

**BRITISH COLUMBIA
MINISTRY OF FORESTS**

Tree Farm Licence 55

Issued to Evans Forest Products Limited

Rationale for Allowable Annual Cut Determination

effective May 1, 1996

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Chief Forester**

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Objective of this Document

This document is intended to provide an accounting of the factors considered and the rationale employed in making my determination, under Section 7 of the *Forest Act*, of the allowable annual cut (AAC) for Tree Farm Licence (TFL) 55. The document will also identify where new or better information is required for incorporation into future determinations.

Description of the TFL

TFL 55, also known as the Selkirk TFL, is located north of the community of Revelstoke and east of the Revelstoke reservoir in the northern half of the Revelstoke Forest District in the Nelson Forest Region. It extends from the Goldstream River in the south to the Mica Dam in the north and borders the Revelstoke Timber Supply Area (TSA) to the north and west, TFL 56 to the south, and the Golden TSA to the east.

Set among the rugged Selkirk Mountains northwest of Glacier National Park, TFL 55 is characterized by sharp peaks, ice fields, glaciers, and deep, narrow, forested valleys. The great majority of the operable forest lies within the Interior Cedar-Hemlock biogeoclimatic zone, with other portions in the higher-elevation Engelmann Spruce-Subalpine Fir zone. There are also large areas of unforested Alpine Tundra. Bigmouth Creek and Goldstream River, both of which flow into the Revelstoke reservoir, are the principal drainages in the TFL.

The total land base is 92 227 hectares, of which 20 979 hectares are considered to form the long-term harvesting land base. The largest deductions from the productive forest are for environmentally sensitive areas and inoperable stands.

History of Present 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. That year the entire southern part of the licence was acquired by Pope & Talbot Ltd., while the northern block, renamed TFL 55, remained with Westshore. Based on a 1987 timber supply analysis that indicated the AAC of 920 000 cubic metres for the complete TFL 23 could be maintained for 60 years, an AAC of 700 000 cubic metres was approved for the now-reduced TFL 23 and 220 000 cubic metres 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, still called TFL 55, was assigned to Evans Forest Products Ltd., while the southern portion became TFL 56 and was assigned to the Revelstoke Community Forest Corporation. The former AAC of 220 000 cubic metres was divided equally between the two licences, although it was understood by all parties that this was an interim determination and that the division was not based on any comprehensive analysis. A provision in the licence agreements permitted one boundary amendment to be made on or before

the date of this AAC determination, either by mutual consent or by arbitration. Neither party expressed an intent to utilize this provision.

Management Plan (MP) 7 for TFL 23 was deemed to be the interim MP for TFL 55 and was designated MP 1. A draft MP 2 with a proposed AAC has been submitted by the licensee: the approval process for that plan is occurring concurrent with this AAC determination.

The current AAC of 110 000 cubic metres is apportioned by the Minister of Forests as follows:

Schedule B Small Business Forest Enterprise Program lands	Schedule B licensee-operated lands	TOTAL
11 675 m ³	98 325 m ³	110 000 m ³

(There are no Schedule A private lands.)

New AAC Determination

Effective May 1, 1996, the new AAC for TFL 55, including Schedule B lands in the Small Business Forest Enterprise Program, will be 100 000 cubic metres. This includes a coniferous component of 90 000 cubic metres and a partition of 10 000 cubic metres attributable to timber in stands outside the current Operable Cut Line as understood at the time of this determination and as agreed to by the District Manager of the Revelstoke Forest District. This decision will remain in effect until a new AAC is determined, which must take place by May 1, 2001.

Information Sources Used in the AAC Determination

Information considered in determining the AAC for TFL 55 includes the following:

- "Evans Forest Products Limited, Management Plan #2 1995-1999: Selkirk Tree Farm Licence 55," September, 1995;
- "Statement of Management Objectives, Options and Procedures for Management Plan #2, Selkirk Tree Farm Licence No. 55, Evans Forest Products," December 6, 1993;
- "Evans Forest Products Limited, Selkirk Tree Farm Licence (TFL 55): Management Plan #2 Timber Supply Analysis Report" September 12, 1995, prepared by Timberline Forest Inventory Consultants;
- "Tree Farm Licence 55 Recreation Analysis Report," November 1994, prepared by Sterling Wood Group Inc., Victoria;
- "Tree Farm Licence 55 Twenty-Year Strategic Development Plan," January 1995, prepared by Evans Forest Products Limited;
- *West Kootenay-Boundary Land-Use Plan*, Government of British Columbia, March 1995;

- Letter from the Minister of Forests to the Chief Forester, dated July 28, 1994, stating the Crown's economic and social objectives;
- Memorandum from the Minister of Forests to the Chief Forester, dated February 26, 1996, stating the Crown's economic and social objectives with regard to visual resources;
- Technical review and evaluation of current operating conditions through comprehensive discussions with British Columbia Forest Service (BCFS) staff, notably at the AAC determination meeting held in Victoria on December 6-7, 1995;
- Letter from Evans Forest Products Limited to Resource Tenures and Engineering Branch, dated March 4, 1996, providing employment and processing information about its mills;
- *Forest Practices Code of British Columbia Act*, July 1995;
- *Forest Practices Code of British Columbia Regulations*, April 1995; and
- *Forest Practices Code Timber Supply Analysis*, BCFS, February, 1996.

Role and Limitations of the Technical Information Used

The *Forest Act* requires me to consider biophysical as well as social and economic information in AAC determinations. A timber supply analysis and the inventory and growth and yield data used as inputs to the analysis formed the major body of technical information used in my AAC determination for TFL 55. The timber supply analysis is concerned primarily with biophysical factors—such as the rate of timber growth and definition of the land base considered available for timber harvesting—and with management practices.

However, the analytical techniques used to assess timber supply are simplifications of the real world. There is uncertainty about many of the factors used as inputs to timber supply analysis due in part to variation in physical, biological and social conditions—although ongoing science-based improvements in the understanding 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. Therefore, technical information and analysis do not necessarily provide the complete answer or solution to forest management problems such as AAC determinations. The information does, however, provide valuable insight into potential impacts of different resource-use assumptions and actions, and thus forms an important component of the information I must consider in AAC determinations.

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

Statutory Framework

Section 7 of the *Forest Act* requires the Chief Forester to consider various factors in determining AACs for TFLs. Section 7 is reproduced in full as Appendix 1.

Guiding Principles

Rapid changes in social values and in our understanding and management of complex forest ecosystems mean that there is always some uncertainty in the information used in AAC determinations. Two important ways of dealing with uncertainty are (i) minimizing risk, and (ii) redetermining AACs frequently to ensure they incorporate up-to-date information and knowledge. In respect of these: (i) in making AAC determinations, I consider the uncertainty associated with the information before me, and attempt to assess the various potential current and future social, economic and environmental risks associated with AACs from a range of possible harvest levels; and (ii) the benefits of frequent decision making have been recognized in the legislated requirement to redetermine AACs every five years. This principle is central to many of the guiding principles that follow.

In considering the various factors that Section 7 of the *Forest Act* requires me to take into account in determining AACs, I attempt 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, that are not substantiated by demonstrated performance—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 the Forest Practices Code.

The impact of the Forest Practices Code on timber supply is a matter of considerable public concern. In determinations made before the Code was brought into force, no final standards or regulations were available at the time the BCFS timber supply analyses were conducted. Accordingly, the analyses were unable to assess the impacts of any new constraints on timber production which might be imposed under the Code. In those determinations I did not consider any more stringent restrictions or additional impacts upon timber supply beyond those anticipated to occur due to the application of guidelines current at the time of determination. However, I assumed that the Code would at least entrench the standards exemplified by those guidelines as statutory requirements.

