

**BRITISH COLUMBIA
MINISTRY OF FORESTS**

Tree Farm Licence 26

Issued to the Corporation of the District of Mission

Rationale for Allowable Annual Cut (AAC) Determination

effective July 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 I have employed as Chief Forester of British Columbia in making a determination, under Section 7 of the *Forest Act*, of the allowable annual cut (AAC) for Tree Farm Licence (TFL) 26. The document also identifies where new or better information is required for incorporation into future determinations.

Description of the TFL

Tree Farm License 26, also known as the Mission TFL, is located to the north of the community of Mission, in the northern half of the District of Mission in southwestern British Columbia. It lies close to Golden Ears Provincial Park and is surrounded by the Fraser TSA. The total land base consists of two main supply blocks on either side of the southwestern arm of Stave Lake and three small noncontiguous blocks further to the south.

The tenure has been held continuously by the licensee, the 'Corporation of the District of Mission', since it was first issued in 1958—one of only two such municipally-held TFLs in the province. It is administered from the Chilliwack Forest District Office in Chilliwack, within the Vancouver Forest Region. The licensee does not own a processing facility and therefore sells the timber harvested, much of it to local mills in recent years.

The total area of the TFL is 10 414 hectares, of which 7656 hectares is considered the long-term timber harvesting land base. Of the latter, the majority lies within the Coastal Western Hemlock biogeoclimatic zone, with a small portion in the Mountain Hemlock zone.

History of the AAC

In 1958, TFL 26 then known as Forest Management Licence No. 26, was awarded to the Corporation of the District of Mission. At that time the size of the timber harvesting land base was estimated to be 6198 hectares, and the licensee was authorized to harvest 12 035 cubic metres per year. Subsequent increases came into effect in 1964, 1969, and 1974 based on new inventory data, the conversion to close utilization standards, a reduction in the rotation age and the use of increased yield estimates. In 1979, a 25-year replacement tree farm license was issued, and the AAC was established at 32 281 cubic metres.

Further increases were established in 1983 and 1988 as a result of additions to the TFL land base and a reclassification of site productivity (the latter a consequence of the 1988 re-inventory). In 1989 another replacement licence was issued. In the same year, Management and Working Plan 6 was approved and a harvest level of 41 200 was determined. This harvest level now includes a component for the Small Business Enterprise Program. Management and Working Plan 6 has had a number of extensions and currently expires on June 30, 1996.

The current AAC, under Management Plan (MWP) 6, is 41 200 cubic metres, with the following components:

TFL 26	Cubic metres per year
Schedule A - private lands	5,930
Schedule B - licensee-operated lands	33,668
Schedule B - Small Business Forest Enterprise Program lands	1,602
TOTAL	41,200

New AAC determination

Effective July 1, 1996, the new AAC for TFL 26—including Schedule A private lands and Schedule B lands in the Small Business Forest Enterprise Program—will be 45 000 cubic metres. This includes a coniferous-leading component of 42 000 cubic metres and a partition of 3000 cubic metres attributable to deciduous-leading stands. This determination will remain in effect until a new AAC is determined, which must take place within 5 years of this determination.

Information sources used in the AAC determination

Information considered in determining the AAC for TFL 26 includes the following:

- Mission Tree Farm Licence 26 Management Plan No. 7 (MP 7 - two volumes), July 7, 1995;
- TFL 26, MP 7 Deciduous Proposal, (amendment to Section 4.0 of MP 7), February 8, 1996;
- Statement of Management Objectives, Options and Procedures for Mission Tree Farm Licence 26, August 1992;
- District of Mission Timber Supply Analysis Report for TFL 26 MP 7, prepared by Sterling Wood Group Inc., November 1994;
- Mission Tree Farm Licence 26 Recreation Inventory, prepared by District of Mission, July 1993;
- Mission Tree Farm Licence 26 Recreation Analysis, prepared by District of Mission, July 1993;
- TFL 26 District of Mission Forest Landscape Inventory and Analysis, revised by Hugh Hamilton Limited, March 1993;
- Mission Tree Farm Licence 26 Twenty Year Plan, prepared by District of Mission, July 1994;
- Letter from the Minister of Forests to the Chief Forester, stating the Crown's economic and social objectives, dated July 28, 1994;
- Memorandum from the Minister of Forests to the Chief Forester, stating the Crown's economic and social objectives with regard to visual resources, dated February 26, 1996;

