

**BRITISH COLUMBIA
MINISTRY OF FORESTS AND RANGE**

**Tree Farm Licence 55
Louisiana–Pacific Canada Ltd.**

**Rationale for
Allowable Annual Cut (AAC)
Determination**

Effective March 8, 2007

**Henry Benskin
Deputy Chief Forester**

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Objective of this document

This document is intended to provide an accounting of the factors I have considered and the rationale I have employed in making my determination, under Section 8 of the *Forest Act*, of the allowable annual cut (AAC) for Tree Farm Licence (TFL) 55. This document also identifies where new or better information is needed for incorporation in future determinations.

Description of Tree Farm Licence 55

TFL 55, held by Louisiana–Pacific Canada Ltd. (‘the licensee’), is situated in the Selkirk Mountains north of Revelstoke, and is bounded by the Goldstream River, Mica Creek, and the Revelstoke Reservoir. The TFL is within the MOFR Southern Interior Forest Region and is administered from the Columbia Forest District office in Revelstoke. Adjacent to the TFL are the Revelstoke and Golden timber supply areas (TSAs), as well as TFL 56.

TFL 55 covers approximately 92 700 hectares and lies in rugged terrain characterized by sharp peaks; glaciers; and deep, narrow, forested valleys. Approximately one-half of the TFL is considered productive forest. The three biogeoclimatic zones found in the TFL, which lies in the interior wet-belt portion of the province, are Engelmann Spruce – Subalpine Fir (ESSF), Interior Cedar Hemlock (ICH), and Alpine Tundra. The lower elevation forests are primarily composed of western redcedar, western hemlock, and Douglas-fir; whereas higher elevation forests are predominantly spruce and subalpine fir (balsam). Wildlife species are abundant and include small mammals; fur-bearers; birds; fish; and large mammals such as grizzly and black bears, caribou, moose, and deer.

The TFL falls within the asserted traditional territories of the following First Nations groups: the Akisq’nuuk First Nation (formerly the Columbia Lake Band), the Okanagan Indian Band, the Shuswap Indian Band, the Simpcw First Nation (formerly the North Thompson Band), the Ktunaxa Nation Council, the Okanagan Nation Alliance, and the Shuswap Nation Tribal Council.

The timber harvested from TFL 55 supplies a local mill at Golden and is traded or sold on the market.

History of the AAC

Prior to 1992, TFL 55 formed part of the separate, northern block of TFL 23, a large licence extending south into the Arrow Forest District and held by Westshore Terminals Ltd. In 1992, TFL 23 was subdivided, and the northern block was renamed TFL 55. It remained with Westshore Terminals Ltd. An AAC of 220 000 cubic metres was determined in 1992 for the new TFL 55.

In 1993, Westshore divested itself entirely of its former holdings and TFL 55 was subdivided into two roughly equivalent areas: the northern portion remained as TFL 55 and was assigned to Evans Forest Products Ltd. while the southern portion became TFL 56. The former AAC of 220 000 cubic metres was divided equally between the two

licences, with the AAC of TFL 55 set at 110 000 cubic metres.

A new AAC for TFL 55 was determined at 100 000 cubic metres, effective May 1, 1996. The AAC included a partition of 10 000 cubic metres attributable to timber classified at that time as inoperable.

In 1999, the TFL was reassigned to Louisiana Pacific Canada Engineered Wood Products Ltd. The corporation changed its name to LP Engineered Wood Products Ltd. in November 2000 and changed it again in April 2004 to Louisiana–Pacific Canada Limited. The last AAC determination was made effective April 18, 2001, when the AAC was set at 90 000 cubic metres.

New AAC determination

Effective March 8, 2007, the new AAC for TFL 55 will be 90 000 cubic metres, the same level as the current AAC.

This AAC will remain in effect until a new AAC is determined, which must take place within five years of this determination.

Information sources used in the AAC determination

Several information sources were used in this determination, many of which are referred to in detail in the Management Plan, timber supply analysis report, and the information package. Key information sources used in determining the AAC for TFL 55 include:

- *Timber Supply Analysis Information Package: Selkirk Tree Farm Licence 55 (TFL 55) Management Plan No. 4.* Prepared for the licensee by Timberline Forest Inventory Consultants Ltd., accepted by the Ministry of Forests and Range (MOFR) June 16, 2006;
- Existing stand yield tables for Selkirk TFL 55, accepted March 30, 2006 by MOFR Forest Analysis and Inventory Branch;
- Managed stand yield tables, accepted April 5, 2006 by MOFR Research Branch;
- *TFL 55 Site Index Adjustment Final Report*, J.S. Thrower and Associates, accepted January 12, 2006 by MOFR Research Branch;
- Vegetation Resources Inventory (VRI), Phase 1 and 2, accepted November 28, 2005 by MOFR Forest Analysis and Inventory Branch;
- *VRI Procedures and Standards for Data Analysis, Attribute Adjustment and Implementation of Adjustment in the Corporate Database*, 2004, MOFR;
- Summary of dead potential volume estimates for management units within the Northern and Southern Interior Management Units, MOFR, March 2006;
- *Timber Supply Analysis: Selkirk Tree Farm Licence 55 (TFL 55)*, Management Plan No. 4. Prepared for the licensee by Timberline Forest Inventory Consultants Ltd., accepted by the MOFR on June 16, 2006;

- Proposed *Management Plan No. 4: Selkirk Tree Farm Licence (TFL 55)*, Louisiana-Pacific Canada Ltd., submitted April 28, 2006.
- *TFL 55, Twenty-Year Plan*, Louisiana-Pacific Canada Ltd., accepted by the MOFR Columbia Forest District on October 24, 2006;
- Summary of public input solicited by the licensee regarding the contents of Management Plan No. 4;
- *Tree Farm Licence 55 Rationale for Allowable Annual Cut (AAC) Determination Effective April 18, 2001*. 2001. Ken Baker, Deputy Chief Forester;
- *Revised Information Package: Selkirk Tree Farm Licence 55*, Management Plan No. 3, Louisiana-Pacific Canada Engineered Wood Products Ltd., accepted July 14, 2000;
- *Revelstoke Higher Level Plan Order*, March 2005. Ministry of Agriculture and Lands;
- *Revelstoke and Area Land Use Planning Final Recommendations*, October 1999, Revelstoke Minister's Advisory Committee;
- *Identified Wildlife Management Strategy. Accounts and measures for managing identified wildlife: Southern Interior Forest Region. Version 2004*. Province of BC;
- *Order Establishing Provincial Non-Spatial Old Growth Objectives*. April 2004, Integrated Land Management Bureau;
- *Revelstoke Timber Supply Area Analysis Report*. September 2004, MOFR;
- *Mountain Caribou in British Columbia: A Situation Analysis*. May 2005, BC Mountain Caribou Science Team;
- *Mountain Caribou 2006 Survey Results, Subpopulation Trends and Extinction Risk, Draft for Technical Review*. June 2006, Ministry of Environment;
- Letter from the Minister of Forests and Range to the Chief Forester, dated July 04, 2006, stating the Crown's economic and social objectives;
- *Forest and Range Practices Act, 2002 and amendments*;
- *Forest and Range Practices Regulations, 2004 and amendments*;
- *Forest Practices Code of British Columbia Act, 1995, and amendments*;
- *Forest Practices Code of British Columbia Act Regulations, 1995, and amendments*;
- *Landscape Unit Planning Guide*, March 1999, Province of BC;
- *Biodiversity Guidebook. 1995. Forest Practices Code*, Province of BC;
- *Riparian Management Area Guidebook. 1995. Forest Practices Code*, Province of BC;
- Consideration of factors required by Section 8 of the *Forest Act* for TFL 55 by the deputy chief forester with MOFR district, regional, and branch staff at the AAC determination meeting held October 4 and 5, 2006.

Role and limitations of the technical information used

Section 8 of the *Forest Act* requires the chief forester to consider biophysical as well as social and economic information in AAC determinations. A timber supply analysis, including the inventory, growth, and yield data used as inputs to the analysis, typically forms the major body of technical information used in AAC determinations. Timber supply analyses and associated inventory information are concerned primarily with management practices and with biophysical factors, such as the rate of timber growth and definition of the land base considered available for timber harvesting.

The analytical techniques used to assess timber supply are necessarily simplifications of the real world. Many of the factors used as inputs to timber supply analysis are uncertain, due in part to variations in physical, biological, and social conditions. Ongoing scientific studies of ecological dynamics will help reduce some of this uncertainty.

Furthermore, technical analytical methods such as computer models cannot incorporate all of the social, cultural, and economic factors that are relevant when making forest management decisions. Technical information and analysis therefore do not necessarily provide complete answers or solutions to forest management problems such as AAC determinations. Such information does provide valuable insight into potential impacts of different resource-use assumptions and actions, and thus forms an important component of the information required to be considered in AAC determinations.

In determining the AAC for TFL 55, I have considered known limitations of the technical information provided, and I am satisfied that the information provides a suitable basis for my determination.

Statutory framework

Section 8 of the *Forest Act* requires the chief forester to consider particular factors in determining AACs for TSAs and TFLs. Section 8 of the Act is reproduced in full as Appendix 1.

In accordance with Section 23(3) of the *Interpretation Act*, the deputy chief forester is expressly authorized to carry out the functions of the chief forester, which include those required under Section 8 of the *Forest Act*.

Guiding principles for AAC determinations

The chief forester has expressed the importance of consistency of judgment in making AAC determinations. I also recognize the need for consistency of approach and I am familiar with the guiding principles that the chief forester has employed in making AAC determinations. I find these principles to be reasonable and appropriate and I have adopted them as described below in making my AAC determination for TFL 55.

Rapid changes in social values and in our understanding and management of complex forest ecosystems will affect our interpretation of the information used in AAC

determinations or our weighing of it. In making the large number of periodic determinations required for British Columbia's many forest management units, administrative fairness requires a reasonable degree of consistency of approach in incorporating these changes and uncertainties. To make my approach in these matters explicit I have set out the following body of guiding principles. In any specific circumstance where I may consider it necessary to deviate from these principles I will explain my reasoning in detail.

Two important ways of dealing with uncertainty are:

- (i) minimizing risk, in respect of which in making AAC determinations, I consider particular uncertainties associated with the information before me, and attempt to assess and address the various potential current and future social, economic, and environmental risks associated with a range of possible AACs; and
- (ii) re-determining AACs frequently to ensure they incorporate current information and knowledge, a principle that has been recognized in the legislated requirement to re-determine AACs every five years. The adoption of this principle is central to many of the guiding principles that follow.

In considering the various factors that Section 8 of the *Forest Act* requires the chief forester to take into account in determining AACs, I intend to reflect as closely as possible operability and forest management factors that are a reasonable extrapolation from current practices. It is not appropriate to base my decision on unsupported speculation with respect either to factors that could work to *increase* the timber supply, such as optimistic assumptions about harvesting in unconventional areas or using unconventional technology; or to factors that could work to *reduce* the timber supply, such as integrated resource management objectives beyond those articulated in current planning guidelines or in the *Forest Practices Code of British Columbia (Code)*, which is now in transition to the *Forest and Range Practices Act (FRPA)*.

In many areas, the timber supply implications of some legislative provisions, such as those for landscape-level biodiversity, still remain uncertain, particularly when considered in combination with other factors. In each AAC determination the chief forester takes this uncertainty into account to the extent possible in the context of the best available information. In making my determination for TFL 55 I have followed the same approach.

As British Columbia progresses toward completion of strategic land-use plans, in some cases the eventual timber supply impacts associated with the land-use decisions resulting from the various regional and sub-regional planning processes remain subject to some uncertainty before formal approval by government. In determining AACs, I will not speculate on timber supply impacts that may eventually result from land-use decisions not yet finalized by government.

In some cases, even where government has made a formal land-use decision, it is not necessarily possible to analyze and account for the full timber supply impact in a current AAC determination. Many government land-use decisions must be followed by detailed implementation decisions requiring, for instance, the establishment of resource

management zones and resource management objectives and strategies for those zones. Until such implementation decisions are made it would be impossible to assess in full the overall impacts of land-use decisions. In such cases, the legislated requirement for frequent AAC reviews will ensure that future determinations address ongoing plan implementation decisions. Whenever specific protected areas have been designated by legislation or order-in-council, these areas are deducted from the timber harvesting land base (THLB) and are not considered to contribute any harvestable volume to the timber supply in AAC determinations, although they may contribute indirectly by providing forest cover to help in meeting resource management objectives such as biodiversity.

Two key land-use planning documents apply to TFL 55. In October 1999, the Minister of Forests endorsed the report *Revelstoke and Area Land Use Planning Final Recommendations*, which was a product of four years' work by the Revelstoke and Area Land Use Planning Minister's Advisory Committee (RMAC). In March 2005, government approved the Revelstoke Higher Level Plan Order (RHLPO). The RHLPO establishes key RMAC recommendations as a higher level plan under the *Forest Practices Code of British Columbia Act* and is carried forward under the *FRPA*. The RHLPO defines a Resource Management Zone (RMZ) and objectives for caribou habitat, grizzly bear habitat, and landscape-level biodiversity. This has clarified some aspects of land and resource management and I refer to this where applicable in various components of this document.

When appropriate, I will consider information on the types and extent of planned and implemented intensive silviculture activities as well as relevant scientific, empirical, and analytical evidence on the likely magnitude and timing of their timber supply effects.