The *Forest Practices Code of British Columbia Regulations* were approved by the Lieutenant Governor in Council on April 12, 1995, and released to the public at that time. The *Forest Practices Code of British Columbia Act* was brought into force on June 15, 1995. Studies in selected TSAs (*Forest Practices Code Timber Supply Analysis*, BCFS, February 1996) indicate that under the Code there will be some impacts on timber supply additional to those expected under previous guidelines. In AAC determinations made since the coming into force of the Code, I have viewed with some caution the timber supply projections in timber supply analyses that pre-date the Code, or that are based on information packages that pre-date the Code (as is the case in TFL 55). At the same time, I am mindful that the full force of the Code may not be felt

during the transition phase of its implementation, and the impacts of specific factors on timber supply may not yet have been assessed on a local basis.

The impact on the timber supply of land-use decisions resulting from planning processes such as the Commission on Resources and Environment (C.O.R.E.) process or the Land and Resource Management Planning (LRMP) process is a matter often raised in discussions of AAC determinations. In determining AACs it would be inappropriate for me to attempt to speculate on the impacts on timber supply that will result from land-use decisions that have not yet been taken by government. Thus I do not consider the possible impacts of existing or anticipated recommendations made by such planning processes, nor do I attempt to anticipate any action the government could take in response to such recommendations.

Moreover, even where government has made land-use decisions, such as the West Kootenay-Boundary Land-Use Plan, it may not always be possible to analyze the timber supply impact in an AAC determination. In most cases, government's land-use decision must be followed by detailed implementation decisions. For example, a land-use decision may require the establishment of resource management zones and resource management objectives and strategies for these zones. Until such implementation decisions are made, it is impossible to properly assess the impact of the land-use decision. However, the legislated requirement for five-year AAC reviews will ensure such decisions are addressed.

The Forest Renewal Plan will fund a number of intensive silviculture activities that have the potential to affect timber supply, particularly in the long term. In general, it is too early for me to assess the consequences of these activities, but wherever feasible I will take their effects into account. The next AAC determination will be better positioned to determine how the Plan may affect timber supply.

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 changing. Moreover, in the past, waiting for improved data has created the extensive delays that have resulted in the current urgency to redetermine many outdated AACs. In any case, the data and models available today are far superior to those available in the past, and will undoubtedly provide for more reliable determinations.

Others have suggested that, in view of data uncertainties, I should immediately reduce some AACs in the interests of caution. However, any AAC determination I make must be the result of applying my 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 the June 1993 Delgamuukw decision of the B.C. Court of Appeal regarding "unextinguished non-exclusive aboriginal rights." The AAC I determine should not in any way be construed as limiting the Crown's obligation under the Delgamuukw decision, and in this respect it should be noted that my determination does not prescribe a particular plan of harvesting activity within the TFL. It is also independent of any decision by the Minister of Forests with respect to subsequent allocation of the wood supply. Aboriginal rights will be taken into account as far as possible under Section 7(3)(a)(v) of the *Forest Act* and will be respected in the administration of the AAC determined.

Regarding future treaty decisions: as with other land-use decisions it would be inappropriate for me to attempt to speculate on the impacts on timber supply that will result from decisions that have not yet been taken by government.

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 as set out in Section 4 of the *Ministry of Forests Act*, and my responsibilities under the *Forest Practices Code of British Columbia Act*.

Consideration of Factors as Required by Section 7 of the *Forest Act*

The role of the "base case"

In considering the factors required under Section 7 to be addressed in AAC determinations, I am assisted by timber supply forecasts provided to me through the work of the Timber Supply Review project for TSAs and, for TFLs, by the licensees. For each determination a timber supply analysis is carried out, using a data package of information from three categories: land base inventory, timber growth and yield, and management practices. Using this set of data and a computer simulation model, a series of timber supply forecasts is produced. Each forecast is based on the same set of data and reflects different decline rates, initial harvest levels, and trade-offs between short- and long-term harvest levels.

From this range of forecasts, one is chosen that attempts to avoid excessive changes from decade to decade and significant timber shortages in the future, while ensuring the long-term productivity of forest lands. This is known as the "base case" forecast, and forms the basis for comparison when assessing the effects of uncertainty on timber supply.

Because it represents only one in a number of theoretical forecasts, and because it incorporates information about which there may be some uncertainty, the base case forecast is not an AAC recommendation. Rather, it is one possible forecast of timber supply, whose validity—as with all the other forecasts provided—depends on the validity of the data and assumptions incorporated into the computer simulation used to generate it.

Therefore, 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, if necessary, to more properly reflect the current situation.

These adjustments are made on the basis of informed judgement, using current information available about forest management, which—particularly during the period leading up to, and now during, the implementation of the Forest Practices Code—may well have changed since the original data package was assembled.

Thus it is important to remember, in reviewing the considerations which lead to the AAC determination, that while the timber supply analysis with which I am provided is integral to those considerations, the AAC determination itself is not a calculation but a synthesis of judgement 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. But once an AAC has been determined that reflects appropriate assessment of all the factors required to be considered, no additional precision or validation may be gained by attempting a computer analysis of the combined considerations to confirm the exact AAC determined—it would be impossible for any such analysis to fully incorporate the subtleties of the judgement involved.

For TFL 55 the timber supply analysis was conducted by Timberline Forest Inventory Consultants (Timberline) on behalf of the licensee. The computer simulation model used by the analyst was TIMSIM 7.0 (TIMberline SIMulation: hereafter called the "model"), based on a model originally developed at the University of British Columbia and later modified by Timberline. Four management options reflecting different assumptions were modelled to determine potential harvest schedules. These were the Status Quo, Decreased Utilization, Wildlife Habitat and Planned Management options. The Planned Management option was based on an updated data package and proposed by the licensee as the base case. This option assumed a larger timber harvesting land base than historically recognized, due to the inclusion of lower quality stands previously considered unmerchantable and an expansion of operations above the current Operable Cut Line. On this basis, and in reflection of a host of other assumptions, the harvest was projected to be maintained at the current level of 110 000 cubic metres per year for 20 years before beginning a decline to just over 55 000 cubic metres, to be reached in 80 years. It would rise slightly after 100 years and again after 150 years to the long-term harvest level of approximately 61 500 cubic metres per year.

The Planned Management option was also predicated upon localized data for green-up ages and upon an assumption that areas now occupied by stands older than 160 years will produce 20 percent more volume after harvest and regeneration. These two assumptions lacked documentary support and were not approved by the BCFS Research Branch for use in the timber supply analysis.

The approach taken in the Planned Management option suggests the possible implications of higher site productivity. While there is evidence from elsewhere in the province that actual site productivity may be higher than indicated by inventory data for old stands, no such studies have been done for this area. Consequently, the BCFS selected the Planned Management option with approved green-up ages and regeneration yields as the base case; throughout this document the

term "base case" will refer to that harvest flow projection. Under this option, the existing harvest level of 110 000 cubic metres per year was projected to be maintained for two decades before beginning a decline to the long-term harvest level of approximately 48 412 cubic metres per year, to be reached in 11 decades.

Note: Timberline also prepared the timber supply analysis for TFL 56, held by the Revelstoke Community Forest Corporation. The two analyses employ many of the same assumptions and methodologies. Moreover, due to similarities in terrain, area and forest types between these two adjacent units, the factors that affect timber supply in one are typically significant in the other. For these reasons, much of the discussion that follows appears in similar form in the AAC rationale for TFL 56 wherever similar conclusions were drawn during the independent evaluation of that TFL.

Section 7 (3)

In determining an allowable annual cut under this section the chief forester, despite anything to the contrary in an agreement listed in section 10, shall 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 harvest.