- 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 October 26, 1995;
- *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 as Chief Forester 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 26. 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 26, 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. These principles are 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 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 (as is the case in TFL 26). 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, 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 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. Specific identified activities in traditional areas will be taken into account as far as possible under Section 7(3)(a) 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 of 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 reviewing the factors required under Section 7 to be considered in the AAC determination for TFL 26, I am assisted by the timber supply analysis undertaken by the licensee (hereafter called the 'licensee analysis') and reviewed by Forest Service staff. The timber supply analysis was 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 was produced. For TFL 26, TREEFARM, a forest estate model (hereafter called the "model") proprietary to Sterling Wood Group Inc. was used. Each forecast was based on the same set of current management assumptions and inventory and growth and yield 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 was chosen that sought 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 26, the timber supply analysis was conducted by Sterling Wood Group Inc. on behalf of the licensee. Using current management assumptions, the base case was projected at the initial harvest level recommended by the licensee—42 000 cubic metres per year. The results indicate that this level could be maintained for 30 years before dropping to 41 000 cubic metres per year. A decade later it would drop to 40 000 cubic metres per year, where it would remain for six decades. It would then begin a rise to the long-term harvest level of 48 000 cubic metres per year, which would be reached 140 years from now. For this TFL, then, the base case projects no significant harvest declines or "falldown." The small reduction between 30 and 100 years would be attributable to visual quality concerns and the limited number of mature stands available during that period.

Section 7 (3) of the *Forest Act*

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

Since the approval of Management and Working Plan No.6 in 1989, 1510 hectares of additional land have been added to TFL 26, increasing the estimate of the long-term timber harvesting land base to 7656 hectares and the gross land base to 10 414 hectares. The increase has had an upward influence on timber supply from the previous analysis, as discussed further, under "Reasons for decision."

While the majority of the land base is operable by conventional ground-based harvesting systems, approximately 1 percent of the timber harvesting land base has been identified as accessible only by helicopter logging. BCFS staff support this assumption, although the licensee has limited experience with helicopter logging. Nonetheless helicopter logging has been demonstrated in similar timber types in the area and the proposed sites in TFL 26 are suitable for such systems.

The largest single deduction from the productive forest is for deciduous forest types—816 hectares of predominantly red alder, which historically have not been harvested. As discussed below, under *deciduous forest types*, the licensee has proposed in Management Plan No.7 to harvest some of these types and convert some of these to predominantly coniferous stands.

The licensee is also seeking to add two additional areas of Crown land to TFL 26. A sensitivity analysis indicated that these additions could result in an initial harvest level of 44 000 cubic metres per year and a higher long-term harvest level of up to 50 000 cubic metres per year without jeopardizing future timber supply. Until those additions are formally approved, however, I am unable to take them into consideration.

I consider the additional 1510 hectares and the current assumptions for operability in the licensee analysis to be reasonable and appropriate for this determination.

- environmentally sensitive areas

Areas identified as environmentally sensitive areas (ESAs) have increased markedly, from 31 hectares in MWP 6 to 315 hectares in the proposed MP 7. The single largest factor is the classification of an additional 100 hectares of sensitive-soil areas. The ESAs were approved by the BCFS in 1993, although the ESAs along streams and lakeside areas

are now considered insufficient to meet the current requirements for riparian habitat under the Forest Practices Code. This issue will be discussed in detail below, under *riparian areas*. Apart from this factor, however, I am satisfied the deductions for ESAs in the licensee analysis are appropriate.

- non-merchantable forest types

Non-merchantable forest types are stands that are considered to be uneconomical to harvest. They are identified on the basis of local knowledge and experience, and have the following general characteristics: they are typically older than 200 years, occur on poor sites and have crown closures of less than 50 percent. In the licensee analysis, 42 hectares of these non-merchantable forest types were deducted from the productive land base, and I consider this reasonable.

- deciduous forest types

In the licensee analysis, 816 hectares of deciduous forest types, predominantly red alder, were deducted from the productive land base. Since then, however, the licensee has submitted a detailed proposal to harvest 35 to 40 hectares of deciduous stands over the 5-year term of MP 7. This proposal replaces a less specific proposal regarding deciduous harvesting made under the "Special Projects" section (4.0) of draft MP 7. This new proposal addresses non-timber resource considerations as well as the impacts on associated non-deciduous stands.

