as follows.

An increase in allowable annual cut is based upon the increment in short-term harvest flow attributable to the innovative forestry practices and activities. These innovative forestry practices and activities are contained within the general description of the Forestry Plan and the allowable annual cut increase application to be appended to the Forestry Plan, and will be carried out, by the IFPA-holder in accordance with that plan.

The minister has enabled the term of the innovative forestry practices agreement to be extended to August 31, 2011 and identified that an allowable annual cut increase expiry date is also limited to this date. The expiry timeline does not limit me from awarding increases based on activities of a longer duration. However, I am mindful of such an expiry date and the implications around any increase awarded.

The IFPA-holder proposed a number of activities as innovative forestry practices. I have agreed that some of these activities could meet the definition of an innovative forestry practice but that there were others that did not. Of the 5 activities that I found met the definition, I describe below my reasoning on whether an allowable annual cut increase is justifiable based on the information presented for those practices.

The Douglas-fir thinning proposed by the IFPA-holder is likely the type of practice envisioned by those drafting the IFPA pilot program as innovative. In reviewing this practice I found that the information provided to me about the stand selection, subsequent stand growth, and the modelling of such stand growth was very limited. This information did not provide me with comfort about the level of pine volumes recoverable and the response of these stands to the treatment. Further, I have concerns around the maintenance of a sufficient mid-term timber supply. The need resonates highly with me to maintain as much of the non-pine component as possible for the mid-term. My feeling is that there is less risk to leave these Douglas-fir stands and not recover the pine volumes than there is to enter these stands for a thinning. Government staff have also expressed concern about environmental and stand structure considerations that may warrant not accessing these stands for small volume per hectare gains. Given these considerations, I am not willing to award an allowable annual cut increase for the proposed practice. However, I do encourage the IFPA-holder to study such practices in order to improve the knowledge base.

Improved estimates of site productivity have been shown to increase timber supply in many management units and IFPA-holders in other pilots have been credited for such work. The timber supply analysis supplied in the application demonstrates that the updated site productivity estimates do not increased harvest flow. As such, I am not willing to award the licensee an increase for this practice.

Better information on losses of productive land base to roads is desirable. However, I do not find that the information on roads provided in the application is sufficient upon which to base an allowable annual cut increase. No specific field studies were provided that identified lower estimates than were modelled in previous timber supply area timber supply reviews. The analysis around roads was fairly simple. I did not derive from such analysis any greater confidence in the estimates of productive forest losses due to trails, roads, and landings than had been presented in previous timber supply reviews. As such, I find no justification for an allowable annual cut increase related to roads.

Of the activities presented, I recognized that the two rehabilitation practices for pine stands below 65 cubic metres per hectare as innovative forestry practices could likely contribute to increased harvest flow. However, the information and scenarios that the IFPA-holder has presented do not provide me with a complete picture of the timber supply implications of these practices. In particular, the modelled descriptions of the practices and related stand descriptions are broader than what would be expected operationally.

Of two scenarios presented around rehabilitation, the scenario that reduced operability of pine stands 35 to 65 years for the first 15 years and the operability of all pine stands appears closer to the proposed innovative practices. For this scenario, that shows about a 38 000 cubic metres per year increase in the short-term, there is likely upward pressure on the short-term harvest flow as the operability was not reduced for mature stands but there is also downward pressure as not all the stands harvested in the model are likely to be harvested operationally.

Other factors may also play a role in the observed incremental increases. For example, I find that the inclusion of deciduous, which is not being harvested at the level modelled, likely adds to the short-term harvest flow increment observed. The short-term difference between the status quo scenario and the rehabilitation scenarios suggest a contribution from deciduous of approximately 6000 cubic metres. Several other factors such as utilization standards and genetic gains differ between current practice and the modelling assumptions. However, these differences are likely not to contribute to short-term increases in harvest flow as the differences relate primarily to non-pine species. Nevertheless, I need to be mindful that there is some possibility that harvest flow benefits from their inclusion.

It has been suggested that only a portion of the demonstrated harvest flow increase be awarded given that the proposed practices do not have proven performance. The legislation does enable me to award an increase based on proposed practices and I am willing to award where appropriate an increase based on a proposed practice. However, I do consider uncertainty around practices. As stated in my guiding principles I may consider awarding a lower allowable annual cut increase than suggested by the analysis in order to lower risk associated with an increased harvest.