Some have suggested that, given the large uncertainties present with respect to much of the data in AAC determinations, any adjustments in AAC should wait until better data are available. I agree that some data are not complete but this will always be true where information is constantly evolving and management issues are changing. Moreover, in the past, waiting for improved data created the extensive delays that resulted in the urgency to re-determine many outdated AACs between 1992 and 1996. In any case, the data and models available today are superior to those available in the past and they will undoubtedly provide for more reliable determinations.

Others have suggested that, in view of data uncertainties, the chief forester should immediately reduce some AACs in the interest of caution. However, any AAC determination made by the chief forester or myself must be the result of applying our individual judgement to the available information, taking any uncertainties into account. Given the large impacts that AAC determinations can have on communities, no responsible AAC determination can be made solely on the basis of a response to uncertainty. Nevertheless, in making my determination, I may need to make allowances for risks that arise because of uncertainty.

With respect to First Nations' issues, I am aware of the Crown's legal obligations resulting from decisions in recent years made by the Supreme Court of Canada. I am aware of the Crown's legal obligation to consult with First Nations regarding asserted rights and title in a manner proportional to the strength of their claimed interests and the degree to which the decision may impact these interests. In this regard, I will consider

any information brought forward respecting First Nations' aboriginal interests, including operational plans that describe forest practices to address First Nations' interests. As I am able, within the scope of my authority under section 8 of the *Forest Act*, I address those interests. When aboriginal interests are raised that are outside of my jurisdiction, I will endeavour to forward these interests for consideration to other decision-makers.

The AAC that I determine should not be construed as limiting the Crown's obligations under the Court's decisions in any way, and in this respect it should be noted that my determination does not prescribe a particular plan of harvesting activity within TFL 55. It is also independent of any decisions by the Minister of Forests and Range with respect to subsequent allocation of wood supply.

Overall, in making AAC determinations, 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 and Range Act*, and of my responsibilities under the *Forest Act*, *Forest Practices Code of British Columbia Act* (the *Code*), and under the *Forest and Range Practices Act* (FRPA).

Because the new regulations of the *Forest and Range Practices Act* are designed to maintain the integrity of British Columbia's forest stewardship under responsible forest practices, it is not expected that the implementation of the legislative changes will significantly affect current timber supply projections made using the *Code* as a basis for the definition of current practice.

The role of the base case

In considering the factors required under Section 8 of the *Forest Act* to be addressed in AAC determinations, I am assisted by timber supply forecasts provided to me by the licensee as part of the MOFR Timber Supply Review program.

For each AAC determination a timber supply analysis is carried out using an information package that includes data and information from three categories: land base inventory, timber growth and yield, and management practices. Using this set of data and a computer model, a series of timber supply forecasts is produced. These include sensitivity analyses to assess the timber supply effects of uncertainties or changes in various assumptions around a baseline option, normally referred to as the 'base case' forecast.

The base case forecast may incorporate information about which there is some uncertainty. Its validity, as with all the other forecasts provided, depends on the reliability of the data and assumptions incorporated into the computer model used to generate it. Much of what follows in the considerations outlined below is an examination of the degree to which all the assumptions made in generating the base case forecast are realistic and current, and the degree to which its predictions of timber supply must be adjusted to more properly reflect the current situation.

These adjustments are made on the basis of informed judgment, using current information about forest management, which may well have changed since the original information package was assembled. Forest management data are particularly subject to change during periods of legislative or regulatory change, such as the enactment of the *Forest and Range Practices Act*, or during the implementation of new policies, procedures, guidelines, or plans.

Thus, in reviewing the considerations which lead to the AAC determination, it is important to remember that the AAC determination itself is not simply a calculation. While the timber supply analysis with which I am provided is integral to those considerations, the AAC determination is a synthesis of judgment and analysis in which numerous risks and uncertainties are weighed. Depending upon the outcome of these considerations, the AAC determined may or may not coincide with the base case forecast. Judgments that may be based in part on uncertain information are essentially qualitative in nature and, as such, are subject to an element of risk. Consequently, once an AAC has been determined, no additional precision or validation may be gained by attempting a computer analysis of the combined considerations to confirm the exact AAC determined.

Timber supply analysis

The 2006 timber supply analysis for TFL 55 (referred to below as the ‘timber supply analysis’ or just the ‘analysis’) was prepared by Timberline Forest Inventory Consultants Ltd. (Timberline) on behalf of the licensee. Timberline used its model Critical Analysis of Schedules for Harvesting, version 6.21 (CASH6) to conduct the analysis. Based on my staff’s experience in examining results from this model, I am satisfied that it is capable of providing reasonable projections of timber supply for TFL 55.

Given that many harvest scenarios are possible, the harvest flow objectives for the base case included: (i) restoring the initial harvest level to 100 000 cubic metres per year, the level of the AAC that was in effect from 1996 to 1999; (ii) decreasing the periodic harvest rate in manageable steps of 10 percent or less per decade, when decreases are required to meet resource management objectives or reach the long-term harvest level; and (iii) maintaining even-flow in the long term with a non-declining growing stock.

The base case harvest for the first 40-year period is 100 000 cubic metres per year. The harvest then declines 10 percent to 90 000 cubic metres per year for the subsequent decade, and declines again by 10 percent to a long-term harvest level of 81 000 cubic metres per year beginning in the year 2055.

In the base case, the species composition of harvested areas over the first 50 years reflects the high proportion of mature and old natural stands in the timber harvesting land base. Deciduous stands do not contribute to the base case as they are not used in the TFL. The long-term species profile is dominated by spruce, hemlock, and redcedar; smaller components of balsam, Douglas-fir, and other species are also included.

To ensure sustainable even-flow in the long term, the base case simulation was run for 400 years and sensitivity analyses were run for 250 years. After the original older forests are harvested, the harvest is dominated by existing and future managed stands that average between 400 and 500 cubic metres per hectare.

In the 2001 analysis, which supported MP No. 3 and the last AAC determination effective 2001, the base case declined by 10 percent per decade for four decades from an initial level of 90 000 cubic metres per year. The harvest forecast then declined a further 1.3 percent to reach the long-term harvest level of 58 260 cubic metres per year in decade six. Relative to the current base case, the previous base case was 28.1 percent lower in the mid and long term.

The main changes in the new base case relative to the previous one are: (i) the areas of the current and long-term timber harvesting land base are 16 and 13 percent larger, respectively; (ii) the licensee completed a new forest inventory using improved methodology; (iii) analysis units were defined using ecosystem-based criteria; (iv) site productivity estimates have been improved, resulting in forecasts of higher volumes from managed stands in the mid and long term; (v) genetic gains due to the use of select spruce seed were included; (vi) cutblock adjacency constraints were modelled spatially for the first 30 years; (vii) implementation of objectives from the Revelstoke Higher Level Plan Order for seral stages and caribou was incorporated; (viii) natural disturbances were modelled in the non-timber harvesting land base; and (ix) ungulate winter ranges were no longer considered as a management objective.

The licensee tried to assess the factors leading to the 28.1 percent increase in the long-term harvest level in this analysis relative to the 2001 analysis. The most important factor was the method used for assigning site index values to managed stands. In this analysis, site indices were adjusted using new methodology to address the bias formerly caused by basing site indices on height and age values in the forest cover inventory that were interpreted from aerial photographs, particularly for older stands.

A further difference between this analysis and the 2001 analysis is the use of a new inventory based on Vegetation Resource Inventory (VRI) standards including ground samples. Using the VRI to define non-productive and non-forest stands resulted in much less area being excluded on this account in the derivation of the timber harvesting land base than in the 2001 analysis. To a large extent, however, the additional area identified in the 2001 analysis as being non-productive and non-forest was excluded in this analysis as inoperable. Since the last analysis the licensee reviewed its operability mapping and identified more area as being operable than in the 2001 analysis. After excluding non-forest, non-productive, and inoperable areas, the area considered by the licensee to be operable in this analysis was approximately 3000 hectares greater than in the 2001 analysis. This additional area is attributable both to the increased area considered by the licensee to be operable (2100 hectares) and to the increased area defined as productive using the VRI within the operable area.

The total area excluded for other factors such as riparian reserves, low site, not-sufficiently restocked stands, and wildlife tree patches was approximately the same as in the 2001 analysis and therefore the timber harvesting land base in this analysis is also approximately 3000 hectares (16 percent) greater than in the 2001 analysis.

In combination, the new inventory, the improved site productivity assignments, the increase in the size of the timber harvesting land base, and the other changes listed above cause interactions and synergies that result in harvest projection changes that cannot be attributed to any one factor in isolation. It is clear, though, that without the improved site productivity estimates and the increase in the area of the timber harvesting land base, the other changes would have had a combined downward impact on timber supply relative to the 2001 base case forecast.

From my review of the timber supply analysis, including discussions with MOFR analysts about the differences between this analysis and the 2001 analysis, I am satisfied that the base case forecast provides a suitable basis of reference for use in my considerations in this determination. In addition to the base case forecast, I was provided with alternative harvest flows, a number of sensitivity analyses carried out using the base case as a reference, and supplemental analysis work. This and other information noted below have been helpful in the considerations and reasoning leading to my determination.

Where I have concluded that an assumption was appropriately modelled in the base case, I will not discuss my considerations of it in this document, other than to note my agreement with the approach that is already documented in the licensee's analysis. Conversely, I will explain my consideration of any assumption that concerns me for any reason, such as lack of clarity in the analysis report, apparent divergence from current management practice, or a high level of public or First Nations input.

Consideration of factors as required by Section 8 of the *Forest Act*

Section 8 (8)

In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

- (a) the rate of timber production that may be sustained on the area, taking into account**
 - (i) the composition of the forest and its expected rate of growth on the area:**

Land base contributing to timber harvesting

- general comments

The total area of TFL 55, as estimated from the licensee's inventory file, is 92 706 hectares. About 36 801 hectares are considered non-forest or non-productive forest, and about 802 hectares are occupied by roads. In the analysis these areas were deducted from the total area, leaving 55 103 hectares of productive forest land. The area of productive forest land is 10 561 hectares (about 24 percent) larger than that assumed in

the 2001 analysis. This is due to the fact that the VRI no longer classifies area with the subjective attribute 'productive' so it must be inferred from other VRI attributes.

As part of the process used to define the timber harvesting land base (i.e., the land base estimated to be biologically and economically available for harvesting), a series of deductions was made from the productive forest land base. These deductions account for the factors that effectively reduce the suitability or availability of the productive forest area for harvest due to ecological or economic reasons. For TFL 55, the deductions result in a current timber harvesting land base of 22 341 hectares, which means that 32 762 hectares of productive forest (nearly 60 percent) are unavailable for timber harvesting for a variety of reasons. The long-term timber harvesting land base is 21 087 hectares, which accounts for future roads, trails, and landings in the TFL and for reforestation of present NSR areas.

The current timber harvesting land base is 16 percent larger than the land base assumed in the 2001 analysis associated with MP No. 3 and the AAC determination effective 2001. Several factors contributed incrementally to cause this increase: key among them is an increased in the area considered to be operable.

In this analysis, productive forests that are excluded from the timber harvesting land base do not contribute to timber supply but do contribute to meeting a variety of non-timber resource objectives such as for wildlife and biodiversity.

In the analysis, several factors that concern management for non-timber resources (as per section 8(8)(a)(v) of the *Forest Act*) were accounted for by excluding area from the timber harvesting land base. I will discuss these below under 'Integrated resource management objectives'.

The 'total area' deducted in the discussions that follow refers to the entire area of the factor excluded from the timber harvesting land base without consideration of overlapping land base reductions. The 'productive forest area' reported is in the context of the 'total area'. The 'net area' refers to deductions made after accounting for preceding overlapping area exclusions; therefore, the order of the land base reductions affects the estimates of 'net area'.

The sensitivity of the timber supply to changes in land base area was tested by assessing the impact of increasing and decreasing the THLB by 5%. The non-THLB area was adjusted by a corresponding amount in each case to ensure that the total productive land base stayed the same. Results of the sensitivity analysis showed that the harvest level is more sensitive to decreases than to increases in the THLB. The forecast harvest level fell by about 12% when the THLB was reduced by five percent, whereas the harvest level increased by only four percent when the THLB was increased by five percent. This suggests that there is a significant risk of overestimating the potential timber supply if the true extent of the THLB is overestimated by even a modest amount.

My consideration of the deductions applied in the derivation of the timber harvesting land base is presented in the following sections of this rationale.

- non-productive and non-forested reductions

In the timber supply analysis, areas classified as non-forested such as alpine, subalpine forest, lake, rock, river, swamp, or urban areas were excluded from the land base assumed to contribute to timber supply.

The methodology used in this analysis to define the reduction for non-forest and non-productive areas differed significantly from that used in 2001. The new VRI does not define specific non-forest and non-productive attributes that were used in previous analyses. The BC Land Classification System (BCLCS) within the VRI was used to identify these areas for the current analysis. Level 1 non-vegetated land was excluded as non-forest and level 2 non-treed land as non-productive. Level 2 treed land is defined by the system as stands greater than 30 years old with less than ten percent crown closure. An exception was made for areas with a history of timber harvesting under the assumption that land previously harvested would be productive for future harvest. This resulted in 36 801 hectares being excluded as non-forest and non-productive in this analysis as compared to 47 300 hectares in the 2001 analysis, a difference of 10 449 hectares.

Although this difference is significant, the methodology used in this analysis follows the commonly accepted approach for timber supply analyses based on VRI data. In addition, as discussed below, the decrease in the amount of non-forest and non-productive area between the 2001 and 2006 analyses is largely offset by overlap with the area defined as inoperable in 2006.

I accept that the exclusions applied in the base case to account for non-productive and non-forested areas represent the best available information. I make no adjustments to my determination on this account.