- Economic and physical operability

Under the Planned Management option proposed in MP 2, the long-term timber harvesting land base was estimated at 20 979 hectares, an increase of almost 18 percent from the 17 826 hectares recognized in the Status Quo option. The bulk of this gain is attributable to the inclusion of stands previously considered unmerchantable or inoperable. This section of the rationale will discuss the latter only; unmerchantable stands will be addressed below, under *Unmerchantable stands*.

As part of the netdown process from the productive land base in the Status Quo option, the licensee analysis deducted approximately 24 000 hectares of historically inoperable land. To account for improved fibre markets and more sophisticated technology, the licensee then analyzed these inoperable stands to identify those that might be added back to the land base. Following further deductions for environmentally sensitive areas, unmerchantable types, decadent hemlock, and other categories, 8936 hectares remained. Under the Planned Management option 25 percent of these stands—2234 hectares—were then returned to the timber harvesting land base.

In the licensee's view, up to 50 percent of this net inoperable area may prove operable so it considers 25 percent to be a conservative estimate. District staff, in contrast, are concerned that 25 percent is optimistic and that problems with terrain stability and regeneration will preclude operations on many of these sites.

I share the district's concerns. I am aware that the terrain above the Operable Cut Line is very rugged and often characterized by steep slopes, with shallow soils and significant bands of bedrock at the surface. The past operability line was located as a reasonable reflection of where operations were most likely to extend to, given the economic and environmental concerns associated with developing the area.

The logic that the operable land base can change over time is not unreasonable. The prudence of such changes in assumptions, however, cannot be assessed on the basis of a comparison of numbers. A proposal to increase the operable land base by 18 percent should be supported by some field work and map-based criteria to verify the probability that such an increase is appropriate from both economic and environmental perspectives. In this case, there is no field work to substantiate the figure of 2234 hectares. Nor are the specific stands geographically identified: the 25 percent appears to be simply an estimate

that may or may not be conservative. In the absence of some recognition of either difficult-to-access or difficult-to-regenerate sites on this more sensitive terrain, I cannot support an increase of this magnitude as being reasonable at this time.

The licensee has harvested approximately 40-50 hectares above the Operable Cut Line in the recent past, but this is a very limited performance history on which to base an expansion of the magnitude proposed in MP 2. Furthermore, this evidence of operations beyond the Operable Cut Line could well be offset by many other small areas where operations are unable to achieve development up to the existing line. Hence, the limited performance of 50 hectares cannot be viewed as evidence that the Operable Cut Line is mislocated. Without knowing where the 2234 hectares are and what other factors may constrain operations, I cannot assume the full contribution from those stands.

No sensitivity analysis was performed to test the impact of a reduced land base. However, a comparison of the harvest flow projections for the Status Quo option and the base case (the latter being similar in the early decades to the Planned Management option) provides a useful perspective. The two projections also assumed different forest cover requirements, but due to the prevalence of mature stands in the unit the short-term impact attributable to that factor is minimal. The bulk of the discrepancy in harvest levels, at least in the short term, can safely be ascribed to the difference in land bases. The harvest flow projection for the Status Quo option indicated the current harvest level (110 000 cubic metres per year) could be maintained for only one decade, whereas in the base case it could be maintained for two decades. There is some risk, then, to timber supply in the short and medium terms.

In summary, I am persuaded that the full inclusion of these historically inoperable lands in the timber harvesting land base is not sufficiently well justified at this time and that it is likely that timber supply will be less than modelled in the base case. The total area and actual volume in question are difficult to quantify, but if the full land base increment (2234 hectares) is in doubt this would represent over 10 percent of the base case timber harvesting land base. I have accounted for this concern in Reasons for decision.

- West Kootenay-Boundary Land-Use Plan

No new protected areas were created in TFL 55 by the March 1995 West Kootenay-Boundary Land-Use Plan. The plan has, however, initiated work on a caribou management strategy that could ultimately impose further constraints on harvesting activities. This possibility is discussed in more detail below, under *Wildlife*.

- Environmental sensitivity

Prior to the netdown process, the analyst identified 20 169 hectares of productive forest as environmentally sensitive areas (ESAs) with regeneration problems, sensitive soils or

critical wildlife habitat. The vast majority of these are in areas previously considered inoperable. As many of these sites have more than one constraining feature, they may have been labelled twice—e.g. for soil sensitivity and regeneration problems. Accordingly, once overlaps are considered, the total area of netdowns for ESAs is less than 20 169 hectares. The analysis appropriately accounted for this.

Even though the largest single ESA category identified was for sensitive soils, district staff question whether sufficient deductions were made, especially given the inclusion in the analysis of large areas of previously inoperable high-elevation sites. No overview terrain stability analysis was performed, but a district review of recent cutting permits indicated some areas, particularly in steep gullies, that were not mapped as environmentally sensitive but should have been.

In the absence of a more detailed investigation, the volume at risk cannot be quantified. Even so, I find it reasonable to expect there is a moderate-to-high likelihood that more specific soil mapping will lead to designations of more area in the ESA category. Given that this will further reduce the operable land base, such a change will likely lead to a more constrained timber supply across all time frames. The situation should be subject to better quantification by the time of the next AAC determination once the licensee undertakes the geotechnical analyses required under the Forest Practices Code.

I have some concerns as well with the inclusion of riparian areas, small lakes, bogs and alpine meadows in the critical wildlife habitat ESAs. This procedure makes it difficult to assess the amount of area explicitly represented by or required for riparian management under the Code. The issue will be discussed in more detail below, under *Riparian areas*.

- Low site

Reductions were made for low site areas. These were defined as stands older than 150 years with a volume less than 125 cubic metres per hectare, and stands between 35 and 150 years with either insufficient volume or a site index less than 13. All stands 35 years or less were considered to have harvesting history and were retained in the timber harvesting land base (unless deleted later in the netdown sequence for other reasons).

A cutoff level as low as 125 cubic metres per hectare results in stands being included in the operating land base that are often excluded in timber supply analyses for timber supply areas. Only 1097 hectares were identified as low site on a total land base of over 92 000 hectares. In general, I find this an optimistic classification, but without further data I cannot determine if it is a cause for concern. Prior to the next analysis, actual performance in low productivity areas should be reviewed, and the analysis should reflect the findings of such a review.

- Unmerchantable stands

As part of the netdown for the Status Quo option (see discussion above, under *Economic and physical operability*), the analyst deducted approximately 24 000 hectares of inoperable stands. Included in these were some 840 hectares of unmerchantable, or problem-forest-type, stands. Within the operable land base, 1024 hectares of unmerchantable stands were removed, leaving 6289 hectares of historically unmerchantable stands still in the timber harvesting land base. The 1024 hectares identified in the Status Quo option were then added back in as part of the Planned Management option.

The unmerchantable stand category contains a high proportion of pulp logs and decadent hemlock, cedar and balsam trees, which the licensee submits are now economically viable to harvest because of high fibre prices. Undeniably, there are valuable stands within these areas, but to assume that 100 percent of historically unmerchantable stands within the operable land base are now merchantable is overly optimistic, particularly given the very decadent nature of many of the stands that occur in the wet-belt transition zone in which TFL 55 lies. In other units some harvesting has occurred in the top end of the quality spectrum of these types, but I am unaware of any licensee that has successfully harvested throughout the full range of traditionally unmerchantable types.

As with the inoperable stands included in the analysis (see discussion above, in *Economic and physical operability*), it is difficult to identify the volume at risk. I have no analysis work that would allow me to confidently identify unmerchantable stands that are feasible for harvest. Accordingly, I can conclude only that it is highly likely that timber supply will be somewhat less than modelled in the base case. This provides a further reason to view the base case with caution and as one unlikely to be attained.