In making allowable annual cut increase determinations, and particularly given the impacts on forest values that may result from the current Mountain pine beetle

infestation, I am mindful of my obligation as steward of the forest land of British Columbia, of the mandate of the Ministry of Forests and Range as set out in Section 4 of the *Ministry of Forests Act,* and of my responsibilities under the *Forest Practices Code Act of BC* and the *Forest and Range Practices Act.*

In summary, I am satisfied that the information provided with the application is sufficient upon which to base a decision about an allowable annual cut increase on the licences of the IFPA-holder.

Determination and Conditions

I have reviewed and considered all the factors and the associated uncertainties described in this document.

I first approve the continuation of existing Forestry Plan and the amendment to such of the current application for an allowable annual cut increase. The IFPA-holder should append the application to the Forestry Plan and consider such an integral part of the Forestry Plan. However, I recognize that the Forestry Plan is dated and should be revised to reflect the current plans of Tolko Industries Ltd. I address this concern in a below condition.

I determine that innovative forestry practices or activities under the IFPAs provide 35 000 cubic metres per year from within the IFPA boundaries that is attributable to the innovative forestry practices of the IFPA-holder.

In this decision, I will assign an allowable annual cut increase to the Forest Licences of the IFPA-holder as follows:

> A20003 – in 100 Mile House TSA. by 10 000 cubic metres per year
> A20018 – in Williams Lake TSA. by 25 000 cubic metres per year.

This assignment is generally proportional to the amount of timber harvesting land base of the IFPA area within each timber supply area.

The award on each licence is subject to the conditions below:

(1) Provide a new Forestry Plan by January 5, 2008.

(2) Submit an annual report by April 30th of each year that summarizes the activities completed by the IFPA-holder in the past year, the expected activities in the upcoming year, how conditions of this award have been met, and any other requirements identified in the below conditions.

(3) Report within the annual report changes in legislation, land base composition and forest management practices that occur and identify, if any, changes to timber supply

that would be expect to result. Where changes are significant (e.g., likely to be greater than 10,000 cubic metres per year), impacts should be assessed by an updated timber supply analysis.

(4) Provide within the annual report an area and volume summary by species of harvest activities within stands less than 65 cubic metres per hectare. At minimum all incremental harvest related to this decision should be from stand types of greater than 70% pine and less than 65 cubic metres per hectare.

(5) Report on the Forestry Plan commitment to "offer up to 100% of all increases in AAC to First Nations with traditional territories with the IFPA boundaries". This should be documented in the annual report.

(6) Update potentially affected First Nations/Indian Bands on a regular basis about where proposed harvesting is to take place, the status of beetle infestation, and how First Nations are to be involved in the planning process in order to incorporate their aboriginal interests. Copies of these communication updates will be filed annually with the annual report.

This determination is effective August 2, 2007 and will remain in effect until August 31, 2011, the date at which the innovative forestry practices agreements expire. I note that I am prepared to reduce the allowable annual cut awarded if I find information or assumptions upon which this decision is based are not justified or that conditions of this decision have not been met.

This rationale and Tolko's September 27, 2006 application and September 28, 2006 amendments are an integral part of the Forestry Plan and should be attached hereto.

Recommendations

The review of information in support of an allowable annual cut increase determination provides me with the opportunity to make recommendations on several issues. These recommendations are intended to reduce the uncertainty and risk associated with future determinations and to ensure the intent of the Forestry Plan is met. Below are specific recommendations that I have identified.

- provide improved reporting of the research and information collected under the auspices of the innovative forestry practices agreement and where necessary bring projects to completion;
- monitor resource values such as wildlife trees and hydrology to ensure that rehabilitation practices do not unduly impact these values;
- conduct research and operational trials to improve information around the proposed Douglas-fir thinning practice and subsequent stand development;
- monitor the "shelf life" of pine killed by Mountain pine beetle;

- initiate and complete projects and operations that ensure the integration of First Nation's values and land uses;
- involve, as appropriate, all First Nations with interest in the IFPA area in a meaningful manner.