- non-commercial brush and alpine tundra

The licensee excluded no areas as occupied by non-commercial brush species or alpine tundra. I have reviewed the information on non-commercial brush and alpine tundra and I am satisfied that it was adequately accounted for in the base case through other exclusions.

- economic and physical operability

Portions of the TFL are not physically accessible for harvesting or are not expected to be feasible to harvest economically. These areas are categorized as inoperable and are excluded when deriving the timber harvesting land base. Due to the mountainous and rugged terrain prevalent on TFL 55, timber harvesting is restricted by operability considerations such as adverse terrain and difficult access.

The licensee prepared a classification of the economic and physical operability of stands within the TFL based on current market conditions. This classification mapped stands assumed to be: (i) inoperable; (ii) marginal; or (iii) not available due to miscellaneous factors such as the presence of a resort lodge or mine site. In the base case,

30 244 hectares of productive forest that are considered inoperable were excluded from the timber harvesting land base, as compared to 22 551 hectares in the 2001 analysis. The increase reflects the net result of three factors. First, 2100 hectares of land considered to be inoperable using conventional harvesting in 2001 were reclassified as operable in 2006. Second, areas such as subalpine forest that meet the classification as treed under the BCLCS but would have been classified as non-productive in the previous inventory were removed at this stage as inoperable. Third, most areas that were considered in 2001 to be economically operable using non-conventional harvesting have now been classified as inoperable.

In updating the operability mapping, the licensee's staff checked questionable areas on the ground, and classified them as operable where road access could be developed at reasonable cost and merchantable forests of old-growth spruce, Douglas-fir, or western redcedar were present. The licensee has provided data to MOFR staff on its recent harvesting performance in the areas newly classified as operable. Since 2001, 107 hectares have been harvested and another 88 hectares are pending under cutting permits. The licensee plans further harvests and roads in these areas.

The substantial changes to the land base discussed here and in the section above on 'non-productive and non-forested reductions' result in a net increase of 2913 hectares (about 13 percent) in the operable land base as compared to in the 2001 analysis. The sensitivity of the timber supply to changes in the operable land base was tested by analyzing the impact of reducing the operable area to that used in the 2001 analysis. Compared to the base case, the resulting timber supply was 13% lower in the short term and 6% lower in the mid and long term.

I note that the licensee has updated the operability mapping of TFL 55 since the 2001 analysis and that MOFR staff are satisfied that both the methodology and the resulting change in the operable area are appropriate. The revised mapping addresses a concern raised by the deputy chief forester in the 2001 determination, by reviewing and reclassifying areas that had been considered harvestable by non-conventional means. Having discussed the operability assumptions applied in the base case in detail with district staff and having reviewed them on a field tour with the licensee, I am satisfied that they are appropriate for this determination.

- roads, trails and landings

For the analysis, the licensee used a Geographic Information System (GIS) to exclude from the timber harvesting land base a corridor along all existing roads. For future roads, the licensee excluded a percentage of the productive forest considered available for harvesting to account for loss of productive forest land as a result of the construction of roads, trails and landings. Separate estimates are typically made for existing roads, trails and landings and future roads, trails and landings. These estimates reflect both potential changes in road building practices and road network requirements over time, and the access that the existing network of roads will provide for future harvesting operations. Estimates account for the area that is permanently removed from the timber harvesting land base.

i) existing roads, trails and landings

In the GIS analysis of existing roads, a corridor 17 m wide was excluded along all existing roads. A total of 802 hectares was excluded on this account.

This information improves on the non-spatial exclusion used for existing roads in the 2001 analysis and addresses the request made by the deputy chief forester in his 2001 determination to provide a more precise accounting for these structures. District staff have reviewed the reductions applied in the analysis to account for existing roads, trails and landings, and indicate that they adequately represent current conditions on the TFL.

I have reviewed the available information, and am satisfied that the exclusions applied in the base case adequately account for timber harvest area lost due to existing roads, trails, and landings.

ii) future roads, trails and landings

For future roads, the licensee applied a factor in the timber supply model reducing the size of each polygon by six percent at the time of first harvest entry. This is consistent with the reduction used in the 2001 analysis for TFL 55 and with the reduction for future roads applied in the 2005 Revelstoke TSA analysis. The total area excluded from contributing to the timber harvesting land base over the forecast period was 1340 hectares.

Having reviewed the methodology and deductions applied in the base case, I conclude that the reductions to account for future productivity losses are adequate for this determination. I repeat, however, the deputy chief forester's 2001 request that the licensee review the data and methodology used to account for this factor, and develop a more definitive approach for the next analysis for TFL 55.

- terrain stability

The licensee used terrain stability mapping and field assessments to estimate the area to exclude because of unstable soils. Based on the mapping, portions of areas delineated as unstable and potentially unstable were identified and excluded from the timber harvesting land base in the analysis.

Most of the area mapped in these categories had already been excluded from the timber harvesting land base as inoperable. For the remaining area, the licensee assumed that on average 50 percent of the area of stands associated with unstable terrain and 10 percent of the area of stands associated with potentially unstable terrain would be unavailable for timber harvesting. Because of the reductions applied to account for other factors in the analysis including inoperability, the percentages of area classified as potentially unstable and unstable that were actually excluded from the timber harvesting land base were 72 and 94 percent respectively.

The licensee ensures that each proposed cut block within unstable and potentially unstable polygons is checked by a geotechnical engineer, and experience indicates that the exclusion percentages are appropriate. MOFR staff confirm that their experience also supports these exclusion percentages.

The licensee did not exclude areas from the timber harvesting land base to mitigate avalanche hazard as it uses special harvesting practices adjacent to avalanche tracks. These practices, including leaving high stumps, leaving some merchantable trees, and leaving felled non-merchantable trees lying across the slope, have been shown to be effective.

I accept the approach used for this determination, given that the majority of the area was in fact excluded and noting that, at the operational planning level, harvesting approval is guided by terrain stability assessments. I am satisfied that terrain stability concerns are adequately addressed for this determination.

- sites with low timber growing potential

In the derivation of the timber harvesting land base, sites with low productivity as a result of inherent site factors such as nutrient availability, exposure, or excessive moisture are removed from the productive forest land base.

The licensee estimated this factor in the base case by excluding sites that were unable to achieve a minimum acceptable volume by age 140 years. Redcedar and hemlock stands were excluded if they did not achieve 200 cubic metres per hectare by age 140; all other stands were excluded if they did not achieve 150 cubic metres per hectare by age 140. All stands that had been logged in the past were retained in the timber harvesting land base. The resulting net area excluded from the productive forest land base was 127 hectares.

These criteria were selected by the licensee to reflect current practices on the TFL. MOFR staff confirm that the criteria and deductions applied in the analysis do reflect current practice.

I have reviewed the criteria used to define sites with low timber growing potential and discussed the deductions with district staff. The information provided by the licensee for this analysis is improved over that in the 2001 analysis, and I accept that the assumptions applied in the base case are adequate for this determination.

- deciduous stands

Deciduous species are not currently harvested on TFL 55. In the timber supply analysis, all stands composed predominantly of deciduous species were excluded in the derivation of the timber harvesting land base. The net area excluded totalled 85 hectares after accounting for previous reductions applied in the analysis.

I have reviewed the information regarding deciduous stands, and I accept that the assumptions applied in the base case appropriately reflect current practice on TFL 55.

- non-merchantable stands

Non-merchantable stands are stands that may exceed the criteria used to define sites with low timber growing potential, yet are not currently harvested. Following a request made by the deputy chief forester in the 2001 AAC determination, the licensee modified the definition of non-merchantable stands to better reflect current practice. For this analysis, the licensee defined non-merchantable stands as those composed of greater than 80 percent hemlock or balsam and that are greater than 140 years of age. After accounting for previous deductions, a net area of 421 hectares was excluded to account for non-merchantable stand types.

MOFR staff were concerned that many stands with less than 80 percent hemlock, but still substantial amounts, occur on TFL 55 and few such stands are currently being harvested. This suggested that the definition of non-merchantable stands used in the base case might overestimate the area of the timber harvesting land base. To assess the sensitivity of the timber supply to this uncertainty, the licensee conducted a sensitivity analysis using a composition of 60 percent hemlock as a stand's upper limit of merchantability.

The sensitivity analysis showed that excluding stands with species composition of 60 percent or greater hemlock reduced the timber harvesting land base by 1298 hectares (about six percent). This reduced the short-term timber supply by about ten percent compared to the base case, and the mid- and long-term supply by six percent.

Although MOFR staff provided me with some data on harvesting of hemlock in the TFL, those data do not suffice to confirm whether the criteria used in the base case are appropriate. Therefore, in the absence of more convincing information on the future potential for harvesting hemlock leading stands, I conclude that there is a significant risk of disproportionate harvesting of other species because stands with a high component of hemlock will be at times non-merchantable or marginally merchantable. I will take this risk into consideration in my Reasons for Decision.

I encourage the licensee to use hemlock in proportion to its representation in the timber supply forecast during the next decade and those that follow. This is consistent with the licensee's assumption about including predominantly hemlock stands in the operable land base. A lengthy delay in making a transition to harvesting more hemlock could lead to a serious drop in the timber supply after 40 or 50 years if markets for this species do not improve substantially in the meantime.

I request that the licensee track its harvesting of stands having a significant component of hemlock and summarize that information by percent hemlock composition for the next AAC determination.

Existing forest inventory

Based on recommendations of the deputy chief forester in the 2001 AAC determination, the licensee conducted a comprehensive reinventory of TFL 55. The licensee completed a VRI which is the current provincial standard for gathering new forest inventory information. Phase 1, which consists of mapping polygons and attributes through aerial photo-interpretation, was completed in 2002. Phase 2 ground sampling also occurred in

2002 and the results were used to adjust phase 1 attributes to correct for bias in interpretation. The attribute adjustment procedure was reviewed and approved by MOFR staff.

The VRI was updated and projected to January 1, 2005 to account for disturbances such as harvesting and, using projections for height and age, for growth.

The licensee ran a sensitivity analysis to explore the effect on timber supply of the phase 2 adjustments in the VRI as compared to the unadjusted phase 1 values. Using the phase 1 values the short-term harvest level was reduced by 18 percent and the mid- and long-term levels by ten percent compared to the base case. As the phase 2 adjustment procedure followed provincial standards I do not consider there to be a risk to the timber supply in the licensee's VRI methodology.

I note that the current forest inventory used in the timber supply analysis has been significantly upgraded since the 2001 AAC determination. It indicates that the existing volume on TFL 55 was previously underestimated to a substantial degree.

I have considered the information regarding the forest inventory and am satisfied that it forms an acceptable basis for this determination.

-interior log grades

On April 1, 2006 new log grades were implemented for the BC Interior. Under the previous grade system, logs were assessed according to whether the trees they came from were alive or dead at the time of harvest. Certain classes of dead trees were not billed against a licensee's 'cut control' nor were they considered as part of the volume identified in a determination of an AAC. Under the new system, a log will be graded based on its size and quality at the time it is scaled or assessed without regard to whether it was alive or dead at the time of harvest. These 'dead potential' trees (i.e., dead trees that are potentially merchantable) will now also be accounted for in a licensee's cut control and will need to be considered in AAC determinations.

Existing inventory and modelling tools do not explicitly identify dead potential volumes. Possible sources of data for assessing the 'dead potential' volume in a TFL include inventory audit plots, VRI phase 2 ground samples, permanent sample plots, temporary sample plots, and cruise data. For TFL 55, MOFR staff used phase 2 sample plots from the recently completed VRI to provide an estimate of dead potential volume.

While these VRI figures likely provide best estimates for the management units as a whole and for the operable land base, they are not necessarily the most representative of the 'dead potential' volumes specific to the timber harvesting land base itself or to the location of current and near-term operations on the timber harvesting land base. Several considerations present difficulties when assessing the most appropriate figure to apply in these particular areas. 'Dead potential' volume extracted from forest stands can vary significantly over time, depending on markets and other factors. The accounting is also complicated by the relationship between 'dead potential' volumes and the requirement to leave coarse woody debris on the ground for biodiversity objectives.

The VRI phase 2 data indicate that dead potential volume is about 10.6 percent of the live volume for stands over 60 years on the forested land base of TFL 55. This estimate, however, is subject to the uncertainties I described above in that it is for the entire TFL and not just the timber harvesting land base. Further, the correlation between 'dead potential' using VRI phase 2 ground samples and actual use by the licensee is not currently known.

The harvest billing system provides an alternative source of information on use of dead wood. For the period 1995 to 2004, a time when taking dead wood to the mill was solely at the discretion of the licensee, dead wood (grade 3 endemic and grade 5 logs) totalled about 6 percent of the volume harvested.

Having reviewed this information with MOFR staff, I conclude in my "Reasons for Decision" that on this account timber supply has been underestimated by about six to 10.6 percent. I recommend under "Implementation" that the licensee and MOFR staff work together to determine an appropriate method of tracking actual use of dead potential volumes so that this factor can be more fully accounted for in the next determination.

- age-class structure

Age-class structure data from the inventory file are used in the analysis to project forest stand conditions over time. Assumptions about age classes can impact timber supply at any point in the forecast period since they form the basis against which minimum harvestable ages, green-up requirements, and other forest cover constraints are applied.

For TFL 55, the majority of stands on the timber harvesting land base are mature or old growth. Stands younger than 250 years are distributed relatively evenly across the age classes.

I have reviewed the age class distribution present on TFL 55 and I am not aware of any issues that would impact this determination.