- Roads, trails and landings

The methodology used in the licensee's analysis was comparable to that used in the nearby Arrow and Revelstoke TSAs. A total of 7.56 percent of the timber harvesting land base was deducted to account for existing roads, trails and landings. Future losses were modelled slightly differently: an initial 1.01 percent land base reduction for main roads was assumed in the first 20 years, supplemented by a 3.76 percent volume reduction to reflect losses to future trails and landings.

The figures are consistent with those approved for neighbouring management units, and I have no reason to question them here. As a result, I find them suitable for this determination.

Existing forest inventory

- Age of inventory

The most recent applicable inventory was undertaken in 1989 as part of an inventory for all of the former enlarged TFL 23. That information, along with a 1992 update for depletions and projection for growth, was used in the timber supply analysis. However, most of the 1989 inventory plots were placed at the southern end of the TFL, outside the boundaries of what is now TFL 55. Given the terrain differences between the areas—there are more steep slopes in TFL 55 than in the current TFL 23—district staff have expressed concerns that the sample of inventory plots may be unrepresentative of the situation within TFL 55. There is as yet no statistical evidence to substantiate those concerns.

An inventory audit planned for the summer of 1996 may provide a better indication of the accuracy of the information. Pending the outcome of that audit, I accept the information presented to me as the best available and as suitable for this determination. For the next determination, though, there is clearly a need for a new, comprehensive inventory specific to TFL 55.

- Age class structure

Approximately 69 percent of the timber harvesting land base holds stands older than 200 years of age. The balance of the inventory is distributed fairly evenly among the younger age classes, with no significant volumes within any specific class. Although the older stands tend to be in the higher elevation areas they do provide the TFL with some flexibility in responding to changes in constraints on timber supply.

- Species profile

Engelmann spruce-leading stands are by far the most common (covering 53 percent of the timber harvesting land base), with western hemlock (22 percent) and western redcedar (15 percent) the next most prevalent species. There are also smaller areas of balsam and Interior Douglas-fir.

- Volume estimates for existing stands

Volume estimates for existing stands were developed using the Variable Density Yield Prediction (VDYP) growth and yield model and a methodology approved by Inventory Branch. VDYP is based on information gathered from a large number of sample plots, and is generally accepted in British Columbia as an appropriate model for projecting volumes in existing stands. As noted above (under *Age of inventory*), however, there are few sample plots within the boundaries of TFL 55, and the limited operating history specific to this unit makes it difficult to confirm the accuracy of the inventory data used for the projections.

Inventory data from adjacent management units with similar stand conditions and longer operating histories suggest the estimates for this TFL may be optimistic. This risk to timber supply is exacerbated by the fact that the harvest forecast is particularly sensitive in the short term to changes in existing volumes (more so than in the adjacent TFL 56, for instance): a 10 percent reduction in existing volumes would lower the initial harvest level to 101 000 cubic metres per year, approximately 8 percent below the base case. It is, therefore, imperative to confirm the inventory figures before the next AAC determination. To that end, the inventory audit scheduled for this summer should cast more light on the true situation. At this time, however, I have no better information to rely upon, and so I accept the estimates used in the analysis as suitable for use in this determination.

Expected rate of growth

- Site productivity estimates

Site indexes were calculated for all stands older than 35 years, based on the inventory type groups and the licensee's delineation of three site-index range intervals—less than 14 (metres at 50 years), 14–17, and more than 17, labelled, respectively, "poor," "medium" and "good." These ranges differ slightly from those used by the BCFS, but site class definitions are somewhat arbitrary, the licensee's choices being neither better nor worse than those of the Forest Service. Moreover, the timber supply implications of that variation are generally negligible: the exception occurs when using the definition of the lowest productivity class to exclude it as unmerchantable. (See earlier discussion, under *Low site*.)

Ongoing provincial paired-plot studies show that for some species in some areas, current site indexes, determined using inventory information from existing unmanaged forests,

underestimate the growth potential of some regenerated forests. In this analysis site index information for stands aged 21–35 years was considered unreliable so those analysis units were assigned the average site indexes for comparable analysis units with stands over 35 years of age. For stands under 21 years, there was neither information on the areas covered by the respective analysis units nor reliable site index information. Accordingly, the analyst assumed analysis units occurred there in the same proportions as in areas with stands over 35 years of age. As part of this assumption, the corresponding average old-growth site indexes were assigned to these younger areas.

This analytical procedure could be conservative, given that the use of old-growth site indexes may underestimate the growth potential of the stands under 36 years of age. The final results of the province-wide paired plot studies should provide more certainty about the accuracy of the current site indexes. Regardless, this issue has timber supply implications primarily in the long term; for this AAC determination it is not a significant factor.

The licensee also incorporated revised site indexes approved by the BCFS Research Branch for analysis units in which species conversion is planned. For TFL 55, these involved the conversion of mixed hemlock-cedar and hemlock-Engelmann spruce stands to Interior Douglas-fir, and cedar and cedar-hemlock stands to Engelmann spruce-Interior Douglas-fir. The revised indexes were derived from equations developed by Research Branch, and I have no reason to question their use here.

- Volume estimates for regenerated stands

Volume estimates for regenerated stands were developed using the Table Interpolation Program for Stand Yields (TIPSY) growth and yield model. All growth curves and operational adjustment factors (OAFs) were reviewed and approved by Research Branch for use in the analysis, with the two qualifications noted earlier in The role of the "base case": the higher volumes proposed for stands over 160 years and the lower green-up ages were disallowed as there was insufficient supporting documentation.

The use of old-growth site indexes for certain regenerated stands (see *Site productivity estimates*, above) may cause an underestimation of future timber supply, which would lead to an increase in the long-term harvest level. At this time the assumed higher growth rates have not been assessed or proven. Accordingly, I accept the regenerated stand volumes as representative of the best information available for use in this determination.

- Minimum harvestable ages

Minimum harvestable ages for both existing and regenerated stands were based, for the most part, on culmination ages. For low-productivity sites a minimum merchantable volume was also factored in. Although the final ages tended to be lower than in adjacent management units, the procedure is acceptable. In any event, a sensitivity analysis

indicated the short-term harvest level is insensitive to changes in minimum harvestable ages. I am therefore satisfied that, for this determination, the ages used do not create unacceptable risks of future timber supply disruptions.

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

Regeneration delay

A three-year regeneration delay period was modelled in the analysis. District staff warn that this figure may underestimate the true delay period in substantial areas of severe terrain and brush-prone sites that the licensee proposed be added to the timber harvesting land base. Due to the lack of harvesting and regeneration history, however, their concerns cannot yet be substantiated.

I share the district concern, but note that any increase in the regeneration period will affect timber supply only in the medium-to-long term. For this determination the regeneration delay periods modelled in the analysis are acceptable. As new information is acquired, based on further experience in areas of severe terrain and heavy brush, it will be used in future analyses.

Impediments to prompt regeneration

There are no known significant impediments to regeneration on the traditional operable land base. On marginally operable areas characterized by steep terrain and brush-prone sites added under the Planned Management option, more intensive treatments may be required. ESA mapping for inoperable sites with potential regeneration problems was performed, but, as noted earlier, under *Economic and physical operability*, district staff have raised concerns that the mapping may not reflect actual difficulties. They have also indicated that harvesting will not be permitted in areas where regeneration will be particularly difficult or infeasible. The magnitude of the risk to timber supply is uncertain at this time, but this factor does cast further doubt on the availability of those inoperable stands.