Yours Truly,

T.P. (Phil) Zacharatos, R.P.F.
Regional Manager
Southern Interior Forest Region

August 2, 2007

Appendix 1: Section 59.1 of Forest Act

Innovative forestry practices 59.1

(1) For the purpose of improving the productivity of the forestry resource, the minister, at his or her discretion, may enter into an agreement with a person referred to in subsection (2) to allow that person to carry out, subject to subsection (5) and the *Forest and Range Practices Act*, one or more of the innovative forestry practices and other activities that are set out in a regulation made under subsection (4).

(2) For the purposes of subsection (1), the minister may enter into an agreement with a person who (a) is the holder of a forest licence or other agreement that is entered into under section 12 and specified in a regulation made under subsection (4) of this section, and (b) presents a written proposal for an agreement to the minister.

(3) An agreement under subsection (1) (a) must be for a term not exceeding 15 years, and (b) may include terms and conditions that (i) the minister considers are necessary to effectively carry out the purpose of the agreement and further the social and economic objectives of the government, and (ii) are consistent with this Act and the regulations and the *Forest and Range Practices Act*, and the regulations and standards made under that Act.

(4) The Lieutenant Governor in Council may make regulations specifying (a) the innovative forestry practices and other activities that may be the subject of an agreement referred to in subsection (1), and (b) the agreements entered into under section 12, the holders of which may enter into an agreement with the minister under subsection (1) of this section.

(5) A person may only carry out an innovative forestry practice or other activity referred to in subsection (1) if the person (a) has prepared and obtained the regional manager's approval of a Forestry Plan that meets the requirements of subsection (6), and (b) is carrying out the practice or activity in accordance with the plan.

(6) A Forestry Plan (a) must contain a description of the management area where the innovative forestry practices or other activities will be carried out, (b) must specify the particulars of the innovative forestry practices or other activities, (c) must contain a description of how the innovative forestry practices or other activities will be carried out, (d) must contain a schedule of when the innovative forestry practices or other activities will be carried out, (e) must specify how the innovative forestry practices or other activities will contribute to improved productivity of the forestry resource, (f) must specify how the innovative forestry practices or other activities will justify an increase in the allowable annual cut of the participant's licence or agreement referred to in subsection (2) (a), and (g) may include other terms and conditions that (i) the regional manager believes are necessary to effectively carry out the agreement referred to in subsection (1), and (ii) are consistent with this Act and the regulations and the *Forest and Range Practices Act*, and the regulations and standards made under that Act.

(7) After approving a person's Forestry Plan, the regional manager may increase the allowable annual cut authorized in the person's licence or agreement referred to in subsection (2) (a) by an amount that is justified according to timber supply analysis methodology approved by the chief forester or the chief forester's designate.

(8) When the regional manager increases an allowable annual cut under subsection (7), the regional manager may limit the increase to a period of time, area of land and type of timber, and may make the increase subject to conditions.

(9) If an assessment of (a) the innovative forestry practices or other activities being carried out under the Forestry Plan, or (b) information that was not available at the time the regional manager increased the

allowable annual cut under subsection (7) indicates that all or part of the allowable annual cut increase was not justified, the regional manager may reduce the allowable annual cut of the licence or agreement referred to in subsection (2) (a) by an amount not exceeding the increase granted under subsection (7).

(10) If, with respect to an innovative forestry practice or other activity, a person is not complying with (a) the agreement referred to in subsection (1), (b) the Forestry Plan approved under subsection (5), (c) any limitation or conditions imposed under subsection (8), or (d) this Act and the regulations made under this Act, or the *Forest and Range Practices Act* and the regulations or standards made under that Act, the regional manager may do one or both of the following: (e) suspend or cancel the agreement referred to in subsection (1) and sections 76 and 77 apply with respect to that suspension or cancellation; (f) reduce the allowable annual cut of the person's licence or agreement referred to in subsection (2) (a) by an amount the regional manager determines is attributable to the default.

(11) A reduction under subsection (9) or (10) may be apportioned over a period of up to 5 years.

(12) If the forest licence, or other agreement referred to in subsection (2) (a), is suspended, the agreement under subsection (1) is suspended.

(13) If the forest licence, or other agreement referred to in subsection (2) (a), is cancelled or surrendered, the agreement under subsection (1) is cancelled.

(14) If the agreement referred to in subsection (1) is suspended or cancelled, the Forestry Plan is suspended or cancelled, as the case may be.