Expected rate of growth

- aggregation procedures

For TFL 55, an ecologically-based system was used to aggregate stands into analysis units for modelling. This approach was selected because it integrates more closely with the site index adjustment process discussed below. Stands were grouped using the Biogeoclimatic Ecosystem Classification (BEC) system of site series, combined with leading tree species. This resulted in 25 analysis units for natural stands and another 25 for managed stands. A third set of analysis units were created to account for future managed stands that will benefit from genetic gains.

These aggregation procedures provide a finer resolution of the data than was applied in the 2001 analysis. I accept this approach as modelled for use in this determination.

- site productivity estimates

Inventory data include estimates 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. 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.

The most accurate estimates of site productivity come from stands between 30 and 150 years of age. The growth history of stands less than 30 years of age is often not long enough to give accurate estimates of productivity. Estimates derived from stands older than 150 years 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. The underestimate of site productivity based on forest inventory estimates for older stands has been verified in several studies (e.g., the Old Growth Site Index or OGSi project) in the province. These studies have confirmed that when old stands are harvested and regenerated site productivity realized is generally higher than is predicted by site index estimates based on the inventory.

Predictive ecosystem mapping (PEM) was completed during the preparation of MP No. 4 for TFL 55. The PEM updates the Biogeoclimatic Ecological Classification (BEC) of the land base to a finer resolution than previously mapped.

For the analysis, site index values for natural stands older than 30 years were derived from the VRI age and height attributes. A site index adjustment (SIA) project was conducted for the licensee by J.S. Thrower and Associates Ltd. in December 2005 and documented in the *TFL 55 Site Index Adjustment Final Report*. This report was reviewed and accepted by MOFR staff. The SIA was applied to existing managed stands (30 years of age and younger) and to future managed stands.

The licensee conducted sensitivity analyses to assess the impact of changes in site productivity estimates. The first adjusted site index values of managed stands by plus one metre and minus one metre. Results indicate that an increase of site index by one metre leads to a two percent increase in the harvest level in the short term and a seven percent increase in the mid and long term. A decrease of site index by one metre leads to a four percent decrease in the short-term harvest level and a six percent decrease in the mid and long term. The second sensitivity analysis investigated the impact of using the unadjusted site index values from the 2001 analysis (i.e., with no SIA applied). The resulting harvest level was 20 percent lower in the short term and 37 percent lower in the mid and long term as compared to the base case forecast in this analysis.

These results suggest that the application of improved site index estimates exerts an upward pressure on the timber supply that helps to counter the influence of downward pressures and risks, including adjacency constraints on future harvesting, that I discuss elsewhere in this report.

I have discussed with MOFR staff the methods used by the licensee to assign site index to existing and regenerated stands in the analysis, and I find them acceptable for this determination. I further note that the licensee has satisfactorily met the request made by the deputy chief forester in the 2001 determination to refine data for young stands on the TFL. The implementation of the SIA represents a significant improvement in analysis information, as does the use of the new VRI to derive site index values of existing natural stands.

Because the influence of the SIA on future harvest level is so great, especially when combined with VRI adjustments and predicted genetic gains, I request under 'Implementation' that the licensee monitor the growth performance of natural and managed stands relative to volume projections.

- volume estimates for existing natural stands

In the timber supply analysis, estimates of timber volumes in existing natural (unmanaged) stands greater than 30 years of age were projected using the Variable Density Yield Prediction (VDYP) model (version 6.6d). Deciduous species do not contribute to the harvest volume but were kept as an input into the VDYP projections. The deciduous volume was netted out at a later stage by applying an appropriate volume reduction factor by analysis unit. Yield tables were also reduced to account for wildlife tree patches, as discussed below under 'Stand Level Biodiversity'.

The total inventory volume for the timber harvesting land base was calculated from the analysis units and yield curves, and the resulting volume was compared to the timber harvesting land base volume from the VRI. The timber harvesting land base volume from the VRI was 98.9 percent of the volume calculated from the yield curves, indicating that the yield curves for the analysis units were producing acceptable results.

Although no issues were raised regarding the natural stand volume estimates, the licensee performed a sensitivity analysis to test the impact of increasing or decreasing volumes of natural stands by ten percent. Resulting harvest levels were ten percent higher and lower respectively in the short term as compared to the base case forecast, but did not change significantly in the long term.

I have reviewed the information regarding existing natural stand yields and am satisfied that standard procedures were used that were accepted by MOFR experts. I therefore find their use appropriate in support of this determination.

- volume estimates for regenerated managed stands

In the analysis, the standard MOFR growth and yield model Table Interpolation Program for Stand Yields or TIPS Y (version 3.0a) was used to estimate the timber volumes for regenerated managed stands. The model was applied to all future regenerated stands and to all existing conifer-leading stands less than or equal to 30 years of age. The managed stand yield curves were reviewed and accepted by MOFR staff for use in the analysis.

The TIPS Y projections are initially based on ideal conditions, assuming full site

occupancy and the absence of pests, diseases, and significant brush competition. Certain operational conditions may, however, cause yields to be reduced over time: such conditions may include a less than ideal distribution of trees; the presence of small non-productive areas; endemic pests and diseases; or age-dependent factors such as decay, waste, and breakage. Two operational adjustment factors (OAFs) are therefore applied to yields generated using TIPSYS, to account for losses of timber volume resulting from these operational conditions. OAF 1 is designed to account for factors affecting the yield curves across all ages, including small stand openings, uneven tree distribution, endemic pests, and other factors. OAF 2 accounts for factors whose impacts tend to increase over time such as decay, waste, and breakage. Standard provincial reductions of 15 percent for OAF 1 and five percent for OAF 2 are applied unless improved localized information is available.

Existing managed stands in TFL 55 were modelled with a standard set of inputs: initial planting at 1450 stems per hectare; OAFs set at 15 percent and five percent; and a utilization level of 17.5 cm minimum diameter.

Future managed stand yield curves differed from existing managed stands by a genetic gain factor applied to the spruce component of the stands. I provide more details on this adjustment in the genetic gains section below.

A sensitivity analysis of increasing and decreasing managed stand yields by 10 percent showed a directly proportional increase and decrease, respectively, in long-term harvest level and no change in the short-term level.

The licensee's modelling of volume from regenerated managed stands follows standard provincial methodology. Having discussed the assumptions used to generate yield estimates for managed stands with MOFR staff, I accept them as suitable for use in this determination.

- minimum harvestable ages

A minimum harvestable age is an estimate of the earliest age at which a forest stand has grown to a harvestable condition. The minimum harvestable age assumption mainly affects when currently young stands will be available for harvest within the timber supply model. This, in turn, affects how quickly existing stands may be "harvested" in the model such that a stable flow of timber harvest may be maintained. In practice, many forest stands will be harvested at much older ages than the minimum harvestable age, due to economic considerations or forest cover constraints on harvesting that arise from managing for values such as visual quality, wildlife, and water quality.

Minimum harvestable ages assumed in the base case were the ages at which stands attained: (i) a minimum of 95 percent of culmination of mean annual increment; (ii) a minimum diameter at breast height of 25 cm; and (iii) a minimum volume per hectare of 200 cubic metres for redcedar and hemlock and 150 cubic metres for all other species. These criteria, when combined, resulted in actual minimum harvestable ages that ranged from 70 to 130 years for natural stands and from 60 to 140 years for managed stands.

Sensitivity analysis showed that if all minimum harvestable ages were reduced by ten years the mid- and long-term harvest level would increase by about one percent. Conversely, if the minimum harvestable ages were increased by ten years the short- and mid-term harvest level would fall by six percent but the long-term level would rise by two percent. Thus the timber supply in this TFL is fairly sensitive to such changes.

MOFR staff who reviewed the criteria expressed concern that minimum volume per hectare limits may be too low and that minimum harvestable ages of 60 years for some managed stands may also be unrealistically low. No managed stands have yet been harvested in TFL 55, so there is no empirical information to confirm the age criteria. MOFR staff note, however, that the approach used by the licensee follows a standard methodology and is significantly improved from the approach applied in the 2001 analysis.

I have considered the information regarding the minimum harvestable age assumptions applied in the base case. I note that it is always difficult to assess future minimum harvestable ages with precision, as the ages are dependent on future technology and market conditions. I accept that the specification of minimum harvestable ages for this determination was adequate, but given the sensitivity of the timber supply to changes in minimum harvestable age and MOFR staff's expressed concerns, I will note this factor as an uncertainty under Reasons for Decision. I encourage the licensee and MOFR to monitor harvest performance relative to model assumptions to improve the minimum harvestable age criteria for future determinations.

(ii) the expected time that it will take the forest to become re-established on the area following denudation:

Regeneration delay and impediments to prompt regeneration

Regeneration delay is the period between harvesting and the time at which an area becomes occupied by a specified minimum number of acceptable well-spaced seedlings. A regeneration delay of two years for planted sites was assumed in the analysis. No specific impediments to prompt regeneration were identified for TFL 55.

MOFR district staff reviewed regeneration performance in TFL 55, including a random sample of 20 blocks in autumn 2005, and found an average delay of 2.5 years. Based on this and other local observations, they concluded that the regeneration delay assumed in the analysis is appropriate.

A sensitivity analysis showed that increasing the regeneration delay to seven years would decrease the harvest level by five percent in the short term and by six percent in the mid and long term.

I have reviewed the information regarding the regeneration assumptions and I accept it for use in this determination.

Not-satisfactorily restocked areas

Not-satisfactorily restocked (NSR) areas are those areas where timber has been removed, either by harvesting or by natural causes, and a stand of suitable tree species and stocking has yet to be established. Where a suitable stand has not been regenerated and the site was harvested prior to 1987, the classification is 'backlog' NSR. All other NSR is considered 'current' NSR.

From its spatial database for forest development planning, the licensee identified 103 hectares of backlog NSR. This area is currently stocked with an average of 450 stems per hectare. To develop an appropriate method for modelling future growth on this area, the licensee ran the ministry's TIPS Y model at both 450 stems per hectare and 1450 stems per hectare (the usual 'satisfactorily restocked' density) using a range of leading species and site index combinations. This showed that the backlog NSR stands would produce 45 percent less volume at the minimum harvest age as compared to satisfactorily restocked areas. To approximate this in the analysis, the 103 hectares of backlog NSR was removed from the timber harvesting land base but was assumed to contribute to the future timber harvesting land base. The licensee modelled this by bringing the backlog areas in after a regeneration delay of 30 years, and added a 40 percent reduction in stand yields at minimum harvestable age. This innovative approach addresses the previous deputy chief forester's concern in his 2001 determination that the growth of NSR stands was overestimated.

Current NSR was estimated at 300 hectares and was assumed to be regenerated within the two-year regeneration delay period. MOFR district staff confirm that this is appropriate for harvested areas but are concerned about areas burned by wildfires, where provincial funding would be needed to support the licensee's reforestation program.

I have reviewed the assumptions regarding the small area of not-satisfactorily restocked stands, and I am satisfied that I do not need to make any additional adjustment to my determination because of this factor. I urge the licensee to make reforesting burned areas a priority, however, to ensure actual impacts do not exceed those modelled. Provincial funds may be available to the licensee to support that work.

(iii) silvicultural treatments to be applied to the area:Silvicultural systems

On TFL 55, the predominant silvicultural system is clearcutting. In the timber supply analysis, all harvesting was modelled through the use of even-aged (clearcutting) silvicultural systems.

MOFR district staff indicate that they are not aware of any partial cutting in current practice on TFL 55. They state that the analysis assumptions regarding the use of clearcutting systems are consistent with current practice on the TFL.

I have reviewed the information regarding silvicultural systems, and I am satisfied that the analysis assumptions appropriately reflect the systems currently employed on the TFL. I therefore accept the information for this determination.

Regeneration and use of select seed

Regeneration practices modelled in the analysis assumed planting of all harvested areas at an initial density of 1450 stems per hectare. A genetic gain of eight or nine percent, depending on analysis unit, was assumed for spruce in all future managed stands due to the use of select (Class A) spruce seed on TFL 55.

A sensitivity analysis tested the effect of removing genetic gains from future managed stands. The resulting harvest level was unchanged in the short term and was four percent lower in the mid and long term.

Having reviewed the information regarding the use of select seed, I am satisfied that the base case has appropriately reflected current operational practices and expected benefits of using select spruce seed. This is improved information and it addresses the previous deputy chief forester's request that genetic gains be included in this analysis.

Incremental silviculture

Incremental silviculture includes activities such as juvenile spacing, pruning, and fertilization that are not part of the basic silviculture obligations required to establish a free-growing forest stand following timber harvesting.

The licensee's management plan states that it will undertake juvenile spacing and thinning only if external funding is secured. No accounting for incremental silviculture was included in the analysis. MOFR staff confirm that the analysis assumptions reflect current practice, as incremental silviculture is not practiced to any extent on TFL 55.

I have reviewed the information and assumptions regarding incremental silviculture and am satisfied that current practice was appropriately reflected in the timber supply analysis.

(iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area:

I have reviewed the information regarding utilization standards and allowances for decay, waste, and breakage used in the base case forecast for TFL 55 and am satisfied that standards consistent with practices on TFL 55 were employed in the analysis.

(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production:

Integrated resource management objectives

The Ministry of Forests and Range is required under the *Ministry of Forests and Range Act* to manage, protect and conserve the forest and range resources of the Crown and to plan the use of these resources so that the production of timber and forage, the harvesting

of timber, the grazing of livestock, and the realization of fisheries, wildlife, water, outdoor recreation, and other natural resource values are coordinated and integrated. Accordingly, the extent to which integrated resource management (IRM) objectives for various forest resources and values affect timber supply must be considered in AAC determinations.