The licensee estimates that harvesting 35 to 40 hectares for the 5-year term of MP 7 will produce a harvest level of approximately 3000 cubic metres per year. Some of these areas will be converted, where ecologically suitable, to coniferous stands. All harvesting under the proposal will be subject to the operational planning requirements of the Forest Practices Code.

In reviewing this proposal, BCFS staff have estimated that the long-term harvest level for the deciduous component would be 5800 cubic metres per year.

Although the licensee has not previously harvested in these stands, I find the area proposed for harvest to be a moderate target. Moreover, in view of the fact that the associated harvest level of 3000 cubic metres per year is substantially below the estimated long-term harvest level of 5800 cubic metres per year for the deciduous component of the TFL, I am satisfied that it is a reasonable harvest level for the term of the MP 7. Initiating this level of harvesting has the benefit of facilitating development of operational experience in this forest profile. The experience gained will be useful in re-assessing this harvest level in the next determination. As discussed below, under "Reasons for decision," I have established a partition of 3000 cubic metres per year to facilitate the harvesting of deciduous forest types.

- roads, trails and landings

In the licensee's analysis, land base deductions to account for existing roads, trails and landings were estimated at 230 hectares, approximately 2.3 percent of the productive land base. Deductions to account for future roads, trails and landings were based on past silviculture prescriptions and actual harvesting results and calculated at 5 percent of the entire timber harvesting land base—401 hectares. I regard this later percentage deduction as reasonable, but note that approximately 75 percent or more of the timber harvesting land base already has access roads. The appropriate deduction should therefore have been 5 percent of the remaining unroaded area (25 percent of the timber harvesting land base) or, roughly, 100 hectares. The licensee has subsequently also agreed with this approach.

A further, although less significant, error occurred when 30 hectares were deducted to account for future roads outside cut blocks. The entire timber harvesting land base is assumed to be eligible for cut blocks, therefore there was no need to have an additional deduction for roads located in the timber harvesting land base outside of cut blocks beyond the deductions noted in the paragraph above.

Given that all future access development is projected to be completed within 20 years, the assessment of future road losses and its associated impact on timber supply will become more certain in the very near future. Nonetheless, I am mindful that there has been a 300 hectares over-estimation of land base deductions to account for future roads, trails and landings, and therefore the licensee analysis has underestimated timber supply. The upward influence on the base case harvest level has not been quantitatively analyzed; however, if all new roaded areas are assumed to contain mature stands yielding 700 cubic metres per hectare (the average for the licence area), the incremental timber supply is estimated to be as high as 2000 cubic metres per year. Accordingly, this factor suggests some uncertainty and risk that timber supply in the short and medium terms has been underestimated in the base case, which I have considered in this determination as discussed below, under "Reasons for decision."

Existing forest inventory

- age of inventory

A complete re-inventory was undertaken in 1988 and 1989 incorporating aerial photography and extensive ground sampling. In addition, 1200 hectares of land added to the TFL in 1991 were inventoried in 1992 using the 1988 aerial photographs and 1992 field data. The inventory file was updated to the end of 1991 for depletions and to the end of 1992 for growth projections. BCFS staff have reviewed the inventory and have not found areas of concern. Accordingly, I am satisfied that it provides a reliable basis for my determination.

- age class structure

Due to the extensive harvesting and disturbance history in this area, stands in TFL 26 are predominantly young; 6910 hectares of the 8057 hectares in the current timber harvesting land base have stands less than 80 years of age. The maturing of these younger stands over time will allow a long-term harvest level that is actually higher than the current harvest level.

- *species profile*

Western hemlock-leading stands are the dominant forest type on the TFL (58 percent). Other forest types include coastal Douglas-fir (25 percent), western redcedar/cypress (15 percent) and amabilis fir (2 percent). Over time the licensee intends to convert this profile to predominantly Douglas-fir and cedar plantations; both species are ecologically suited to the area. I am satisfied that the base case has appropriately accounted for this.

Deciduous-leading stands were excluded from the timber harvesting land base in the licensee analysis, although the licensee has subsequently proposed harvesting some of these stands as discussed above, under *deciduous forest types*.