Not-satisfactorily-restocked areas

There are 1571 hectares of not-satisfactorily-restocked (NSR) areas on the timber harvesting land base. Of these, 824 hectares are backlog and 747 hectares are considered current NSR. The licensee has committed to treating all backlog NSR by the end of 1996 and, accordingly, added these lands back to the land base in the analysis. I have no information that would lead me to question this commitment, so I accept that this factor has been modelled appropriately.

(iii) silvicultural treatments to be applied to the area;

Incremental silviculture

Thus far the licensee has carried out only basic silviculture practices, and this was modelled in the analysis. The licensee has applied to Forest Renewal BC for funding for incremental silviculture but the outcome of that application is not known at this time. Even if funding is forthcoming, the impact of intensive silviculture will be felt only in the medium and long terms: for this determination it is not a significant factor.

Commercial thinning

No allowance for commercial thinning was made in the analysis. Given the advanced ages of most forests in the unit, there seems little or no opportunity to carry out thinning for at least the near future.

(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;

Utilization and compliance

The standard Interior close utilization standards were assumed in the analysis: i.e. any trees with a diameter at breast height of 17.5 cm (12.5 cm for lodgepole pine) must be harvested, and, once felled, all wood up to a top diameter of 10 cm must be removed from the site, leaving a stump no higher than 30 cm. These reflect current practice and have been accounted for within the accepted yield tables.

Decay, waste and breakage

The standard decay, waste and breakage factors for existing stands were approved by BCFS Inventory Branch staff and modelled in the analysis. District staff believe, however, as they did in the Revelstoke TSA, that the true factors may be higher than assumed in the decadent, overmature hemlock, balsam, spruce and cedar stands that were previously considered unmerchantable. If true, this would suggest existing volumes in these stands have been overestimated.

There is no evidence yet to substantiate the district concerns. The inventory audit scheduled for the summer of 1996 should help confirm the accuracy of the current factors. Until those results become available, I accept that operational losses have been modelled using the best information available for this determination.

- (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 (IRM) objectives

The Ministry of Forests is required by the *Ministry of Forests Act* to manage, protect and conserve the forest and range resources of the Crown and to plan the use of these resources to ensure production and harvesting of timber and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated. Accordingly, the extent to which IRM objectives constrain the timber supply must be considered in AAC determinations.

Data collection and the completion of the information package on which the analysis was based took place before the introduction of the Forest Practices Code and well before the finalization of the various guidebooks. Therefore, the management practices assumed in the analysis do not meet the new requirements in several instances.

- *Visually sensitive areas*

No visual quality objectives (VQOs) have been assigned in the TFL, and none were modelled in the analysis. Viewsheds do exist alongside the Goldstream River, but these are largely in inoperable areas. Accordingly, I have no reason at this time to expect this factor will affect timber supply in the near future. Nonetheless, I approve of the licensee's commitment to undertake a landscape inventory for the entire TFL during the term of MP 2.

- *Wildlife*

The principal species of concern in TFL 55 is caribou. The analysis identified 1714 hectares of productive forest as wildlife ESAs for caribou habitat, but, as discussed earlier, under *Environmental sensitivity*, much of this is likely in inoperable areas.

The licensee's principal strategy for managing caribou habitat is to maintain sufficient habitat on the timber harvesting land base at critical elevations and times—e.g. between 915 and 1220 metres during the early winter. These requirements were modelled accordingly and are discussed below, under *Forest cover requirements*.

The management zones used were derived from the 1989 Nelson regional wildlife guidelines but do not incorporate all the areas identified on the caribou habitat map produced as part of the West Kootenay-Boundary Land-Use Plan. Now, even that map may be superseded by the caribou management strategy initiated by the land-use plan. That strategy has yet to be finalized and approved by Cabinet but is expected later this year.

Revelstoke Forest District staff are concerned that the Planned Management option does not meet current expectations for maintenance of caribou habitat. In its review of the management plans for both TFLs 55 and 56, Parks Canada expressed strong concerns about the adequacy of the licensees' assumptions and provisions for caribou management. Specifically, Parks staff questioned the extent to which inoperable areas provide suitable habitat and whether the existing forest cover guidelines for winter habitat are sufficient. These views were endorsed in a subsequent submission from the Ministry of Environment, Lands and Parks.

To estimate the impact of tighter wildlife habitat constraints, a sensitivity analysis modelled a shift to a four-pass harvesting system. There was no effect on the short-term harvest level when the expanded land base (as in the base case) was assumed. When modelled on the historically operable land base, however, a reduction in the short-term harvest level was required.

I do not wish to speculate on the likely outcome of the caribou management strategy nor the potential tradeoffs currently being assessed under the land-use plan. Regardless of future options, however, I must observe that the identification of relatively few wildlife ESAs on the timber harvesting land base, the assumption of a three-pass harvesting system in the base case, and the minimal merchantability and operability reductions proposed in the analysis indicate that insufficient recognition has been given to caribou habitat requirements. This conclusion is further borne out by my knowledge of many other areas of the province where the integration of harvesting with caribou habitat management has been projected in a much more constraining manner.

Based upon the foregoing observations, there is a moderate-to-high likelihood that timber supply has been overestimated in the analysis, although the magnitude of that discrepancy will remain unknown for the near future. I am mindful of the risk that this issue presents and feel obliged to account for it in my determination. Therefore I consider that current requirements for caribou management are likely to exert some downward pressure on timber supply in the short term.

- Riparian areas

As noted earlier, under *Environmental sensitivity*, the analysis did not specify discrete netdowns for riparian areas; these were included in the general wildlife ESAs, most of which are believed by district staff to be in riparian areas. District staff reviewed one

mapsheet and concluded that the wildlife netdowns may cover the riparian reserve zones but not the riparian management zones required under the Forest Practices Code. The risk to timber supply is further intensified by the fact that pre-Code riparian mapping was less extensive than now required: many secondary and tertiary streams where some harvest restrictions are now required were not included in the information package.

Based on the above observations, in conjunction with my familiarity with many other pre- and post-Code comparisons of timber supply analyses, I am persuaded that further land base reductions will be required to meet the new Code standards for riparian management. Given the lack of discrete analysis, the impact cannot yet be fully quantified; however, it will almost certainly reduce timber supply across all time frames. Before the next AAC determination, I expect the licensee to undertake more comprehensive mapping to distinguish riparian areas.

- Recreation

The license area has some significant heli-skiing and back-country values, as noted in the recreation inventory, but public use has been limited to date. The licensee assumed these recreation values would be protected through harvest block design and layout and, accordingly, did not incorporate any recreation ESAs into the analysis. I also note that the licensee has worked in cooperation with the heli-ski operators.

I am satisfied that the analysis has taken recreation concerns into account appropriately and have no reason to believe they will affect timber supply in the short term.

- Areas of cultural or archaeological significance

No evidence was presented to suggest the presence of culturally or archaeologically significant sites. I note that in the feedback to the draft MP 2, the Ktunaxa/Kinbasket Tribal Council expressed a desire for archaeological overview mapping. Pending such an exercise, however, the council cannot determine if there is a conflict with a traditional use site or activity.

Under the current TFL agreement the licensee is obliged to include archaeological mapping as part of its development plan. This exercise has not yet been undertaken, so I have no basis on which to determine the need for an allowance in this decision. Should such mapping result in new and significant information coming to light during the next few years I will address it in the next AAC determination.

- Biodiversity and old growth

No specific mention was made of biodiversity in the analysis, and no allowance was made for wildlife trees. It is clear that the licensee assumed all biodiversity requirements would be met in ESAs and other areas outside the timber harvesting land base.

To account for biodiversity requirements under the Code, district staff estimate a further land base reduction of 4–8 percent will be necessary. In my view, it is too early to assign a further degree of precision to the estimate. Riparian areas are likely to overlap with and provide many of the biodiversity structures needed in this unit; and, as discussed above under *Riparian areas*, it is uncertain yet how much additional land is necessary to satisfy riparian requirements outside of wildlife ESAs.