Three inventory datasets on non-timber resources were required to allow the licensee to meet objectives set in the RHLPO and to assess the impacts of additional management constraints for non-timber resources during the analysis. These inventories cover BEC zones, biodiversity emphasis options, and caribou habitat. The licensee compiled the datasets since the last determination and submitted them in June 2005.

Current management on TFL 55 includes specific provisions for many resource values, as discussed in the following sections. No visually sensitive areas or community watersheds exist on TFL 55, however, so no accounting for these factors was required in the analysis. Furthermore, since 2001 the Ministry of Environment has rescinded all requirements for management of ungulate winter ranges on TFL 55 so no accounting was required for them in the analysis.

- cutblock adjacency/green-up

Specific resource values such as wildlife habitat and visual quality are maintained by restricting the harvest of stands adjacent to a recently harvested stand. When the recently harvested stand reaches a specified height (green-up) the adjacent stands become available for harvest. For the Columbia Forest District, the district manager has recommended as best practice an average green-up height of two metres instead of the standard three metres described in the Forest Planning and Practices Regulation.

Adjacency constraints help prevent the timber supply model from disproportionately harvesting in one area over another. This can also be controlled through a maximum disturbance provision that limits the total area under green-up height in the landscape unit / BEC zone at all times.

In the timber supply analysis, the spatial component of the CASH6 model was used to model an adjacency constraint for only the first 30 years of the analysis. The constraint ensured that the model reserved stands from harvesting until all adjacent stands were more than two metres in height. MOFR district staff consider this constraint appropriate as it represents current practice in the TFL.

In most timber supply analyses, including the 2001 analysis for TFL 55, adjacency restrictions are modelled by applying a non-spatial maximum disturbance constraint for the entire forecast period. In this analysis, however, the licensee did not apply such a constraint after the first 30 years. To assess the impact of this omission, a sensitivity analysis examined the effect of allowing no more than 25 percent of any LU/BEC unit to be covered with stands below two metres in height at any time. The 25 percent limit was also applied within each caribou zone as defined in the 2001 analysis. The sensitivity analysis showed a 2.5 percent decrease in the harvest level in the mid term (after the year 2066) and a 7.5 percent decrease in the long term.

I am satisfied that cutblock adjacency was adequately modelled in the first 30 years of the analysis. I am concerned, however, that the licensee's decision to omit a non-spatial disturbance constraint after 30 years may have resulted in an overestimate of the timber supply in the mid and long term, as indicated by the sensitivity analysis. I consider this further in my "Reasons for Decision".

- recreation resources

TFL 55 has significant recreation resources, and portions of the TFL are used extensively for heli-skiing, hiking, and other dispersed backcountry activities. Several lodges in the area serve as centres for helicopter-based recreational activities. Lodge sites were excluded from the timber harvesting land base as they are on private land.

A recreation resources inventory was completed for the TFL in 1991 and updated in 1999. No recreation sites exist on TFL 55, although one recreational trail passes through alpine areas. The trail corridor was excluded from the timber harvesting land base as part of the non-commercial and alpine tundra deduction. Other than the exclusion of the lodge sites no explicit exclusions or constraints were applied in the analysis to account for management for recreational resources.

I acknowledge the licensee's continued commitment in the management plan to cooperate with commercial recreation interests during operational planning. I note that MOFR district staff confirm past performance is consistent with this commitment, including work with operators to ensure timber harvesting activity in specific areas enhances heli-skiing opportunities.

Having reviewed the information regarding recreation resources, I am satisfied that the analysis assumptions appropriately reflect current management for recreation on TFL 55. I therefore accept the information for use in this determination.

- riparian habitat

Riparian management areas (RMAs) along streams, rivers, lakes, and wetlands provide key habitat for fish and wildlife and help conserve water quality and biodiversity. The *Code* and FRPA provide for RMAs which include riparian reserve zones (RRZs) that exclude timber harvesting and riparian management zones (RMZs) where constraints are placed on timber harvesting. For each stream, lake or wetland, the RRZ and RMZ make up the entire riparian management area.

For the analysis, the licensee used GIS-based techniques to estimate the area of RRZs and RMZs on TFL 55. The recommended widths for RRZs in the *Forest Practices Code Riparian Management Area Guidebook* were mapped for streams, lakes, and wetlands based on their riparian class and were excluded from the timber harvesting land base. To account for tree retention in RMZs in the base case, the licensee applied buffer widths and percent area retention that reflect current practices in the TFL.

After accounting for other deductions from the timber harvesting land base that overlapped with RMAs, 810 hectares were excluded from the timber harvesting land base. MOFR district staff indicate that the exclusions applied in the base case reasonably reflect current practices for RMAs.

I note that the licensee has provided improved, spatially explicit information for riparian areas in this analysis as compared to the 2001 analysis. In consideration of the information above I am satisfied that there has been an adequate accounting for riparian areas in this determination. As a result, I make no adjustments for this factor.

- wildlife habitat

TFL 55 provides habitat for numerous wildlife species, including grizzly and black bear, deer, moose, caribou, mountain goat, wolverine, and cougar.

The Conservation Data Centre of BC maintains forest district tracking lists that name those species and plant associations considered to be at risk and which are known to occur, strongly expected to occur, or which have occurred in the past within a given forest district. The Identified Wildlife Management Strategy (IWMS) addresses habitat management for specific species considered to be at risk, as described in the next section.

i) identified wildlife

‘Identified wildlife’ refers to two categories of wildlife designated by the Minister of Environment under FRPA. These categories are: (1) species at risk (i.e., species that are endangered, threatened, or vulnerable); and (2) regionally important species that rely on habitat that may be adversely impacted by forest or range practices on Crown land and that may not be adequately protected by other management strategies, such as those for biodiversity or riparian management. The establishment of these categories of species enables a number of provisions under FRPA to be used to manage habitat for identified wildlife; including Wildlife Habitat Areas (WHAs) and objectives, and General Wildlife Measures and objectives.

The provincial government announced its Identified Wildlife Management Strategy (IWMS) Volume I in February 1999. The IWMS Version 2004 contains an updated list of identified wildlife, updated species accounts, and updated procedures for implementing the IWMS. Government has limited the impact of management for identified wildlife to a maximum of one percent of the short-term harvest level for the province.

IWMS Version 2004 indicates that eight species of identified wildlife occur or may occur in the Central Columbia Mountains Ecoprovince where TFL 55 lies: Bull Trout, Westslope Cutthroat Trout, Coeur d’Alene Salamander, Northern Leopard Frog, Great Blue Heron, Lewis’s Woodpecker, Short-eared Owl, Fisher, Grizzly Bear, Mountain Caribou, and Wolverine. Habitat for caribou and grizzly bear is covered by provisions of the RHLPO as discussed below, and no Wildlife Habitat Areas or General Wildlife Measures have been designated for the other six species. As a result, no specific accounting for management of identified wildlife was applied in the base case other than the accounting for caribou habitat discussed below.

MOFR staff indicate that the habitat requirements for many of the identified wildlife species expected to occur on TFL 55 may already be accounted for through other constraints applied in the analysis and in practice. For example, if the Coeur d'Alene Salamander is found to occur on the TFL and Wildlife Habitat Areas are designated to conserve its habitat, trees retained in the WHA may also serve as a Wildlife Tree Patch and be accounted for as described below under 'Stand Level Biodiversity'. Management for these species under IWMS is therefore not expected to result in significant additional timber supply impacts during this determination period.

When and if Wildlife Habitat Areas are established or General Wildlife Measures are implemented in TFL 55, the impacts on timber supply of managing for identified wildlife will be more quantifiable. Any future changes to the required measures for identified wildlife species that result in impacts to timber supply, either under the IWMS or according to approved plans, will be incorporated into future determinations.

I have reviewed the information presented to me regarding the analysis assumptions for identified wildlife and I am satisfied that the analysis has appropriately reflected the operational requirements for this value. I will therefore make no adjustments in this determination on this account.

ii) caribou habitat

The mountain ecotype of woodland caribou, which is known in British Columbia as the 'mountain caribou', occurs in TFL 55 and elsewhere in south-eastern BC. In 2002, the Committee on the Status of Endangered Wildlife in Canada designated woodland caribou as threatened within the Southern Mountains National Ecological Area of Canada, which includes the area of TFL 55. This population of caribou has since been officially listed as a species at risk under the federal *Species at Risk Act*, and is on the provincial 'red list' of endangered and threatened species.

Mountain caribou in TFL 55 are part of the Columbia North sub-population which, like almost all sub-populations, has been declining rapidly for at least the last decade. The Columbia North sub-population now numbers fewer than 150 animals. Critical caribou habitats, including portions of TFL 55, have been identified and mapped by the Ministry of Environment, MOFR, and Parks Canada staff through the use of radio telemetry, aerial censuses, terrain analysis, and specific sightings.

Current management of caribou habitat follows the RHLPO objectives established in March 2005, and is essentially the same as the RMAC caribou strategy modelled in the 2001 analysis. Both the RHLPO and RMAC strategy prescribe retention of old forest to provide for critical mountain caribou habitat, including minimum forest cover requirements within the ESSF and ICH biogeoclimatic zones below the operability line defined in 1994, as well as within the ESSF and ICH areas located between the 1994 operability line and the ESSF parkland.

To model the requirements of the RHLPO, the licensee delineated four separate zones for caribou in the analysis, covering 21 591 hectares in total and 14 003 hectares or 63 percent of the timber harvesting land base. Habitat constraints were applied to all

areas of the forested land base with slopes less than 80 percent. In the ‘caribou ESSF’ and ‘caribou ICH’ zones below the 1994 operability line, a minimum of 40 percent of the stands on the operable forested land base was required to be greater than 140 years of age at all times during the forecast period, and a minimum of 10 percent of the stands on the same area was required to be greater than 250 years of age. In addition, for the ‘caribou ESSF’ and ‘caribou ICH’ zones between the 1994 operability line and ESSF parkland, a minimum of 70 percent of the stands was required to be at least 140 years of age.

MOFR district staff confirm that the analysis assumptions for caribou habitat reasonably reflect current management. Both the licensee and government staff anticipate, however, that restrictions on forestry in caribou habitat may be tightened as a result of a provincial review that was ongoing at the time of the analysis. The provincial government established a Species At Risk Co-ordination Office (SaRCO) in 2005 to accelerate progress on recovery of mountain caribou and other species at risk. Working with other ministries, SaRCO developed a series of draft options for caribou recovery and has conducted consultations on the options with resource users, First Nations, and the public. SaRCO is expected to present caribou recovery options for government’s consideration in the near future.

To assess the impact of one possible new strategy, the licensee conducted a sensitivity analysis of increasing the minimum retention for stands older than 140 years from 40 percent to 60 percent. This resulted in approximately a 24 percent decrease in the harvest level throughout the forecast period. In addition, to assess the effect of the current caribou objectives on the harvest, a sensitivity analysis was conducted in which all caribou constraints were removed. Under this scenario the harvest level increased by 14 percent in all time periods.

Management for caribou habitat is important in TFL 55 and, as the sensitivity analyses show, it has a significant effect on timber supply. I have considered the information presented to me regarding current management considerations for caribou and their reflection in the analysis, and I am satisfied that the work done was appropriate given the importance of the species.

I also am mindful of the possibility that management regimes for caribou might change in the short term. Consistent with my guiding principles for AAC determinations, described above, I will not speculate on the nature of these future regimes or their implications for timber supply. Should management requirements change, with corresponding implications for timber supply, between now and the next scheduled determination for TFL 55, I am prepared to revisit this determination sooner than the five years allowed by legislation. I will discuss my considerations of this further under “Reasons for Decision”.

iii) grizzly bear habitat

The RHLPO provides protection from the effects of timber harvesting for high value grizzly bear habitat adjacent to certain avalanche chutes. The order specifies that a minimum 50 metre width of suitable forest cover is to be retained on at least one side of the high value habitat. Mature and old seral forests are to be used in meeting this retention objective whenever such forests must be maintained to meet biodiversity

conservation targets.

The licensee did not specifically account for the management of grizzly bear habitat in the analysis. MOFR district staff indicate that management provisions for grizzly bear habitat are expected to be accommodated through the assignment of biodiversity emphasis options and the specified old and mature forest retention targets in the landscape unit planning process. As a result, no additional timber supply impacts are anticipated to result from grizzly bear management provisions.

For this determination, I am satisfied that the provisions in the analysis of the management requirements for landscape-level biodiversity (as discussed under *landscape-level biodiversity*), to the extent that they reflect current approved management practice, should also account for grizzly bear habitat. As a result, I find that the assumptions in the base case regarding grizzly bear habitat were appropriate, and I make no adjustments for this determination.

- *biodiversity*

Biological diversity, or biodiversity, is defined as the full range of living organisms in all their forms and levels of organization; and includes the diversity of genes, species, ecosystems, and the evolutionary and functional processes that link them. Under the FRPA, biodiversity in a given management unit is assessed and managed at both the stand and landscape levels.

Although some general forest management practices can broadly accommodate the needs of most ecosystems, more often a variety of practices is needed to represent the different natural disturbance patterns under which ecosystems have evolved.

i) *stand-level biodiversity*

Stand-level biodiversity is managed in part by retaining areas of mature timber or wildlife tree patches (WTPs) within or adjacent to cutblocks to provide structural diversity and wildlife habitat. WTPs are retained operationally to maintain over time elements of stand structure such as large trees, snags, and coarse woody debris that are common in old forests but not in younger managed stands. WTPs greater than two hectares can also contribute to old forest and mature forest targets for landscape-level biodiversity objectives if the WTPs are the right age.