- *volume estimates for existing stands*

Volume estimates for existing stands were developed using the Variable Density Yield Prediction (VDYP) model. Older stands and unmanaged second-growth stands were grouped by site class. It was suggested by BCFS inventory staff that because higher-yielding stands are typically harvested first, the remaining older stands may have site indexes that are, on average, lower than those in second-growth stands. However, the risk of overstated yields on older stands is somewhat reduced by two factors:

1. the use of aggregated site classes for stands of similar yield; and
2. the fact that only about a third of the harvest forecast in the first decade is anticipated to come from old-growth stands.

A sensitivity analysis was undertaken to examine harvest level sensitivity to changes in estimates of existing and regenerated stand volumes (the two factors were combined). The results indicated a significant impact if volumes have been overestimated by 10 percent. In that scenario, if a large decline in future timber supply were to be avoided, the initial harvest level would have to drop to 31 000 cubic metres per year. In contrast, a 10-percent underestimation in volumes would facilitate only a minor increment in the initial harvest level to 45 000 cubic metres per year.

However, after having evaluated all the information relative to the accuracy of volume projections, I find the volume estimates used in the analysis to represent the best available information, and they are suitable for use in this determination. I do not find any evidence to support the view that volumes may be either over- or underestimated for existing stands.

Nonetheless, I expect that the licensee will monitor harvested volumes closely on the land base, relative to inventory forecasts. If any new information is developed concerning this factor, it will be considered in a future determination.

Expected rate of growth

- site productivity estimates

Site index assignments used in the licensee analysis for existing stands were approved by BCFS research staff. Stands were grouped by site classes and average site indexes calculated. The distribution of site classes is as follows:

- good - 24 percent of the timber harvesting land base;
- medium - 62 percent; and
- poor - 14 percent.

The analysis also assumed slightly higher site indexes for future Douglas-fir plantations following their conversion from the present hemlock/cedar stands. This adjustment was also approved by BCFS research staff; and I am satisfied that it accurately reflects current management. In summary, I have no reason to adjust assumptions applied for site indexes in the licensee's analysis.

- 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. For the initial decade these were only applied to the 14 percent of the timber harvesting land base currently covered by young western redcedar and Douglas-fir plantations. Growth in all other young stands was modelled using VDYP. Over time, most stands are projected to convert to redcedar or Douglas-fir plantations which will ultimately represent 73 percent of the timber harvesting land base.

The managed stand yield tables used in the licensee analysis were approved by BCFS research staff with one reservation—operational adjustment factors (OAFs) for Douglas-fir plantations were noted to be generally greater than recommended by BCFS research staff. As a result, future yields in these stands may have been underestimated by 5 percent. Given that Douglas-fir plantations will eventually occupy up to 65 percent of the timber harvesting land base, this factor alone suggests the base case may have underestimated the long-term timber supply by up to 3 percent (65 percent multiplied by 5 percent), as discussed below, under "Reasons for decision."

For the next determination, I expect the licensee to re-examine the OAFs applied to Douglas-fir plantations. Any new findings will be considered in a future AAC determination.

- minimum harvestable ages

In the licensee analysis, minimum harvestable ages were assumed to be the younger of:

1. the age when the stand has reached 600 cubic metres per hectare; or
2. the age of culmination of mean annual increment (provided the stand has achieved a minimum of 375 cubic metres per hectare).

Over the base case planning horizon, minimum harvestable ages are expected to range from 70 to 250 years, with an average of 110 years from the fourth decade on. These figures were accepted by BCFS staff, and since they are consistent with current practice, I am satisfied that no adjustments are required for minimum harvestable ages.

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

Regeneration delay

The licensee has an effective planting program and is currently meeting or bettering its regeneration delay targets of three years for balsam/hemlock stands and two years for all other stands. In fact, district staff have noted that estimates of not-satisfactorily-restocked areas in 1993 were far less than the areas actually harvested in the preceding two years. Any possible overestimate of regeneration delay periods implies shorter green-up periods and a slight reduction in rotation ages. Accordingly, it represents a possible small upward pressure on the long-term timber supply.

However, only anecdotal information was presented to suggest a trend in shorter regeneration delay periods. Nonetheless, this trend implies some optimism for future timber supplies. I accept the regeneration delay periods as suitable for this determination.