Regardless of the difficulty in quantifying this factor at present, management for biodiversity will exert a further downward pressure on timber supply relative to the base case. I am mindful that the provincial analysis of the timber supply impacts of the Forest Practices Code projects some of the higher impacts in the province to occur in the Nelson Forest Region. I note, too, that the licensee's proposal to incorporate previously inoperable land into the timber harvesting land base would further restrict biodiversity management options by reducing the amount of area that would otherwise continue to carry older stands.

In summary, there is a high probability biodiversity requirements will reduce timber supply in the short term. The magnitude specific to this TFL remains unanalyzed but can reasonably be projected to result in at least a 4 percent reduction in the short term timber supply (based on analyses conducted elsewhere in the region). Accepting the lower end of the estimated range of impacts put forward by district staff—4 percent rather than 8 percent—acknowledges the potential overlaps between this and other factors such as riparian areas. Four percent therefore represents the minimum foreseeable reduction at this time.

- Green-up and forest cover requirements

Across the entire timber harvesting land base there is a general maximum disturbance limit whereby no more than 33 percent of the land base can be less than three metres tall at any time. There are also minimum forest cover requirements for caribou habitat according to elevation, seasonal use, slope and aspect. Within the areas affected one of two conditions apply: either 50 percent of forest stands must be older than 120 years, or 33 percent of all stands must be older than 200 years.

District staff approved the zonal green-up criteria, and the base case projection incorporated approved green-up ages. (See earlier discussion under The role of the "base case.") These criteria were modelled in the timber supply analysis, but, as discussed above in *Wildlife*, I expect further habitat requirements will prove necessary to meet current management objectives. A sensitivity analysis indicated the base case initial harvest level could be maintained for only one decade if the maximum allowable area

below green-up age were reduced by 10 percent or if a four-pass harvesting system were implemented.

These findings illustrate that this analysis is indeed sensitive to changes in forest cover requirements. I accept that green-up ages were appropriately modelled as originally approved; however, I must reiterate my concern that the assumptions underlying the analysis do not meet caribou habitat requirements.

(vi) any other information that, in his opinion, relates to the capability of the area to produce timber;

Harvest profile

During the TFL's two-year operating history, the licensee has harvested approximately 33 000 cubic metres of cedar sawlogs annually, about 34 percent of its AAC. In descending order, the other species harvested for sawlogs are hemlock (17 percent), spruce (13 percent), balsam (13 percent) and "other" (6 percent). To these are added approximately 16 000 cubic metres (16 percent) of hemlock pulp logs.

These proportions differ from the standing inventory profile (see earlier discussion under *Species profile*), but given the brief history of the licence it is too early to draw any conclusions about the suitability of this harvest profile or even whether it represents a long-term trend. However, in most management units, actual harvests should generally match the species mixture in the inventory over the medium term, or else run the risk of concentrating harvests in select areas—which could create IRM problems—or of undergoing dramatic changes in the total harvest of particular timber types, which could have negative implications for processing facilities. The continued contribution of all forest types to the timber harvesting land base depends on their balanced utilization; consistent avoidance of particular types will eventually have AAC implications.

Partitioned component of the harvest

There is currently no partition in this TFL. The addition to the timber harvesting land base of a large area previously considered inoperable suggests an opportunity for a partition to ensure that a balanced proportion of the total harvest can indeed be reasonably attributed to these areas. This issue will be discussed in more detail below, under Reasons for decision.

20-Year Plan

The original 20-Year Plan submitted by the licensee showed a very imbalanced harvest schedule. A harvest of approximately 1.25 million cubic metres was indicated for the first five-year quarter, far in excess of cut control allowances at the current AAC. Planned harvesting was then projected to decline dramatically in the second five-year

period to less than 170 000 cubic metres, also outside cut control allowances. Over the 20-year period, a total available volume of 2.8 million cubic metres was mapped. This exceeded the volume of 2.2 million cubic metres required to meet 20 years of the proposed AAC of 110 000 cubic metres.

In their review of the plan, district staff rejected portions of a number of proposed cutblocks and shifted first-quarter harvesting into the second quarter to balance the harvest flow and meet cut control requirements. As a result, the total 20-year volume was reduced to 2.1 million cubic metres, slightly below the 2.2 million cubic metres required of the plan. However, it does not appear that the revised 20-Year Plan can meet adjacency requirements. Many blocks proposed for the third and fourth quarters lie next to blocks harvested in the first and second quarters. Those early blocks are unlikely to have greened up sufficiently to allow harvesting in the neighbouring blocks.

The purpose of a 20-Year Plan exercise is to show the proposed AAC is at least spatially feasible over that period. The inability of even the revised plan to do that indicates timber supply is likely less than modelled in the base case and raises serious doubts about the feasibility of maintaining the current harvest level of 110 000 cubic metres per year over the short-term planning horizon.

- (b) **the short and long term implications to the Province of alternative rates of timber harvesting from the area;**

Harvest flow

Apart from the four harvest flow options discussed earlier under The role of the "base case", two other projections were modelled using the land base assumptions underlying the base case and Status Quo option. One depicted a steady harvest of 59 000 cubic metres per year over two centuries, while the other began at 121 000 cubic metres per year and dropped over time to a long-term harvest level of around 48 000 cubic metres per year, similar to that in the base case.

Although these projections suggest some flexibility in the initial harvest level— notwithstanding the findings of my evaluation of specific factors—I see no advantage in raising an AAC only to lower it again within a relatively short period. Community stability is best served by avoiding unnecessary fluctuations in timber supply. By setting a higher initial harvest level, even in cases where it may be biologically feasible, a set of expectations is raised and the socio-economic infrastructure adjusts accordingly. The ensuing reduction, 5 or 10 years later, will create problems and distress that could have been avoided had the harvest level remained constant throughout that period. A reduced, steady harvest flow, in contrast, provides stability but at the expense of a severe adjustment at the outset.

In summary, I accept the base case projection as a suitable point of reference for my determination.

Community dependence on forest industry

The licensee operates the Eagle River Cedar Mill in Malakwa, 47 km west of Revelstoke, and a plywood plant in Golden. Until February 1996, the licensee also operated a mill in Donald, but now plans to shift processing formerly done there to its facility in Malakwa.

Approximately 40 percent of Malakwa's direct and indirect employment depends upon the mill, while the Golden mill employs almost 170 people. If processing operations formerly located at the Donald mill are moved, as planned, to Malakwa the company expects to hire approximately 30 more people there.

In both Malakwa and Golden, therefore, there is a significant degree of community dependence upon the two mills and, accordingly, upon the TFL 55 harvest. The contribution of that harvest to the mills is discussed below, under Timber processing facilities.

Difference between AAC and actual harvest

Given the limited harvesting history (since 1993) in this TFL, it is too early to draw any meaningful conclusions from the licensee's historical performance. However, as discussed earlier, under 20-Year Plan, I am concerned that the layout of future blocks does not conform to expected requirements.

- (c) **the nature, production capabilities and timber requirements of established and proposed timber processing facilities;**

Timber processing facilities

The licensee's sawmill in Malakwa and its plywood plant in Golden utilize most of the suitable TFL 55 harvest. Logs harvested on TFL 55 are either sent directly to the two facilities or traded with other suppliers for cedar (for Malakwa) or whitewood peeler (for Golden). The TFL 55 harvest annually provides approximately 33 000 cubic metres of cedar directly to the Malakwa mill, about one third of the total volume processed there. The volume of wood directed to the Golden plant from TFL 55 varies much more dramatically, as a result of the various log trade agreements the licensee holds with other operators. Whether indirect or direct, however, the unit's contribution to the licensee's operations is significant.