Retention of coarse woody debris was not explicitly addressed in the analysis. Staff note that the age and nature of the stands in TFL 55 suggest that coarse woody debris objectives are achieved indirectly through normal utilization levels in harvesting.

To formulate the assumptions used in the base case, the licensee used retention values from the *Landscape Unit Planning Guide* (LUPG). Existing WTPs shown on forest development plans and other known exclusions of older forest from the productive forest land base were spatially identified and excluded from the THLB. In addition to these known areas, the licensee calculated that an additional 1.53 percent of the productive forest land base would need to be retained as WTPs to meet the LUPG targets and the target of a maximum distance between WTPs of 500 metres that is recommended in the Provincial Wildlife Tree Policy. This area reduction was approximated in the base case

by reducing stand yields by 1.53 percent.

MOFR staff confirm that the methodology used in the analysis is consistent with provincial policy and with procedures used in timber supply analyses for other Tree Farm Licenses.

I have reviewed the information on stand-level biodiversity, and I am satisfied that the assumptions in the analysis are consistent with provincial policy requirements.

ii) landscape-level biodiversity

Objectives for landscape-level biodiversity can be achieved by maintaining forests with a variety of patch sizes, seral stages, and forest stand attributes and structures across a variety of ecosystems and landscapes. Managing for biodiversity is based in part on the principle that maintaining these conditions, together with connectivity of ecosystems and maintenance of forest interior conditions in large stands, will provide for the habitat needs of most forest and range organisms. A major consideration in managing for biodiversity at the landscape level is leaving sufficient and reasonably located patches of old-growth forests for species dependent on old-growth forests or strongly associated with them.

Landscape-level biodiversity objectives for TFL 55 are set by the RHLPO and are defined by landscape unit, BEC unit, Biodiversity Emphasis Option (BEO), and operability class (i.e., whether a unit is above or below the 1994 operability line). The requirement that seral targets must be met both above and below the operability line is one aspect in which the RHLPO differs from requirements in most other areas of the province, which follow the *Order Establishing Provincial Non-Spatial Old Growth Objectives*.

The RHLPO excludes TFL 55 (and TFL 56) from requirements for retention of minimum amounts of mature forest in low BEO areas. The RHLPO also allows the retention requirements for old forests to be reduced to one-third for the next 240 years in low BEO areas within TFL 55 and 56. The licensee decided to not use the one-third allowance and modelled the full old retention requirements since the full requirements would have to be met after 240 years.

In the base case, requirements for landscape-level biodiversity were modelled to fully reflect the RHLPO seral requirements below the 1994 operability line. Above the line there is a small amount of timber harvesting land base, but it was assumed in the analysis that biodiversity objectives for the area above the line would be met by the large amount of inoperable productive forest.

To assess the implications of managing for RHLPO seral targets below the 1994 operability line rather than using the whole land base to meet the targets, the licensee ran a sensitivity analysis without the operability line stratification. Under that scenario almost twice as much area contributed to the retention targets and harvest levels increased by four percent in the short term and three percent in the mid and long term.

A sensitivity analysis was also conducted to test the impact of reducing the old forest retention requirement to one-third of the standard RHLPO target in low BEO areas. This was applied only for the first 80 years of the analysis period as the licensee did not feel it would be in its best interest to wait as long as 240 years to meet the full target. The harvest level increased by about two percent in the short term and by less than one percent in the mid and long term.

MOFR staff have reviewed the analysis assumptions for landscape-level biodiversity, and state that the assumptions meet or exceed the requirements in the RHLPO.

For this determination, I make no adjustments.

- disturbances in the inoperable land base

Forests outside the timber harvesting land base contribute to the achievement of landscape-level biodiversity and caribou objectives. While harvesting does not occur in these forests, natural agents such as fire, insects, and wind create disturbances and affect the age class distribution of stands. An important aspect of timber supply modelling is to reflect realistic conditions in these forests, so that the assumed contribution to old or other seral objectives is consistent with what would be available operationally.

Natural disturbances in the non-timber harvesting land base were not factored into the 2001 timber supply analysis for TFL 55. This results in an unrealistic accumulation of stands in the oldest age class in the projected development of the forest. Several different methodologies have been used in recent timber supply analyses to reflect natural disturbance regimes.

In the base case for this analysis, the rate of natural disturbance modelled in the non-timber harvesting land base was set to achieve the range of natural variation defined in the *Biodiversity Guidebook* for early, mature, and old seral percentages of each BEC variant. Productive areas of the non-timber harvesting land base were modelled as being subject to annual disturbance based on the 'oldest first' rule. The size of the disturbances was based on the disturbance frequency listed in the *Biodiversity Guidebook* for the relevant BEC variants.

The resulting disturbance intervals for the non-timber harvesting land base in TFL 55 were 350 years in the ESSF zone and 250 years in the ICH zone. Annual disturbance rates were 0.29 percent for the ESSF and 0.4 percent for the ICH. The area disturbed annually totalled 177 hectares, and varied from four to 74 hectares in the various ESSF variants and from seven to 89 hectares in the ICH variants.

A sensitivity analysis was conducted to assess the effect of not accounting for natural disturbances on the non-timber harvesting land base; in other words, stands on the non-timber harvesting land base were assumed to grow progressively older with no natural disturbance. As a result, there was no change in the short-term harvest level but the mid- and long-term levels increased by about six percent. This can be attributed to the steady accumulation of old forest in the non-timber harvesting land base, which contributes to retention objectives that would otherwise constrain timber availability.

I have reviewed the information regarding natural disturbance in the non-timber harvesting land base. I note that the licensee has provided much improved information on natural disturbances for this analysis, and accept that the methodology applied appropriately reflects natural disturbance processes as they are currently understood. I encourage research and monitoring, however, which will enable us to better understand disturbance regimes and their implications to timber supply in TFL 55 and other parts of the province.

(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,

Harvest sequencing

In timber supply analysis, the order in which eligible stands are assumed to be harvested can affect the projected timber supply in a number of ways. Any difference between the modelling assumptions made and the order in which stands are actually harvested in operational practice must be examined and accounted for.

In the analysis the harvest flow objectives were to: (i) maintain or increase the current harvest level for as long as possible; (ii) limit changes in harvest level to less than ten percent of the level in the decade prior to the change; and (iii) achieve a maximum stable long-term harvest level while maintaining a stable profile for the growing stock.

In the base case for TFL 55, the model was run with an objective of harvesting the oldest stands first. A sensitivity analysis tested the impact of using two alternative harvest sequencing rules. The first, called 'relative oldest first', gave harvesting preference to stands with the greatest difference between their actual age and their assigned minimum harvest age. The second, called 'maximum volume', gave preference to stands with the maximum volume per hectare. Both alternative rules resulted in approximately a four percent decrease in the mid- and long-term harvest level compared to the 'oldest first' rule used in the base case.

I have also reviewed the information regarding the profile of stands harvested in current practice. Recent evidence indicates that the licensee is harvesting Douglas-fir, spruce, and redcedar in preference to other species. As I noted above in my consideration of non-merchantable stands, I am concerned that the full profile of the forest must be harvested to support the projected level of harvest on TFL 55. To avoid harvest flow problems in future decades, the licensee should make efforts over the term of this and future determinations to use relatively more hemlock and less redcedar.

While no rule completely emulates actual harvesting performance, the sensitivity analyses suggest uncertainty in this factor likely has no impact on short-term timber supply and relatively minor impacts in the mid and long term. I find the 'oldest first' rule used in the base case satisfactory, and make no adjustments in this regard.

Actual harvest level

- partitioning and allocation

Since 1993, a portion of the AAC for TFL 55 has been allocated to BC Timber Sales and its predecessor the Small Business Forest Enterprise Program. In recent years BC Timber Sales has been allocated 17 675 cubic metres per year and the TFL licensee has been allocated the balance of the AAC, 72 325 cubic metres per year.

From 1996 to 2001, a partition of 10 000 cubic metres per year, or ten percent of the total AAC, was assigned to the area above the 1994 operability line. The licensee's harvesting performance in the ensuing five years demonstrated that the partition would not be required after 2001, and the deputy chief forester removed it in his 2001 determination. MOFR district staff consider the licensee to have continued its satisfactory performance in this regard. I am aware of no new information that suggests a partition based on operability considerations is required.

- cut control and harvest performance

Due to a relatively low level of harvest during 1992 to 1996, the licensee was assigned an adjusted undercut of about 8700 cubic metres per year from 1997 to 2001. During that period, 95 percent of the AAC was harvested and concern about under-cutting was eased. A review of the cut control information for 2002-2005 by MOFR staff showed that 98 percent of the AAC had been harvested, indicating that the licensee is fully utilizing its portion of the AAC. I am satisfied from review of the information that there are no issues relating to the ability of the licensee to meet their harvesting obligations on the TFL.

Twenty-year plan

The licensee used the proprietary spatial harvesting model CASH6 to develop a twenty-year plan for TFL 55. The twenty-year plan was based on the first 20 years of the base case analysis. This falls within the 30-year period for which the spatial component of CASH6 was used (see "cutblock adjacency/green-up" above); as a consequence, the twenty-year plan results do not differ from the base case analysis. Base case volumes were successfully located while meeting adjacency and green-up rules. The licensee submitted a map that illustrates the distribution of the proposed cutblocks and roads in the plan, and MOFR district staff confirmed that the plan was feasible. Staff noted that a substantial number of the mapped blocks were in hemlock- and balsam-leading types, which suggests that the licensee needs to address concerns I have expressed above about harvesting the TFL's stands in proportion to the species mix on the timber harvesting land base.

The district manager accepted the licensee's twenty-year plan on October 24, 2006.

The twenty-year plan suggests that the first two decades of the base case harvest projection is operationally attainable. I have been mindful of this information in my consideration of an appropriate harvest level for TFL 55.

Land use planning and landscape unit planning

The RMAC report *Revelstoke and Area Land Use Planning Final Recommendations* (October 1999) was endorsed by government in 2001. Certain key recommendations from the RMAC report were established as a higher level plan order, the RHLPO, in March 2005 under Part 2 of the *Forest Practices Code*. The order provides legal objectives for biodiversity emphasis, old and mature forest, caribou, and grizzly bear that have been carried forward under FRPA. Other recommendations from the 1999 RMAC report were not included in the higher level plan order because they are already addressed by FRPA or other legislation, they do not relate to strategic and operational plans under FRPA, or their potential social and economic implications have not been analyzed.

Under FRPA, the licensee must now provide results or strategies in its Forest Stewardship Plans that are consistent with the RHLPO objectives. The timber supply analysis was designed to be consistent with these legal objectives, and I have addressed this in previously discussed factors such as *aggregation procedures*, *caribou habitat*, *grizzly bear habitat*, and *landscape-level biodiversity*. Having reviewed the legal objectives under FRPA stemming from the RHLPO with MOFR staff, I am satisfied that the analysis has appropriately accounted for this important consideration.

First Nations considerations and cultural heritage resources

The following First Nations groups have asserted traditional territories within the TFL: the Akisq'nuk First Nation, the Okanagan Indian Band, the Shuswap Indian Band, the Simpcw First Nation, the Ktunaxa Nation Council, the Okanagan Nation Alliance, and the Shuswap Nation Tribal Council. The Simpcw First Nation had not been initially included in the consultation process, but during the process more up-to-date information became available indicating that the Simpcw First Nation also had asserted traditional territory covering parts of TFL 55. Therefore, as described in more detail below, the Simpcw were also contacted and provided the opportunity to comment on how their aboriginal interests may be affected by this AAC determination.

MOFR district staff confirmed that no archaeological overview assessments or traditional use studies have been conducted that include the TFL area, and no First Nations artifacts have been found in the area.

The Ktunaxa Kinbasket Treaty Council, which represents the members of the Ktunaxa Nation Council, and the Shuswap Indian Band are in Stage 4 of the B.C. Treaty Commission process. The Okanagan Nation Alliance (members include the Okanagan Indian Band) and the Shuswap Nation Tribal Council (members include the Simpcw First Nation) are not involved in the treaty process. Consistent with my guiding principles, I will not attempt to pre-judge decisions that have not been made, such as treaty settlements. When those decisions are made, however, they can be factored into subsequent timber supply reviews and accounted for in future AAC determinations.

Forest and range agreements (FRAs) and forest and range opportunities (FROs) are interim agreements between MOFR and eligible First Nations. These agreements are designed to provide for workable accommodation of aboriginal interests that may be

impacted by forestry decisions during the term of the agreement, until such time as those interests are resolved through treaty. FRAs and FROs provide First Nations with opportunities for direct award forest tenure and a share of forestry revenues.

The Ktunaxa Nation Council has a FRO and a Wildfire Agreement. The Okanagan Indian Band has a Wildfire Agreement and Silver Star Park Tree Removal Agreement. The Shuswap Nation Tribal Council has a Wildfire Agreement. The Shuswap Indian Band has a FRO. The Simpcw First Nation has a Short Term Mountain Pine Beetle Agreement.