Not-satisfactorily-restocked areas

There are only 28.5 hectares of not-satisfactorily-restocked (NSR) area, and in the analysis they are assumed to regenerate within the regeneration delay period. I am satisfied that this factor has been properly accounted for in the base case projection.

Impediments to prompt regeneration

There are no known impediments to prompt regeneration. Logged areas are successfully regenerated within the specified regeneration delay periods. Furthermore the TFL does not have backlog NSR areas, a fact which further verifies regeneration success.

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

The licensee has carried out juvenile spacing on approximately 425 hectares, and this area was modelled in the licensee analysis. The licensee has expressed an interest in continuing such activities but has not made any specific commitments in Management Plan 7. Accordingly, no further spacing was modelled.

Juvenile spacing can result in the earlier availability of harvestable stands but does not generally result in an overall gain in stand volume. I am satisfied that additional considerations for incremental silviculture are not required in this determination.

Rehabilitation programs

As discussed earlier, under *economic and physical operability* and *deciduous forest types*, the licensee is planning to harvest red alder and, where ecologically suitable, reforest these areas to coniferous forest types. The timber supply impacts are discussed below, under "Reasons for decision."

Commercial thinning

The licensee is considering commercial thinning as there are many regenerated stands which are of sufficient age and stand condition to be suitable for thinning. Although the licensee does not have any area currently scheduled, they propose that if the AAC is increased, this will provide sufficient opportunity to initiate experimental commercial thinning activities.

As with regular harvesting, merchantable volumes gained through commercial thinning operations must be recorded and are considered part of the total harvested volume for cut control purposes. Even in the event that thinning is carried out, it does not generally

increase overall yields by the end of the stand rotation except under a very carefully managed regime of multiple harvesting entries.

Its principal benefit is the flexibility it lends to making volume available over the course of a rotation period, hence making volume available during critical periods when it might not otherwise be available. This operational flexibility can affect timber supply in the short- and mid-term but not the long-term. The licensee's proposal to undertake commercial thinning is discussed further below, under "Reasons for decision."

(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 coastal close utilization standards were assumed in the analysis: i.e. trees must be utilized to a minimum of 17.5 centimetres diameter at breast height (dbh), and, once felled, all wood to a minimum top diameter of 10 centimetres must be utilized and removed from the site, leaving a stump no higher than 30 cm. I am satisfied these reflect current practice and have been accounted for in the analysis.

Decay, waste and breakage

Provincial approved reduction factors for decay, waste and breakage were applied to the volume estimates of existing stands as approved by BCFS staff. I am satisfied that the harvest levels projected in the timber supply analysis adequately account for decay, waste and breakage 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, having regard to the immediate and long-term economic and social benefits and, in consultation and cooperation with other agencies, to plan, coordinate and integrate the use of a variety of forest-related resources. The extent to which integrated management objectives for various forest resources and values constrain the timber supply must be considered in AAC determinations.

- visually sensitive areas

In consideration of the proximity of TFL 26 to the large urban areas of the Lower Mainland and Fraser Valley, visual quality objectives (VQOs) have been assigned to the entire TFL. Constraints on the amount of area permitted to be below a greened-up

condition, for a given period, are specified for various visually sensitive areas. As a result, 30 percent of the timber harvesting land base has been classified as partial retention, 1 percent as retention; and the balance as modification VQOs. I note that application of visual quality objectives to the entire timber harvesting land base represents an enhanced commitment to visual quality management.

A visually effective green-up (VEG) height of four metres was determined to be appropriate for TFL 26 by the BCFS regional landscape staff after an on-site examination.

I am satisfied that the commitment to careful management of viewsapes was appropriately modelled in the licensee analysis, and I consider the management assumptions acceptable for this determination.

- *wildlife*

Although there were no deductions for wildlife habitat in the licensee analysis, there are a number of assumptions which contribute to the management and maintenance of important habitats. Provisions for the biodiversity corridor (see *biodiversity* below), ESAs, non-merchantable areas, riparian areas and forest cover constraints for visual quality all overlap with, and contribute to, providing habitat for wildlife. As well, the licensee is proposing to experiment with creating artificial snags to provide roosting and nesting sites, and to continue to leave standing snags in cut blocks. It is my view that these practices and considerations will meet many of the requirements to maintain wildlife trees and other habitat needs under the Forest Practices Code.