- (d) **the economic and social objectives of the Crown, as expressed by the minister, for the area, for the general region and for the Province; and**

Minister's letter and memorandum

The Minister expressed the economic and social objectives of the Crown for the province in two documents to the Chief Forester: a letter dated July 28, 1994 (attached as Appendix 3), and a memorandum dated February 26, 1996 (attached as Appendix 4). I understand both documents to apply to TFL 55. They are consistent with the objectives stated in the Forest Renewal Plan and include forest stewardship, a stable timber supply, and allowance of time for communities to adjust to harvest level changes in a managed transition from old growth to second-growth forests, so as to provide for continuity of employment.

The Minister stated in his letter that "any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability." He placed particular emphasis on the importance of long-term community stability and the continued availability of good forest jobs. To this end he asked that the Chief Forester consider the potential impacts on timber supply of commercial thinning and harvesting in previously uneconomical areas. The latter would likely require the use of alternative harvesting systems, and to encourage this the Minister suggested consideration of partitioned AACs.

As noted above, under *Commercial thinning*, the age structure of this unit offers little opportunity for commercial thinning, and, indeed, none is planned. The licensee has proposed, however, a very ambitious movement of operations into previously inoperable areas. The absence of prior performance in these areas makes it difficult to evaluate how realistic these goals are. To provide the opportunity without endangering the integrity of the AAC based on the traditional land base, I have considered the use of a partition. This issue will be discussed further, under Reasons for decision.

The Minister's memorandum addressed the effects of visual resource management on timber supply. It asked that pre-Code constraints applied to timber supply in order to meet VQOs be re-examined when determining AACs in order to ensure they do not unreasonably restrict timber supply. As noted earlier, under *Visually sensitive areas*, there are no VQOs designated in this unit, and I concluded that there was no reason at this time to expect timber supply to be constrained in the near future by visual resource management measures.

Local objectives

The licensee received a number of public comments in mid-1993 during the preparatory stage of MP 2, and later that year in response to the Statement of Management Objectives, Options and Procedures. Attendance was light, however, during the open houses held in the fall of 1995 to review the draft MP 2, and few comments were received at that time.

In reaching my determination I have taken into consideration the input received and the differing views presented.

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

Unsalvaged losses

The major sources of unsalvaged losses are fire, insects, disease and, to a lesser extent, windthrow. Annual losses over the next century are estimated at 3338 cubic metres, approximately 3 percent of the current AAC. In the neighbouring Revelstoke TSA, in contrast, unsalvaged losses were estimated at close to 10 percent of the AAC. However, this discrepancy may be due, in part, to the different age-class structures in the two units.

Throughout the province there is considerable uncertainty surrounding the issue of unsalvaged losses. The estimate for TFL 55 falls within the acceptable range of estimates from other units, but this is no assurance of its accuracy. As I have no better information to rely upon I accept it at this time, but I encourage the licensee to monitor actual losses closely over the next few years so that I may assess this estimate more confidently at the next AAC determination.

AAC Determination

Reasons for decision

In reaching my decision on an AAC for TFL 55, I have considered all of the factors presented above and have reasoned as follows.

The timber supply analysis indicates the current AAC of 110 000 cubic metres could be maintained for two decades before beginning a decline to the long-term harvest level of 48 412 cubic metres per year, to be reached in 100 years. This projection assumes substantial volume contributions from areas that were not considered part of the timber harvesting land base during the term of MP 1: i.e. 1024 hectares of decadent hemlock-, cedar- and balsam-leading stands within the operable land base and 2234 hectares of stands that are currently outside the operable land base.

There is one factor—a possible underestimate of the site index for stands currently less than 36 years of age—that suggests timber supply may be higher than assumed in the analysis. As noted under *Site productivity estimates*, however, this has timber supply implications primarily in the long term: it provides no basis for maintaining or increasing the short-term harvest level.

A number of factors combine to cast doubt on the feasibility of the base case.

1. The riparian requirements of the Forest Practices Code are expected to exceed those modelled in the analysis;
2. The biodiversity requirements of the Forest Practices Code will also exceed those modelled in the analysis;
3. The deductions for environmentally sensitive soil areas appear to be underestimated;
4. It is highly unlikely that the historically unmerchantable stands added to the operable land base will provide the volume contribution assumed in the analysis;
5. The assumption that 2234 hectares previously considered inoperable will be available and economical to harvest is optimistic;
6. The current requirements for caribou management exceed those modelled in the analysis; and
7. The 20-Year Plan fails to show the geographic availability of the proposed AAC over the next two decades.

The first two factors have not been explicitly analyzed for this TFL as yet, and it is likely that there is some overlap between them and other factors in this analysis. Nonetheless, in other units riparian and biodiversity requirements have been projected to reduce the timber harvesting land base by 3–5 percent each. Given the prevalence of streams and waterways in TFL 55, I anticipate the riparian constraints will prove particularly significant. Furthermore, given the minimal netdowns to the productive forest for other factors, it is likely that there will be a higher, rather than lower, net impact from biodiversity and riparian requirements, relative to many other units in the province.

As noted earlier, under *Environmental sensitivity*, there is reason to believe sites with sensitive soils were not thoroughly mapped. Accordingly, I expect the timber harvesting land base has been overestimated and that additional, as yet unquantified, areas will be removed from that land base once further mapping is completed.

To these should be added a further, unquantified, land base reduction to account for historically unmerchantable stands within the timber harvesting land base. The base case is predicated on harvesting all of these decadent stands, yet, as noted earlier under *Unmerchantable stands*, the licensee has no historical performance or other evidence on which to base expectations of future harvests. I do expect some of these stands to contribute volume to the licensee's operations and, hence, am unwilling to fully discount their potential to make a limited contribution to the AAC. At this time, however, I do not consider it a reasonable expectation that all of them can be developed. Moreover, the dispersal of these stands among merchantable sawlog stands throughout the land base would render a partition almost impossible to administer. From this issue, then, I find further evidence that the timber harvesting land base has been overestimated in the base case.

The fifth factor concerns the inclusion of 2234 hectares of stands outside the current Operable Cut Line. As discussed earlier, under *Economic and physical operability*, the licensee has only a minimal operating history in these areas and has provided no analysis to persuade me its stated plans are feasible. It is reasonable to expect that many of these areas will prove unsuitable for regeneration or be sensitive to development due to other environmental or economic limitations.

Nonetheless, I am unwilling to entirely rule out all possibility of contributions from these areas. Unlike the unmerchantable stands within the Operable Cut Line, these inoperable stands can be easily identified and harvesting operations monitored; accordingly, they are far more amenable to a partition. I also note that a partition for inoperable areas exists on the nearby TFL 23. It therefore seems reasonable to provide an opportunity to promote the development of operational plans and confirm the viability of harvesting on inoperable areas within TFL 55. A partition will ensure the designated volume is taken from a specified area, avoiding the danger of concentrated harvests on other parts of the land base. At the same time, it acknowledges the risk to timber supply that would otherwise result from overestimating the contribution that can reasonably be expected from this area, given the information at hand.

In setting a volume for the partition I am guided by the general productivity of the entire land base. The analysis projected an initial harvest level of 110 000 cubic metres per year on a timber harvesting land base of approximately 21 000 hectares. From this I am comfortable assuming that 2200 hectares may provide up to 10 000 cubic metres annually for at least the five-year term of this determination. This assumes a similar productivity ratio and management assumptions will apply to the partitioned area as apply to the balance of the TFL. Prior to the next analysis, though, I will require a revised operability map that reflects current technology and market conditions, and a more definitive map-based analysis of biophysical considerations.