Appendix 2: Innovative forestry practices regulation

B.C. Reg. 197/97, O.C. 0694/97 - Deposited June 18, 1997
Consolidated to August 5, 2003

Definitions

1. In this regulation:

"**Act**" means the *Forest Act*;

"**Forestry Plan**" means a Forestry Plan required to be submitted for approval under section 59.1(5) of the Act;

"**forest practice**" has the same meaning as in the *Forest Practices Code of British Columbia Act*;

"**free-growing stand**" has the same meaning as in the *Forest Practices Code of British Columbia Act*;

"**holder**" means a person that presents a written proposal for an agreement under section 59.1(2)(b) of the Act;

"**permanent access structure**" has the same meaning as in the *Forest Practices Code of British Columbia Act*;

"**standard practices**" means the forest practices routinely applied by licensees in the timber supply area when the Forestry Plan is submitted or at any other time determined by the regional manager;

stocking requirements" has the same meaning as in section 1 (1) of the Operational and Site Planning Regulation, B.C. Reg. 107/98.

Authorized innovative forestry practices and activities

2. The innovative forestry practices and other activities that may be the subject of an agreement under section 59.1(1) of the Act are the following:

(a) the implementation of harvesting methods or silvicultural systems that may

(i) increase the total amount of timber available to harvest in the timber supply area over the amount available under standard practices, or

(ii) reduce the loss of productivity associated with permanent access structures from the loss of productivity under standard practices for similar terrain and timber types in the timber supply area;

(b) activities that result in the establishment of free-growing stands on

(i) previously unforested areas,

(ii) areas that are below stocking requirements and are not part of the holder's free-growing responsibilities under section 69.1 (3) and 70(3) of the *Forest Practices Code of British Columbia Act*, or

(iii) areas that

(A) have stands of timber with repressed growth or that contain brush or species that are not commercially valuable, and

(B) are not part of the holder's free-growing responsibilities under section 69.1 (3) and 70 (3) of the *Forest Practices Code of British Columbia Act*;

(c) silviculture treatments on free-growing stands;

(d) silviculture treatments on sites that are not free growing in order to produce stands that exceed current growth performance or standards achieved using standard practices for the timber supply area;

(e) the collection and analysis of new data, in accordance with the specifications of the chief forester, to provide a more accurate representation of the forest composition and its expected rate of growth compared to the rate existing when the forest plan is submitted or at any other time determined by the regional manager;

(f) activities that will enhance and protect other resource values, including, but not limited to, water, fisheries, wildlife, biological diversity, soil productivity and stability, forage production, grazing and recreation values.

Authorized forms of agreement

3. The holders of the following agreements under section 12 of the Act may enter into an agreement under section 59.1 of the Act:

(a) replaceable forest licences, and

(b) replaceable timber sale licences with an allowable annual cut greater than 10 000 cubic metres.

Appendix 3: Memorandum from chief forester on timber supply methodology

BRITISH COLUMBIA Ministry of Forests Chief Forester MEMORANDUM

File: 19500-01/IFPA

April 6, 2001

To: Regional Managers

From: Larry Pedersen
Chief Forester

Re: Timber Supply Analysis Methodology Related to Innovative Forest Practices Agreements (IFPAs)

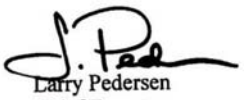
I am certain you are aware that the *Forest Act*, section 59.1, gives regional managers the responsibility for determining if increases in allowable annual cuts (AACs) for IFPA holders are justified. The *Act* requires regional managers to make their judgements according to a timber supply analysis methodology approved by the Chief Forester or the Chief Forester's designate. Attached to this memorandum is a timber supply analysis methodology to fulfill my responsibility under section 59.1 of the *Act*.

The methodology covers general analytical issues related to information needs, analysis outputs, links between AACs for IFPAs and TSAs, harvest flow, AAC increases, and legislation and policy. The method does not dictate the types of innovative practices that should or may be considered appropriate for approval as part of forestry plans, or for justifying AAC increases. Approval of forestry plans is clearly the regional managers' responsibility under the *Act*. Further, I believe that information and practices must be evaluated on their own merits within specific contexts; hence it would not be reasonable for me to prescribe evaluative criteria.

In the end, regional managers must make their own determinations based on analysis that provides insight on the full range of relevant factors, including the important risks and uncertainties. The analysis methodology is designed to assist in this undertaking.