I am mindful of the important wildlife species in the area. Given the limited old-growth in TFL 26, the small size of the unit, its proximity to large protected areas, the biodiversity corridor, and the small cut blocks typically employed by the licensee (approx. 15 hectares), I am not aware of any further wildlife strategies required in the near future that would significantly affect timber supply.

- *riparian areas*

The analysis assumed that no-harvest buffers of 10 or 30 metres (depending on stream width) would be required alongside all Class A and B streams. Devils Lake and Hoover Lake were both modelled with 30-metre riparian management zones. This resulted in a total deduction from the productive forest land base of just over 33 hectares.

Since the completion of the timber supply analysis, BCFS staff have reviewed stream classifications considering the new requirements for riparian management under the Forest Practices Code. The results of this preliminary review suggest that with the implementation of the Code, a further reduction is required of approximately one (1) percent of the timber harvesting land base.

However, these findings are tentative, and hence the timber supply implications of requirements for riparian management may have not been fully quantified at this time. Furthermore, it is possible that some of the riparian areas may overlap with land already deducted for other considerations. Nonetheless, based on my experience I expect the riparian deduction to be at least one percent, and I expect this to be further refined in future timber supply analyses. After considering this matter, I have concluded that deductions for riparian areas represent a small downward pressure on timber supply in the short- to long-term and I have accounted for this as discussed below, under "Reasons for decision."

- community watersheds

Cannell Lake is a source of domestic water for the municipalities of Mission and Matsqui. In recognition of public concerns regarding water quality issues, the licensee has no plans to operate in a 126-hectare area surrounding the lake. The area was deducted from the productive forest land base in the analysis. Also, 35 hectares were deducted to account for areas noted to have environmental concerns due to hydrological sensitivity that resulted from their upstream proximity to existing water licences. These areas will not be harvested, and I find the deductions reasonable and have made no further adjustments for this factor in this determination.

- recreation

Although TFL 26 has few areas of high provincial or regional recreation significance, a recreation inventory has identified several popular recreation sites. These are being managed through the application of VQOs and/or ESA deductions. This strategy was modelled in the analysis, and I accept it as reliable for this determination.

- biodiversity and old growth

No specific old-growth constraints were applied in the licensee analysis, but in TFL 26, the majority of the existing old-growth stands are found outside of the operability lines or in stands considered non-merchantable. Over time the licensee expects that deductions for ESAs, riparian areas and watershed protection will lead to an increase in the old-growth component. The analysis also indicates that a significant accumulation of old growth will occur in zones with partial retention VQOs.

Although there were no additional constraints for old-growth applied in the analysis, a biodiversity corridor covering 173.6 hectares, including 75 hectares of operable land in the Sayres Lake area, was deducted from the productive forest land base. BC Environment staff, however, have expressed concerns that this will be insufficient to satisfy landscape-level biodiversity requirements under the Forest Practices Code for the entire TFL. As a result, it is noted that compliance with the Code may require more constraining management strategies than assumed in the analysis.

While landscape-level biodiversity objectives are uncertain at present, particularly given the small scale of this TFL, current practices and land-base deductions assumed in the licensee analysis will undoubtedly contribute to, if not fully satisfy, requirements for landscape-level biodiversity objectives. Before submission of the next management plan, there will be time to further examine the impact on timber supply from the implementation of specific objectives for biodiversity, and any findings can be incorporated into a future timber supply analysis. For this determination, I am satisfied that this factor does not represent a serious risk to short-term timber supply in this TFL.

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

Twenty-year plan

The most recent 20-year plan prepared for TFL 26 was submitted with the draft management plan in 1994. It has been reviewed by district staff and was accepted in October 1995. The plan clearly indicates that the proposed harvest level can be attained while meeting required management objectives on the TFL.

Harvest profile

The harvest profile specified in the timber supply analysis matches that of the licensee's 20-year plan and reflects the inventory profile currently available. Over time, the licensee intends to harvest higher proportions of Douglas-fir and western redcedar as a parallel to the planned conversion of hemlock sites to these species. (See discussion above, under *species profile*.) I note that the harvest profile generated by the analysis places greater reliance on older age classes, at least in the first decade, than has been customary in recent years; and I have been advised that the licensee is aware of this change. This may well be an artifact of the application of the oldest-first harvest queuing rule assumed in the analysis. In summary, the harvest profile assumed in the licensee analysis is reflective of their 20-year plan and the current inventory profile, and I have no reason to dispute this assumption in this determination.