As stated earlier, I also expect a further downward pressure on the base case initial harvest level to stem from the current caribou habitat management objectives. Given the concerns expressed by district staff and staff from Parks Canada and the Ministry of Environment, Lands and Parks, it is reasonable to expect the licensee will need to adopt more constraining planning and operational practices than those modelled in the analysis. These are likely to include more stringent old-growth and forest cover requirements, possibly leading to the need for a four-pass harvesting system. On its own such a shift would not necessarily require a short-term reduction in the harvest level, but when added to the land base reductions mentioned above, the risk to timber supply becomes significant. I draw this conclusion in full awareness that all caribou management options are currently under review as part of the caribou management strategy initiated by the West Kootenay-Boundary Land-Use Plan. The outcome of that process—which may or may not change the current objectives and management regime—will be addressed in the next determination.

Finally, I am concerned at the failure of the 20-Year Plan to show an even and geographically well-distributed layout of cutblocks over the next two decades. The plan relies heavily upon harvesting first-quarter leave blocks in the third and fourth quarters—by which time, it is projected, the previously harvested blocks will not have reached green-up conditions—yet still struggles to provide 20 years of volume at the current AAC. This does not translate into a specific volume or area reduction but is an indicator that the base case timber supply projection cannot be met operationally.

In reviewing the cumulative effects of all of the above factors, I am convinced that the current AAC cannot be maintained. Areas constrained for riparian and biodiversity requirements, soil sensitivity and unmerchantability may well represent over 10 percent of the timber harvesting land base. To this must be added the uncertainty surrounding a further 10 percent of the land base represented by the formerly inoperable areas. Although a comparison of harvest flow projections suggests the current harvest level could still be maintained for one decade even with a 15 percent land base reduction, this did not take into consideration the other downward pressures such as the caribou management requirements and the shortcomings of the 20-Year Plan.

To preserve future options, to provide a suitable margin of error to accommodate the high risk and uncertainty inherent in this unit, and to ensure a smooth and gradual transition to what I expect to be a lower long-term harvest level than projected in the base case, I have concluded that a 9 percent reduction is needed at this time. This will result in a new overall AAC of 100 000 cubic metres. Of this total, however, 10 000 cubic metres will be derived from the partition for inoperable stands, discussed above.

Potentially, the array of downward pressures and the virtual absence of upward pressures could be construed as justification for an even lower AAC. I am averse to a more severe reduction for two reasons. First, I do not have specific analytical support for a larger reduction. The lack of specific data on many aspects of this TFL's determination requires some level of educated projection. Accordingly, I regard 100 000 cubic metres per year as a probable upper limit, upon which various factors are exerting an unquantified downward pressure. The magnitude of those

pressures will likely become evident over the next few years and will be addressed, if necessary, at the next determination.

Second, I have taken guidance from the socio-economic objectives of the Crown and from my awareness of the high dependence of the local communities upon the forest industry. These have led me to restrain the reduction to the minimum necessary. Although a 9 percent reduction will undeniably impose some hardship I am convinced that it is essential and sufficient to avoid even more economic instability and difficulty in the future.

In reviewing the history of these two units I am struck by the obvious hazards of setting an AAC on the basis of area extrapolation and without an analysis specific to the land base in question. The 1992 division of TFL 23 led to the assignment of an AAC of 220 000 cubic metres to the newly-formed TFL 55, largely on the basis of a comparison of its area with that of the overall parent unit. A year later this segment was itself divided in two and its AAC shared equally between the now-reduced TFL 55 and the new TFL 56.

Unfortunately, such arbitrary divisions all too often create units that lack the geographic resilience of the original management area. Factors and requirements that may be easily accommodated on a larger land base frequently prove constraining on timber supply in a smaller area. Even if the harvest projection can absorb a given change in management assumptions, the capacity of the unit to carry further risk and uncertainty is generally reduced more than would be the case in a larger unit. From a timber supply perspective, the sum of the parts rarely equals the whole.

Determination

It is my determination that a timber harvest level that accommodates objectives for all forest resources during the next five years, that ensures longer-term IRM objectives can be met, that reflects current management practices, and that minimizes the risk of disruptive shortfalls in future wood supply, can best be achieved in this TFL at this time by establishment of an AAC of 100 000 cubic metres. This includes a coniferous component of 90 000 cubic metres and a partition of 10 000 cubic metres attributable to timber in stands outside the current Operable Cut Line as understood at the time of this determination and as agreed to by the District Manager of the Revelstoke Forest District.

Implementation

This determination comes into effect on May 1, 1996, and will remain in effect until a new AAC is determined, which must take place within five years of this determination. During that time the following will be provided or undertaken by the licensee:

1. A revised operability map that reflects current technology, market conditions and biophysical considerations; and
2. Comprehensive new ESA mapping that distinguishes wildlife habitat and riparian areas.

A handwritten signature in black ink, appearing to read "L. Pedersen". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Larry Pedersen
Chief Forester

April 17, 1996

Appendix 1: Section 7 of the *Forest Act*

Section 7 of the *Forest Act* reads as follows:

Allowable annual cut

7. (1) The chief forester must determine an allowable annual cut before December 31, 1996, and after that determination 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 and woodlot licence areas, and
- (b) each tree farm licence area.

(1.1) If, after the coming into force of this subsection, the minister

- (a) makes an order under section 6 (b) respecting a timber supply area, or
- (b) amends or enters into a tree farm licence to accomplish the result set out under section 33.1 (1) (a) to (d),

then, with respect to that timber supply area or tree farm licence area, as the case may be, the chief forester is not required to make the determination under subsection (1) of this section before December 31, 1996, or within 5 years after the last determination, but is required to make the determination

- (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.

(1.11) If

- (a) the allowable annual cut for the tree farm licence is reduced under section 7.1 (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 7.1 (6).

(1.12) If the allowable annual cut for the tree farm licence area is reduced under section 7.1 (3), the chief forester is not required to make the determination under subsection (1) or (1.1) of this section at the times set out in subsection (1) or (1.1) (c) or (d), but must make that determination within one year after the chief forester determines that the holder is in compliance with section 7.1 (2).

(1.2) [Repealed 1994-39-2.]

(1.3) In determining an allowable annual cut under this section 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,
- (b) different types of timber and terrain in different parts of private land within a tree farm licence area, and
- (c) gains in timber production on Crown land that are attributable to silviculture treatments funded by the Province, the federal government, or both.

(2) The regional manager or district manager shall determine a volume of timber to be harvested under a woodlot licence during each year or other period of its term, according to the licence.

(3) In determining an allowable annual cut under this section the chief forester, despite anything to the contrary in an agreement listed in section 10, shall 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) silvicultural 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 his opinion, relates to the capability of the area to produce timber;
- (b) the short and long term implications to the Province of alternative rates of timber harvesting from the area;
 - (c) the nature, production capabilities and timber requirements of established and proposed timber processing facilities;
 - (d) the economic and social objectives of the Crown, as expressed by the minister, for the area, for the general region and for the Province; and
 - (e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

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

Section 4 of the *Ministry of Forests Act* (consolidated 1988) reads as follows:

Purposes and functions of ministry

4. The purposes and functions of the ministry are, under the direction of the minister, to
 - (a) encourage maximum productivity of the forest and range resources in the Province;
 - (b) manage, protect and conserve the forest and range resources of the Crown, having regard to the immediate and long term economic and social benefits they may confer on the Province;
 - (c) plan the use of the forest and range resources of the Crown, 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 Crown and with the private sector;
 - (d) encourage a vigorous, efficient and world competitive timber processing industry in the Province; and
 - (e) assert the financial interest of the Crown in its forest and range resources in a systematic and equitable manner.

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