Page 1 of 2

The methodology should be included as an appendix to the Forestry Plan Outline to ensure the approach is clear to all government staff and external stakeholders. Please contact Chris Fletcher of Timber Supply Branch (250-356-5959, Chris.Fletcher@gems8.gov.bc.ca) with comments or concerns.



Larry Pedersen
Chief Forester

Attachment: Timber Supply Analysis Considerations for Innovative Practices Agreements

cc: Gary Townsend, Director, Timber Supply Branch

Ralph Archibald, Director, Forest Practices Branch

Henry Benskin, Director, Research Branch

Dave Gilbert, Director, Resources Inventory Branch

Dale Draper, Director, Tree Improvement Branch

Jim Langridge, Director, Resource Tenures and Engineering Branch

Drew Brazier, Resource Tenures and Engineering Branch

Timber Supply Analysis Considerations for Innovative Forest Practices Agreements

Section 59.1 (7) of the *Forest Act* allows regional managers, after approving an IFPA Forestry Plan, to increase the allowable annual cut of the holder's forest licence by an amount that is justified according to a timber supply analysis method approved by the chief forester or the chief forester's designate. The following discussion outlines the timber supply analysis method and allowable annual cut decision principles used by the chief forester.

The focus is on components and principles of timber supply analysis that are crucial in gaining an understanding of factors that determine timber supply in an area. Because of the complexities involved in determining harvest levels, it is not possible to develop precise procedures or simple calculations for timber supply analysis. The process can be guided by general principles—which are outlined below—however, the detailed aspects must be developed using case specific professional judgement. In this light, the following ideas are provided as guidance, not as firm procedural requirements that must be followed in all cases. While the general ideas apply in almost all cases, each case must be viewed as unique: some cases may require additional analysis to that outlined, while others may be assessed satisfactorily with less detail than suggested here.

If a timber supply analysis incorporates the types of information noted below, and facilitates evaluation of the considerations discussed, it will have followed a timber supply analysis method supported by the chief forester.

The chief forester's task under the *Forest Act* is to provide an analysis method, not to evaluate, or provide a method for evaluating information quality. Hence, the discussion here does not address information quality but focuses on an analytical method. Nevertheless, the results of any analysis depend heavily on the quality of the information used in the analysis; that is, information about the forest land base, growth and yield, and management objectives. Evaluation of information quality must be done on a case-specific basis, which regional managers, in their evaluation of IFPA analyses, are best positioned to do.

Analysis should consist of clear descriptions of issues, information sources, assumptions, and any relevant data manipulations or adjustments related to the following three categories:

Land base:

- A tabular description of the categories of land and forest that are excluded from the timber harvesting land base, and the area excluded in each category. Such tabular descriptions are included in all timber supply analysis reports published for TSAs as part of the Timber Supply Review.
- A detailed description of the criteria employed in deriving the area included in the above table. This description should follow a format similar to the Information Package for Tree Farm Licence analyses.

- A description of the composition of the timber harvesting land base and the total forested land base in terms of species, site quality, stand age, and any other features relevant in the area.

Growth and yield:

- A description of the models and methods used in generating timber yield tables for existing and regenerated stands.
- The yield tables used for each species and site quality group and silvicultural regime.
- Detailed descriptions of methods and concepts underlying site productivity estimates and yield tables that reflect any planned innovative management.
- Notice of acceptance by appropriate BC Ministry of Forests staff of site productivity or yield estimates or adjustments corresponding to both baseline and innovative practices, and of any sampling or study methods related to deriving the estimates.
- MFR, Regional Growth and Yield Foresters will coordinate the growth and yield review process.

Management objectives:

- A description of the various management objectives that apply to the area and the methods used to represent actions used to achieve the objectives (e.g., silvicultural regimes, utilization levels, seral forest cover requirements, extended "rotations," alternative harvesting systems). The description should specify the component of the land base to which the objective applies; for example, timber harvesting land base, or Crown forested area. The template for Information Packages for Tree Farm Licence analyses provides a framework for organizing relevant information.

Analysis is facilitated if communication between relevant ministry staff and the agreement holders regarding land base, growth and yield, and management inputs occurs as early as possible in the analysis process.