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

Harvest flow

The nature of the transition from harvesting old growth to harvesting second growth is a major consideration in determining AACs in many parts of the province. In the short term, the presence of older stands permits harvest levels to be above the long-term harvest level without jeopardizing the future timber supply. In TFL 26, as the majority of the area is younger, the projected harvest level does not decline dramatically. As the base case projects, an annual harvest level of 42 000 cubic metres could be maintained for 30 years, then a decline by 2 percent for 2 decades to 40 000 cubic metres for 60 years and then an increase incrementally to a harvest level of 48 000 cubic metres after 40 years.

An alternative harvest flow projection was modelled using the existing AAC of 41 200 cubic metres. It was found that this level could be maintained for 50 years before declining to 40 000 cubic metres per year for another 50 years. Thereafter, it could be raised until reaching the long-term harvest level of 48 000 cubic metres per year approximately 140 years from now. Another alternative projection was modelled beginning at an initial harvest rate of 44 000 cubic metres per year; however, this assumed the inclusion of additional lands which, as discussed in *economic and physical operability* above, I am not taking into consideration at this time. A final projection, based on the current timber harvesting land base, began harvesting at 51 000 cubic metres per year; however, the ensuing dramatic decline and uneven flow make this proposal far less desirable than the base case, in my judgement.

Having reviewed the alternative scenarios, I consider the base case, starting at 42 000 cubic metres per year to be acceptable for use in this determination as it provides for reasonable continuity in timber supply without causing unacceptable disruptions in harvest flow in the future.

Community dependence on forest industry

The revenue gained from TFL 26 is directed primarily towards capital and cultural projects in the District of Mission. Although this income does not form part of general revenue—i.e., it is not used to supplement or subsidize taxes for district operating expenses—it is, nonetheless, a significant source of funding for the District.

Difference between AAC and actual harvest

The licensee has historically achieved allowable annual cut levels as required by cut control regulations, and there has been no information submitted to indicate that this will not continue.

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

Timber processing facilities

The licensee does not own a processing facility and currently sells most of its harvested timber to local mills. I have no information to indicate how dependent those plants are upon this source, but the relatively small size of the TFL 26 harvest suggests few facilities are likely to be exclusively or predominantly reliant upon it.

- (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 memo

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 26. 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 community stability.

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. To encourage this the Minister suggested consideration of partitioned AACs. As discussed under *deciduous forest types*, I have considered the licensees' proposal to harvest deciduous forest types, which were previously considered uneconomic. As such, I have provided an opportunity to demonstrate utilization of these forest stands by establishing a harvest level partition for deciduous volumes. With regard to commercial thinning, the licensee has expressed an interest but has proposed no detailed plans as yet. It is thus too early to draw any conclusions about the timber supply implications of such activities.

The Minister's memorandum addresses the effects of visual resource management on timber supply. It asks 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*, the licensee has chosen to manage for certain visual quality objectives across the entire land base because of the TFL's proximity to the heavily populated areas of the Lower Mainland. I have examined the assumptions for VQOs and, although they are constraining, I do not believe that they unreasonably restrict timber supply and as such I have made no adjustments on this account.

- local objectives

The Minister's letter suggests that I should consider important local social and economic objectives that may be derived from the public input regarding the timber supply review. As such, I have considered the comments received during the public review of MP 7.

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

Unsalvaged losses

In the licensee analysis, there was no accounting for unsalvaged losses even though records show unsalvaged losses of approximately 100 cubic metres per year—0.25 percent of the annual harvest—from blowdown. It was assumed the blowdown losses would have no impact on the harvest forecast and therefore they were not accounted for in the licensee analysis. In addition, past records indicate there are no unsalvaged losses as a result of catastrophic occurrences of fire, insects or disease.

The unsalvaged losses for blowdown is an extremely low figure, well below the rate of roughly 1 percent used in the adjacent Fraser TSA. Also, it seems unlikely that there are no losses at all from fires, insects or disease. Accordingly, I will instruct the licensee to conduct a further examination of this factor to confirm the level of unsalvaged losses. For this determination, I will assume that unsalvaged losses represents a small downward pressure on timber supply in the short- to long-term, as discussed below, under "Reasons for decision."