The licensee conducted information sharing regarding the timber supply review process with the Akisq'nuk First Nation, the Okanagan Indian Band, the Shuswap Indian Band, the Ktunaxa Nation Council, the Okanagan Nation Alliance, and the Shuswap Nation Tribal Council through the following process:

- An e-mail was sent to each of the First Nations groups listed above, except the Simpcw First Nation¹, in September 2005 notifying them of the preparation of Management Plan No. 4 and extending an invitation to meet to review the proposed plan;
- A follow-up phone call was placed in early October 2005 to each of the First Nations groups. On this occasion either no one representing the First Nation was available to discuss the issue or the licensee was requested to resend the original e-mail;
- In mid-October 2005 the draft of MP No. 4 was sent, attached to an e-mail, to each of the First Nations. The e-mail noted that the Ministry of Forests and Range also would be contacting the First Nations groups to consult on how their aboriginal interests may be affected by the AAC determination;
- A second follow-up phone call was placed in late October 2005 to each of the First Nations. In all but one instance, no one representing the First Nation was available to take the call. In the one exception, the licensee was asked to resend the e-mail with the draft of MP No. 4 attached;
- On November 7, 2005 a letter was received from the Shuswap Nation Tribal Council that contained no specific comments on MP No. 4;
- On November 18, 2005 a revised version of the draft MP No. 4 was sent to all the First Nations by e-mail;
- On November 18, 2005 the Okanagan Nation Alliance sent an e-mail stating that sending them the draft of MP No. 4 was not meaningful consultation and that the ONA did not have the capacity to responsibly respond;
- On November 30, 2006 the Ktunaxa Nation Council phoned to say that they would contact the licensee if they wanted to meet to discuss the management plan;

¹ The Simpcw First Nation was not contacted until May 5, 2006 as it did not express its aboriginal interest in TFL 55 until February 2006.

- On February 17, 2006 the final version of the management plan and the timber supply analysis report were sent, attached to an e-mail, to each of the First Nations groups.

The Ministry of Forests and Range conducted a consultation process as follows:

- A letter was sent in early May 2006 to the Akisq'nuk First Nation, the Okanagan Indian Band, the Shuswap Indian Band, the Simpcw First Nation, the Ktunaxa Nation Council, the Okanagan Nation Alliance, and the Shuswap Nation Tribal Council to notify them of the upcoming decisions on the replacement of TFL 55 and on the TFL AAC determination. The First Nations groups were requested to inform the MOFR district aboriginal liaison officer of any aboriginal interests and the specific locations of the interests that may be affected by these decisions;
- A 60-day period was provided for the First Nations groups to supply information. No comments or concerns were received by MOFR from any of the First Nations groups regarding the TFL timber supply review;
- The aboriginal liaison officer in the MOFR district indicated that he is not aware of any known aboriginal interests that would be directly affected by the AAC determination for TFL 55.

In summary, I am satisfied that the licensee and MOFR staff have made reasonable efforts to share information and consult with First Nations who have asserted traditional territories within the TFL. If, through the treaty process or other processes, new information becomes available that significantly varies from the information that was available for this determination for any of the First Nations with asserted traditional territory covering portions of TFL 55, I am prepared to revisit this determination sooner than the five years required by legislation.

I note that MOFR district staff continue to be available to meet and consult with First Nations on specific issues that can be addressed at the operational planning level.

(b) the short and long-term implications to British Columbia of alternative rates of timber harvesting from the area,

Alternative harvest flows

The nature of the transition from harvesting old-growth forests to harvesting second-growth forests is a major consideration in an AAC determination. In keeping with the objectives of good forest stewardship, AAC determinations in British Columbia are conducted regularly to ensure that short-term harvest levels are compatible with a smooth transition to medium- and long-term levels. Timber supplies need to remain sufficiently stable so that there are no inordinately adverse impacts on current or future generations. To achieve this, the AAC determined must not be so high as to cause later disruptive shortfalls in supply nor so low as to cause immediate social and economic impacts that are not required to maintain forest productivity and future harvest stability.

In the base case, the harvest flow objectives included: (i) restoring the initial harvest level to 100 000 cubic metres per year, the level of the AAC that was in effect from 1996 to 1999; (ii) decreasing the periodic harvest rate in manageable steps of 10 percent or less per decade, when decreases are required to meet resource management objectives or reach the long-term harvest level; and (iii) maintaining even-flow in the long term with a non-declining growing stock.

The licensee for TFL 55 provided four alternative harvest flows in the timber supply analysis. For one alternative flow the short-term harvest level was raised to 126 000 cubic metres per year for twenty years, then reduced by approximately 10 percent per decade until it reached a long-term harvest of 80 000 cubic metres per year, which is similar to the base case long-term level. In the second alternative flow the harvest level was modelled to give the maximum non-declining flow starting in the first year of the analysis; this resulted in a steady harvest level of 84 000 cubic metres per year for the 250 year analysis period. In the third alternative flow the current AAC of 90 000 cubic metres per year was maintained as long as possible—100 years—before declining to a stable long-term level of 80 000 cubic metres per year. In the fourth and final alternative flow the current AAC was maintained for four decades before declining to a stable long-term level of 83 000 cubic metres per year.

These forecasts and their consequences for the total amounts of timber harvested over time are described in more detail in the licensee's 2006 analysis report. Review of alternative harvest flows can provide information about the amount of timber supply flexibility available in the short, mid, or long term. For example, comparing the base case to the fourth alternative suggests that a substantially larger harvest in the first four decades would be balanced by a reduced long-term harvest level. These forecasts provide me with valuable insight into the timber supply dynamics and trade-offs resulting from various choices of initial harvest levels, given the base case assumptions for TFL 55.

In making my AAC determination I have considered all these forecasts, in addition to the base case forecast and the many sensitivity analyses provided in the analysis report, as well as recent and current actual harvest levels in the TFL. These forecasts and their role in this determination are discussed in 'Reasons for Decision'.

Community implications

Forest-based employment is a significant component of the economy of Revelstoke and the surrounding area. According to a socio-economic analysis documented in the September 2004 *Revelstoke Timber Supply Area Analysis Report*, forestry activities contribute approximately 23 percent of the employment in the Revelstoke area, and 24 percent of the income.

The management of TFL 55 employs four permanent staff and approximately 46 contractors and consultants. The licensee owns a mill in Golden which employs 60 people processing wood from TFL 55 and the licensee's other forest licenses.

I have reviewed the information regarding the community dependence on the forest industry and conclude that the timber harvested on TFL 55 contributes significantly to the licensee's local operations and to employment in the region.

(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia;

Economic and social objectives

- Minister's letter

The Minister has expressed the economic and social objectives of the Crown for the province in a letter dated July 4, 2006 to the chief forester (attached as Appendix 3). This letter replaces the July 28, 1994 letter and a February 26, 1996 memorandum regarding economic and social objectives.

The letter stresses the importance of a stable timber supply while being mindful of other forest values. The letter also notes that much of the interior of British Columbia is in the midst of an unprecedented outbreak of the mountain pine beetle, which raises great challenges for communities affected by the epidemic. The pine beetle is not a directly relevant factor in the determination of the AAC for TFL 55.

I have considered carefully the Minister's stress on the importance of providing a stable timber supply while maintaining other forest values. In that regard I believe the harvest flow objectives assumed in the base case, particularly the proposed increase in the short term to 100 000 cubic metres per year (equal to the AAC that was in effect from 1996 to 2001), represents some risk to the long-term timber supply. This risk is further compounded by other uncertainties, including the outcome of the current government review of mountain caribou policy and the prospect of suitable markets for hemlock. I am also mindful that the general approach in cases of declining timber supply is not to increase the AAC unless the management unit is faced with exceptional circumstances, such as a mountain pine beetle infestation that warrants an immediate increase to allow for salvage of infested timber. The preference has been to employ any potential increases in supply to mitigate the need for future reductions, rather than to increase short-term harvests. This approach minimizes the likelihood that an increase in AAC will lead to the need for larger future reductions and consequent socio-economic adjustments. I return to these issues in my 'Reasons for Decision'.

The base case has, however, accounted for the RMAC recommendations and the RHLPO, the key government-approved land and resource plans that are applicable to the TFL. Because the land base assumptions in the analysis accounted for these land use decisions, as well as other non-timber values, this has significantly reduced uncertainty in timber supply associated with these factors.

- local objectives

The Minister's letter of July 4, 2006, suggests that the chief forester should consider important social and economic objectives that may be derived from the public input in

the timber supply review where these are consistent with government's broader objectives as well as any relevant information received from First Nations.

The licensee provided opportunities for public review in the development of its Management Plan 4 and associated documents which supported the timber supply analysis. MOFR district staff confirm that the licensee met its public input obligations satisfactorily, and that no written responses were received.

I am satisfied that the licensee has carried out its public involvement obligations satisfactorily, and that no specific issues were identified in public review which would impact this determination.

Local objectives for land and resource use in TFL 55 are largely captured in the government-endorsed *Revelstoke and Area Land Use Planning Final Recommendations* and the RHLPO. I have accounted for the RHLPO objectives as they relate to various factors I have considered in my determination.

District staff briefed me on the information sharing and consultation process with First Nations associated with this timber supply review, which I discussed earlier under 'First Nations Considerations and Cultural Heritage Resources'. I have taken this information into account in my determination.

Based on this, I believe my accounting for objectives provided in the RHLPO, and my review of public and First Nations considerations that I detailed above, have appropriately addressed the Minister's request that I consider local objectives.

(e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

Unsalvaged losses

Numerous parasites, fungi, or plants can kill trees or degrade the quality and value of logs. Unsalvaged losses are timber volumes destroyed or damaged by causes such as fire, insects, and disease that are not recovered through salvage operations.

Estimates for unsalvaged losses account for epidemic infestations that are not incorporated into yield estimates used in the analysis. Timber volume losses due to 'normal' infestations (endemic losses) are accounted for in inventory sampling for existing timber yield estimation or through other methods. Losses associated with second-growth stands are addressed by application of operational adjustment factors as noted previously in this rationale.

To estimate unsalvaged losses for the timber supply analysis, the licensee used a combination of historical data for the TFL, local knowledge, and professional judgement. Fire losses were calculated using data on unsalvaged fires on the timber harvesting land base between 1955 and 2004. Average windthrow and avalanche losses were calculated by reviewing losses during the past 15 years and applying professional judgement. Losses as a result of hemlock looper, Douglas-fir bark beetle, and spruce bark beetle were calculated using Forest Insect and Disease survey data, local knowledge, and

professional judgement.

In total, the licensee excluded 1490 cubic metres per year from the projected harvest volume to account for unsalvaged losses. This represents a 50 percent increase over the level used in the 2001 analysis. MOFR district staff have reviewed the assumptions and approach used in the calculation of unsalvaged losses, and indicate that the estimates appear reasonable. District staff further note that the licensee has refined its estimates of unsalvaged losses using data specific to the land base of the TFL, which satisfies the deputy chief forester's concern expressed in the 2001 determination.

Having reviewed the information regarding unsalvaged timber volumes, I accept that the methodology and estimates assumed in the base case reasonably reflect current unsalvaged losses on the TFL.

I note, however, that losses due to the spruce bark beetle have the potential to increase rapidly should small infestations not be dealt with promptly. I encourage the licensee and MOFR staff to monitor the spruce beetle in and around the TFL and be ready to take immediate action should a threat arise.

Reasons for Decision

In reaching my AAC determination for TFL 55, I have considered the information discussed throughout this document, and I have reasoned as follows.

Under the assumptions applied in the base case, as discussed throughout this document, it was possible to attain an initial harvest level of 100 000 cubic metres per year. This harvest level could be maintained for four decades before beginning a series of two declines at a rate of ten percent per decade, to the long-term harvest level of 81 000 cubic metres per year.

In determining an AAC for TFL 55, I have identified a number of factors which, considered separately, indicate that the timber supply may be either greater or less than that projected in the base case. Some of these factors can be readily quantified and their impact on the harvest level assessed with reliability. Others may influence timber supply by adding an element of risk or uncertainty to the decision, but cannot be reliably quantified at this time.

I have identified the following factor in my considerations as indicating that the timber supply projected in the base case may have been overestimated:

- *cutblock adjacency/green-up* – I considered that accounting for adjacency constraints after the first 30 years of the forecast would decrease the mid-term harvest level by 2.5 percent and would decrease the long-term harvest level by 7.5 percent.

I have also identified the following factor that indicates that timber supply projected in the base case may have been underestimated:

- *interior log grades* – I concluded that the base case is underestimated over the forecast period by approximately six to 10.6 percent due to the use of dead trees that are charged to the AAC but that were not accounted for in the analysis.

In consideration of the above-mentioned influences, I note that the only uncertainty affecting short-term timber supply is that concerning the appropriate volume of ‘dead potential’ trees to include in the AAC. In my assessment of the risk associated with the inclusion of this volume, I note that the licensee’s current and expected use of dead potential volume is unknown.

The risks and uncertainties normally associated with the management of non-timber values have been reduced to some degree in TFL 55 with the approval of the Revelstoke Higher Level Plan Order (RHLPO), which has legal effect under the *Forest and Range Practices Act*. The RHLPO establishes a resource management zone and sets objectives for retention of mature and old forest, and for management of habitat for caribou and grizzly bears. In addition, the former requirement for ungulate winter ranges (UWRs) on the TFL has now been rescinded by the Ministry of Environment, and riparian habitat has been mapped much more accurately by the licensee and appropriately accounted for in establishing the timber harvesting land base. Although some small uncertainty remains around potential Wildlife Habitat Areas (WHAs) that may be established on the TFL in future, MOFR staff consider it likely that existing provisions for other non-timber values, such as stand-level biodiversity, may also to some extent cover WHAs and therefore reduce impacts on the timber supply.

I am concerned, however, that potential remains for a significant change in caribou habitat management on TFL 55 as a result of the provincial government’s ongoing review of its policy for mountain caribou. Also, the federal government’s listing of mountain caribou under the federal *Species at Risk Act* provides additional uncertainty in form of the potential for direct intervention by the federal government to protect critical habitat on Crown land. I am aware that proposed provincial policy options for recovering caribou populations include more than just increasing the constraints on timber harvesting; for example, government may consider intervening to increase caribou numbers or reduce the abundance of predators and alternate prey. It is possible that any increase in forestry constraints would only be implemented after population enhancement is tested, and that would probably take several years. Nevertheless, I cannot ignore the potential for increases in habitat protection as a result of decisions by either level of government, especially since recent caribou surveys appear to show continuing declines of most sub-populations, including the one residing in the area of TFL 55.