Other considerations include:

Model review and benchmarking. There are no specific requirements or limitations on which analysis models may be used. However, interpretation of results and confidence that timber supply effects can be attributed to innovative practices rather than model differences requires a detailed understanding of assumptions made in the model about relevant processes and features. The best method of gaining this understanding is to benchmark the model with FSSIM, or other models used and understood by Timber Supply Branch staff. This is not to imply that FSSIM is a better model, or produces more accurate results than other models. It is simply the case that Ministry of Forests staff understands how FSSIM works, and can therefore use it as a basis for understanding how other models work. If the model to be used has not been reviewed and benchmarked by Ministry of Forests staff, the agreement holder should develop a review process in cooperation with Timber Supply Branch or a regional timber supply analyst. If the model being benchmarked produces different results from FSSIM (or other models used and understood by Timber Supply Branch staff), the agreement holder or its representative should be responsible for explaining the differences in detail in a technical document.

Even with a benchmarked model, the potential to increase harvest levels should be evaluated using the same model for both current and innovative practices. For example, a timber supply forecast corresponding to an innovative management regime and generated with a model other than FSSIM should not be compared directly to a forecast derived using FSSIM and the current management regime. Using results generated with the same model will help ensure any timber supply increase is based on management not model differences.

Results and reporting. The analysis report and related appendices should include sufficient output information to allow understanding of the main factors determining timber supply, and if applicable, reasons behind timber supply changes due to proposed innovative practices. Management, land base and growth and yield assumptions are to be documented in an Information Package. The timber supply analysis should demonstrate how these assumptions affect timber supply. The outputs should allow for examination of all relevant forest management objectives; for example, areas in seral stages by landscape unit, or area achieving visually effective green-up in visual management zones. Outputs related to timber inventory levels, areas and average volumes harvested, average age of harvested stands, and age class distributions over time all assist in understanding timber supply dynamics and evaluating the feasibility and realism of analysis results.

Sensitivity analysis. The analysis report must include results of sensitivity analyses that examine a reasonable range of uncertainty around management, land base and growth and yield assumptions and proposed innovative practices. The implications of changes in available funding to undertake planned innovative practice may be an important consideration for sensitivity analysis.

Operational feasibility. The analysis should examine any issues that may affect the operational feasibility of harvesting at the levels indicated. The most common issue involves the ability to locate harvest opportunities spatially.

Interactions between IFPA area and the TSA. IFPA timber supply analysis should demonstrate that any harvest level increases related to IFPAs will not disadvantage timber supply at the TSA level, or timber supply available to other operators in the TSA. An IFPA area may not be representative of the forest and management conditions for the TSA, and hence analysis results for the IFPA area should not be extrapolated and assumed to apply to the whole TSA.
Administration of IFPAs is the purview of the regional manager, and it is the regional manager's prerogative to require or request any analysis that s/he believes will assist in clarifying matters regarding IFPA AACs. It may be appropriate to investigate, using timber supply analysis, the advantages and disadvantages of different approaches to administering timber supply in the IFPA in the context of the TSA. For example, benefits may be gained by administering timber supply flexibly at the TSA level (e.g., allowing for harvesting of an IFPA increase from throughout the TSA not only the IFPA area) rather than combining timber supplies that have been assessed separately for spatial sub-units of the TSA. Ultimately, the regional manager will decide on the administrative

approach, and the analysis must be consistent with that approach.

The intent here is to highlight that analysis must show that timber supply benefits for IFPAs will not come at the cost of supply at the TSA level or other operators in the area.

Harvest flow. Timber supply forecasts employing assumptions/estimates of both current and proposed innovative practices must follow reasonable flow patterns over time. In general, a reasonable flow pattern provides for a controlled and gradual transition from short-term to medium- and long-term harvests, and avoids large and abrupt disruptions in supply. Considerations include: rate of harvest level decline if any is necessary; the degree to which mid-term timber supply may appropriately drop below the long-term sustainable harvest level; and the timing of increase to the long-term sustainable timber supply if it is higher than mid-term levels.

A difference between mid-term and long-term levels may be justified because mid-term supply depends more on the existing stock of timber and the timing of availability of regenerated stands, while long-term timber supply is based on timber growth which is affected by site productivity and forest management practices. Maintaining mid-term levels above or equal to the long-term level could in some circumstances delay the achievement of, or lead to failure to achieve the maximum long-term level, or cause timber supply disruptions, because of limited supply of existing timber. Likewise, a decline in timber supply from a higher short-term supply to a lower mid-term may be appropriate if it can be shown that the associated harvests do not jeopardize or cause disruptions in long-term productivity.