Reasons for decision

In reaching my decision on an AAC for TFL 26, I have considered all of the factors presented above and have reasoned as follows.

The current AAC is 41 200 cubic metres from coniferous-leading stands. Following the last AAC determination, 1510 hectares of operable land were added to the land base and subsequently incorporated into the licensee's timber supply analysis for this determination. In the licensee analysis, the base case indicates an initial harvest level of 42 000 cubic metres per year could be maintained for three decades.

However, in reviewing the information for this determination, I have identified a number of factors that exert upward or downward pressures on the base case harvest forecast, due to either changes in practice or new information provided since the completion of the licensee analysis in November, 1994.

Factors identified as downward influences on the timber supply relative to the base case forecast include:

- *riparian*: implementation of the requirements for riparian habitat under the Forest Practices Code will require additional reductions than considered in the base case. However I do not consider the recent findings of additional reductions to be conclusive for TFL 26, and hence the timber supply implications of requirements for riparian management may have not been fully quantified at this time. Furthermore, it is possible that some of the riparian areas may overlap with land already deducted for other considerations. However, after considering this matter, I have accounted for a small downward pressure of approximately 1 percent on timber supply in the short- to long-term based on the work done to date, but also note that this is subject to further refinement in the future;
- *unsalvaged losses*: estimates of unsalvaged losses in the base case are low, and I have accounted for a small unquantified downward influence on the base case in the short- to long-term.

Factors identified as upward influences on the timber supply relative to the base case forecast include:

- *roads, trails and landings*: over the next 20 years, the base case forecast has likely overestimated by up to 2000 cubic metre per year future losses due to roads, trails and landings;
- *operational adjustment factors*: the OAFs used in the analysis to estimate losses in future Douglas-fir plantations are higher than approved factors. I have considered this an underestimation of up to 3 percent of the long-term timber supply.

I have examined the restrictive and augmenting influences on the timber supply for TFL 26. Given these influences on timber supply, the increased land base from the previous analysis (1510 hectares), the relative stability of the base case, and the fact that the long-term harvest level is above the initial base case harvest level, leads to a persuasive argument that the downward influences will be offset by the upward influences in the mid- to long-term. I thus regard the base case as a reasonable projection of expected timber supply for TFL 26.

In addition to the base case coniferous harvest projection, there is the consideration for the deciduous forest types. Deciduous stands are being successfully harvested in many other units in the province, and the licensee has prepared a well-documented proposal to undertake similar operations in TFL 26. The harvest level proposed is a moderate level and leads me to believe that it represents little risk to other forest management objectives in the TFL. Nonetheless, to ensure that harvesting is restricted to deciduous forest types, I shall approve this additional harvest level as a partition of 3000 cubic metres per year as proposed by the licensee. These forest types are easily identifiable and the administration of such a partition should be straightforward.

Given the addition of the 1510 hectares of operable land and the degree of analytical support for the base case, I find the licensee's proposal—of an increase of 800 cubic metres to 42 000 cubic metres per year—reasonable. However, in light of the future decline forecast in 30 years, albeit relatively small, I would not increase the harvest level to a higher level beyond the level proposed, given current assumptions. This 800 cubic metres per year increment also provides an opportunity for the licensee to experiment with commercial thinning within the regulatory context of the AAC and without jeopardizing the economic infrastructure that has built up around the existing harvest of 41 200 cubic metres per year.

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 avoids disruptive shortfalls in future wood supply, can best be achieved in this TFL at this time by establishment of an AAC of 45 000 cubic metres. This includes a coniferous-leading component of 42 000 cubic metres and a partition of 3000 cubic metres attributable to deciduous-leading stands.

Implementation of decision

This determination comes into effect on July 1, 1996, and will remain in effect until a new AAC is determined, which must take place within five years of this determination. During the interim, and in preparation for the next AAC determination, I expect the licensee to re-examine the operational adjustment factors as currently applied in the analysis for Douglas-fir plantations and undertake a further examination of the estimate of unsalvaged losses for TFL 26.

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

Larry Pedersen
Chief Forester

June 18, 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.

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.

Documents attached:

Appendix 3: Minister of Forests' letter of July 28, 1994

Appendix 4: Minister of Forests' memo of February 26, 1996