A sensitivity analysis that tested the impact of one potential new habitat policy for caribou indicated a 24 percent decrease in the harvest level throughout the forecast period. Although this is only one of many options for enhancing recovery of caribou, it suggests there is a risk of a significant reduction in the timber supply from TFL 55 in the next determination period. I note that, if government makes a decision on management requirements for caribou habitat in the TFL that has implications for timber supply, I am prepared to revisit this determination to adjust the AAC as necessary sooner than in the five years required by legislation.

Another area of risk and uncertainty lies in the marginally economic hemlock stands that occur on the timber harvesting land base. I discuss this factor in detail under *non-merchantable stands*. Marginally economic stands with a hemlock content as high

as 80 percent were included in the base case. MOFR staff indicate, however, that few stands with 60 to 80 percent hemlock are currently being harvested, presumably because of poor markets. A sensitivity analysis tested the impact of excluding stands with greater than 60 percent hemlock from the timber harvesting land base; that analysis indicated the need to reduce the harvest level in the short term by 10 percent, and by 6 percent in the mid and long term. I am therefore concerned that, if I assume these stands contribute in my determination and in fact they are avoided, portions of the land base that are more economic for harvesting may be over-harvested. That could potentially lead to greater impacts on timber supply than are projected in the base case.

As discussed above under *site productivity estimates*, the application of improved site index estimates in this analysis increased timber supply by 20 percent in the short term and 37 percent in the mid and long term, compared to the estimates used in the 2001 analysis. Because of the magnitude of the increase in the estimated rate of forest growth, especially when combined with VRI adjustments and predicted genetic gains, I urge the licensee to monitor the growth performance of natural and managed stands.

I further observe the sensitivity of the timber supply to changes in assumptions or practices related to such factors as operability, non-merchantable stands and minimum harvestable age. The sensitivity analyses showed that shifting assumptions for these factors and others exert a strong effect on available volume at various points in the forecast period. I conclude from this that downward pressure would be exerted on the base case forecast should circumstances arise in future that reduce operability or the merchantability of hemlock, or increase the age at which stands are ready for harvest. This is an additional risk that I consider to be significant.

I must also take into consideration the Minister's letter and its emphasis on the importance of a stable long-term timber supply. I acknowledge the licensee's point that an accelerated short-term harvest may hasten the transition to higher productivity second-growth stands. I concluded above under *Minister's letter*, however, that the relatively high initial harvest level modelled in the base case represents some risk to the long-term timber supply. I also noted the general approach in AAC determinations not to increase the AAC in the face of projected declines in timber supply, unless exceptional circumstances warrant an immediate increase. I find the general approach to be relevant to this determination, particularly in view of the uncertainties I described above.

When I take into account the upward and downward pressures, uncertainties and risks, the sensitivity analyses, and the Minister's statement regarding a stable timber supply, I cannot support an increase in the harvest level to 100 000 cubic metres per year as proposed in the base case.

Having considered and reviewed all information, it is my conclusion that it is appropriate to determine an AAC for TFL 55 of 90 000 cubic metres per year, unchanged from the current AAC.

Determination

I have considered and reviewed all the factors as documented above, including the risks

and uncertainties of the information provided. It is my determination that a timber harvest level that accommodates objectives for all forest resources during the next five years and that reflects current management practices as well as the socio-economic objectives of the Crown can be best achieved on TFL 55 by establishing an AAC of 90 000 cubic metres.

This determination is effective March 8, 2007, and will remain in effect until a new AAC is determined, which must take place within five years of the date of this determination.

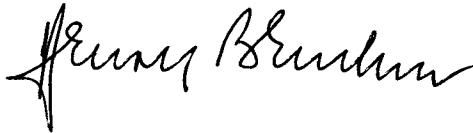
If significant new information is made available to me, or major changes occur in the management assumptions upon which I have predicated this decision, then I am prepared to revisit this determination sooner than the five years required by legislation.

Implementation

In the period following this decision and leading to the subsequent determination, I encourage the licensee or MOFR staff or both to undertake the tasks noted below. I have described these tasks further in the appropriate sections of this rationale document. These projects are important to help reduce the risk and uncertainty associated with key factors that affect the future timber supply in TFL 55, particularly in the mid term. I therefore make the following requests, to be completed before the next determination:

- *Roads, trails, and landings*: I ask the licensee to develop a better approach for estimating losses of productive area due to construction of future roads, trails, and landings so that this factor can be more fully accounted for in the next determination;
- *Non-merchantable stands*: My determination is predicated on the licensee's use of hemlock in proportion to its representation in the timber supply forecast. I request that the licensee document its harvesting of stands having a significant component of hemlock and summarize that information by percent hemlock composition for the next determination;
- *Interior log grades*: I urge that the licensee and MOFR staff work together to determine an appropriate method of tracking actual use of dead potential volumes, so that this factor can be more fully accounted for in the next determination;
- *Site productivity estimates*: I request that the licensee monitor growth in natural and managed stands to assess its site productivity estimates and ensure the yield projections used in future analyses appropriately reflect volumes per hectare realized in harvesting operations;
- *Minimum harvest ages*: I recommend that the licensee and MOFR staff work together to monitor harvest performance to improve the criteria for minimum harvestable age for future determinations;

- *Not-satisfactorily restocked areas:* I recommend that the licensee make it a priority to reforest burned areas in the TFL, to ensure impacts on the timber supply do not exceed the modelled conditions;
- *Non-recoverable losses:* I advocate that the licensee and MOFR staff monitor the occurrence of the spruce bark beetle in TFL 55 and surrounding areas, and that they work together to ensure control actions are taken as soon as possible should abnormal infestations occur.



Henry Benskin
Deputy Chief Forester

March 8, 2007



Appendix 1: Section 8 of the *Forest Act*

Section 8 of the *Forest Act*, Revised Statutes of British Columbia 1996, c. 157 Consolidated to October 21, 2004, reads as follows:

Allowable annual cut

- 8**
- (1) The chief forester must determine an allowable annual cut at least once every 5 years after the date of the last determination, for
 - (a) the Crown land in each timber supply area, excluding tree farm licence areas, community forest agreement areas and woodlot licence areas, and
 - (b) each tree farm licence area.
 - (2) If the minister
 - (a) makes an order under section 7 (b) respecting a timber supply area, or
 - (b) amends or enters into a tree farm licence to accomplish a result set out under section 39 (2) or (3),
 the chief forester must make an allowable annual cut determination under subsection (1) for the timber supply area or tree farm licence area
 - (c) within 5 years after the order under paragraph (a) or the amendment or entering into under paragraph (b), and
 - (d) after the determination under paragraph (c), at least once every 5 years after the date of the last determination.
 - (3) If
 - (a) the allowable annual cut for the tree farm licence area is reduced under section 9 (3), and
 - (b) the chief forester subsequently determines, under subsection (1) of this section, the allowable annual cut for the tree farm licence area,
 the chief forester must determine an allowable annual cut at least once every 5 years from the date the allowable annual cut under subsection (1) of this section is effective under section 9 (6).
 - (3.1) If, in respect of the allowable annual cut for a timber supply area or tree farm licence area, the chief forester considers that the allowable annual cut that was determined under subsection (1) is not likely to be changed significantly with a new determination, then, despite subsections (1) to (3), the chief forester
 - (a) by written order may postpone the next determination under subsection (1) to a date that is up to 10 years after the date of the relevant last determination, and
 - (b) must give written reasons for the postponement.
 - (3.2) If the chief forester, having made an order under subsection (3.1), considers that because of changed circumstances the allowable annual cut that was determined under subsection (1) for a timber supply area or tree farm licence area is likely to be changed significantly with a new determination, he or she
 - (a) by written order may rescind the order made under subsection (3.1) and set an earlier date for the next determination under subsection (1), and
 - (b) must give written reasons for setting the earlier date.

- (4) If the allowable annual cut for the tree farm licence area is reduced under section 9 (3), the chief forester is not required to make the determination under subsection (1) of this section at the times set out in subsection (1) or (2) (c) or (d), but must make that determination within one year after the chief forester determines that the holder is in compliance with section 9 (2).
- (5) In determining an allowable annual cut under subsection (1) the chief forester may specify portions of the allowable annual cut attributable to
 - (a) different types of timber and terrain in different parts of Crown land within a timber supply area or tree farm licence area, and
 - (b) different types of timber and terrain in different parts of private land within a tree farm licence area.
 - (c) Repealed. [1999-10-1]
- (6) The regional manager or district manager must determine an allowable annual cut for each woodlot licence area, according to the licence.
- (7) The regional manager or the regional manager's designate must determine an allowable annual cut for each community forest agreement area, in accordance with
 - (a) the community forest agreement, and
 - (b) any directions of the chief forester.
- (8) In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider
 - (a) the rate of timber production that may be sustained on the area, taking into account
 - (i) the composition of the forest and its expected rate of growth on the area,
 - (ii) the expected time that it will take the forest to become re-established on the area following denudation,
 - (iii) silviculture treatments to be applied to the area,
 - (iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,
 - (v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production, and
 - (vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,
 - (b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area,
 - (c) Repealed [2003-31-2]
 - (d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia, and
 - (e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

- - - - -

Appendix 2: Section 4 of the *Ministry of Forests and Range Act*

Section 4 of the *Ministry of Forests and Range Act* (consolidated 2006) reads as follows:

Purposes and functions of ministry

4. The purposes and functions of the ministry are, under the direction of the minister, to do the following:
 - (a) encourage maximum productivity of the forest and range resources in British Columbia;
 - (b) manage, protect and conserve the forest and range resources of the government, having regard to the immediate and long term economic and social benefits they may confer on British Columbia;
 - (c) plan the use of the forest and range resources of the government, so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated, in consultation and cooperation with other ministries and agencies of the government and with the private sector;
 - (d) encourage a vigorous, efficient and world competitive
 - (i) timber processing industry, and
 - (ii) ranching sectorin British Columbia;
 - (e) assert the financial interest of the government in its forest and range resources in a systematic and equitable manner.

Document attached:

Appendix 3: Minister of Forests and Range's letter of July 4, 2006



JUL 04 2006

Jim Snetsinger
Chief Forester
Ministry of Forests and Range
3rd Floor, 1520 Blanshard Street
Victoria, British Columbia
V8W 3C8

Dear Jim:

Re: Economic and Social Objectives of the Crown

The *Forest Act* gives you the responsibility for determining Allowable Annual Cuts-decisions with significant implications for the province's economy, communities and environment. This letter outlines the economic and social objectives of the Crown you should consider in determining Allowable Annual Cuts, as required by Section 8 of the *Forest Act*. This letter replaces the July 28, 1994 letter expressing the economic and social objectives of the Crown, and the February 26, 1996 letter expressing the Crown's economic and social objectives for visual resources. The government's objective for visual quality is now stated in the Forest Practices and Planning Regulation of the *Forest and Range Practices Act*.

Two of this government's goals are to create more jobs per capita than anywhere in Canada and to lead the world in sustainable environmental management. The Ministry of Forests and Range supports these objectives through its own goals of sustainable forest and range resources and benefits. In making Allowable Annual Cut determinations, I ask that you consider the importance of a stable timber supply in maintaining a competitive and sustainable forest industry, while being mindful of other forest values.

The interior of British Columbia is in the midst of an unprecedented mountain pine beetle outbreak. Government's objectives for management of the infestation are contained in British Columbia's Mountain Pine Beetle Action Plan. Of particular relevance to Allowable Annual Cut determinations are the objectives of encouraging long-term economic sustainability for communities affected by the epidemic; recovering the greatest value from dead timber before it burns or decays, while respecting other forest values; and conserving the long-term forest values identified in land use plans.

Page 1 of 2

**Minister of
Forests and Range
and Minister Responsible
for Housing**

Office of the
Minister

Mailing Address:
PO Box 9049 Stn Prov Govt
Victoria BC V8W 9E2
Telephone: 250 387-6240
Facsimile: 250 387-1040

Location:
Parliament Buildings
Victoria BC V8V 1X4
e-mail: FOR.Minister@gov.bc.ca

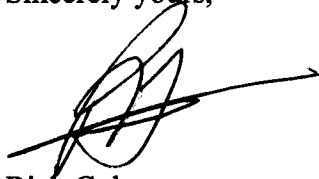
Jim Snetsinger

To assist the province and affected communities in planning their responses to the beetle infestation, it would be best to have realistic assessments of timber volumes that can be utilized economically. Therefore, in determining the best rate of harvest to capture the economic value from beetle-killed timber, I ask that you examine factors that affect the demand for such timber and products manufactured from it, the time period over which it can be utilized, and consider ways to maintain or enhance the mid-term timber supply.

The coast of British Columbia is experiencing a period of significant change and transition. In making Allowable Annual Cut determinations I urge you to consider the nature of timber supply that can contribute to a sustainable coast forest industry, while reflecting decisions made in land and resource management plans.

You should also consider important local social and economic objectives expressed by the public during the Timber Supply Review process, where these are consistent with the government's broader objectives as well as any relevant information received from First Nations.

Sincerely yours,

A handwritten signature in black ink, appearing to be 'Rich Coleman', with a long horizontal line extending to the right from the end of the signature.

Rich Coleman
Minister