The analysis should include different harvest flows that examine each of these considerations. A "base case" harvest flow for current practices must be chosen from the range of possibilities. The choice should be explained. In most cases this explanation can be brief, and consist primarily of reference to alternative harvest flow patterns. The IFPA base case harvest flow should reflect that used in the Timber Supply Review base case, if relevant. This will ensure that any change in short-term timber supply is due to changes in management, not harvest flow.

The analysis report should describe the criteria used to determine:

- the long-term harvest level and growing stock (criteria for sustainability);
- the harvest flow (e.g., maintain current harvest level for as long as possible, maximize volume harvested over a specified time frame, control the rate of decline);
- the minimum harvest level allowed in the medium term.

Allowable cut increases. Harvest forecasts for many management units in B.C. show declining timber supply over a period of decades. The general approach in cases of declining timber supply is that short-term allowable cuts are not usually increased unless there is a sound demonstrated forest management reason. This approach ensures that allowable cuts are not increased in the short term only to force reductions in the near future. There may be sound forest management reasons, such as existence of high risk of loss of stands to fire, insects or disease due to current or developing stand attributes (e.g., age or diameter distribution favourable to beetle attack, etc.).

An AAC increase in the short term should not decrease future timber supply below the

levels forecast without the increase, unless there is a documented and compelling reason to do so.

The general approach described above for TSA and TFL AAC determinations with respect to potential increases leads to some issues for IFPAs. One of the explicit aims of the IFPA initiative is to allow AAC increases for IFPA-holders. However, one stipulation of an increase is that other license holders will not be negatively affected by any AAC increases for the IFPA. In this context, important considerations in designing and interpreting an IFPA timber supply analysis would include:

- what are the forest management reasons that justify an AAC increase?
- what effects would an increase have on future timber supply?
- would a boost in AAC increase the sensitivity of future timber supply to uncertainties?
- if the forecast is for a temporary short-term increase (that is, timber supply is forecast to decline from the higher level) what actions will be taken to mitigate or avoid future socio-economic impacts? In other words: in the absence of a forest management objective for increasing the AAC, how will a temporary increase assist in strengthening the long-term role of timber harvesting and processing in the social and economic fabric of the area (capacity-building, diversification, etc.)?

Consistency with legislation and policy. The land base, growth and yield and management regime modeled in the analysis should be consistent with current legislation and policy. While the need for consistency with laws and policy is perhaps self-evident, it must be acknowledged that one of the goals of IFPAs is to move management in new directions. Therefore, it is imperative that modeling of proposed innovative management does not imply conflicts with legislation and policy. This analytical consideration differs from the approval of innovative management that is the regional manager's responsibility as part of Forestry Plan approval. The intent here is to highlight the need to evaluate analysis inputs and results to ensure that they do not create or imply conflicts. If a timber supply forecast is based on conflicts with designations or objectives that are the responsibility of other statutory decision makers under existing laws or policies, that forecast cannot reasonably be accepted as a basis for harvest level determination.

Relationship between chief forester (TSA) and regional manager (IFPA) determinations. The concern has been raised that AAC determinations for TSAs under Section 8 of the *Forest Act* may conflict in some way with AAC determinations for IFPAs. Communication between the chief forester and regional manager will be necessary to avoid discrepancies or conflicts regarding AAC determinations. It is not possible to generalize about the relationship between TSA AAC determinations and related to IFPAs given the diversity of timber supply conditions across the province.

A guiding principle for TSA and TFL AACs is that the determination should reflect current or reasonably foreseeable practices. Use of the preceding method and considerations should ensure that practices approved under IFPAs will constitute current or reasonably foreseeable management, and will be considered as such in TSA AAC determinations.

Documentation of decisions. Documentation of reasons for decision is useful to ensure the basis for the decision is clear and understandable. Further, both the regional manager and the chief forester have AAC determination responsibilities under the *Forest Act*. Reasonably detailed decision documentation, referring to the technical considerations discussed in this methods document, would help ensure consistency between regional manager and chief forester determinations, particularly when the time period between the decisions is long.