BRITISH COLUMBIA
MINISTRY OF FORESTS

Tree Farm Licence 8

Issued to Pope & Talbot Limited

Rationale for allowable annual cut (AAC) determination

effective September 1, 1997

Larry Pedersen
Chief Forester

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Objective of this document

This document is intended to provide an accounting of the factors I have considered and the rationale I have employed as Chief Forester of British Columbia in making a determination, under section 8 of the *Forest Act*, of the allowable annual cut (AAC) for Tree Farm Licence (TFL) 8. The document also identifies priorities where new or better information is required for incorporation into future determinations.

Description of the TFL

Tree Farm Licence 8 is located in the Boundary Forest District in the south central interior of BC. It is comprised of two separate units: Block 1 in the Boundary Creek area, north of Greenwood, and Block 2 in the Trapping Creek and Carmi Creek drainages, north of Beaverdell. The TFL is held by Pope & Talbot Ltd and is administered by the Boundary Forest District within the Nelson Forest Region.

The TFL area is characterized by mixed topography of rolling hills and plateaus. The surrounding hills are part of the Okanagan Highlands and the Midway Range on the western side of the Monashee Mountains. The productive forest lies primarily within the Montane Spruce and the Interior Douglas-fir biogeoclimatic zones.

The total land base of TFL 8 is 77 664 hectares, of which 74 239 hectares (96 percent) are classified as productive forest. The other 3425 hectares (4 percent) are composed of non-forest land. The current timber harvesting land base is 64 658 hectares or 87 percent of the total productive forest.

History of the AAC

In 1951, Block 1 of TFL 8 was awarded to Boundary Sawmills Ltd. Block 2, originally awarded to the Olinger Lumber Company as TFL 11 in 1952, was assigned to Boundary Sawmills Ltd. in 1967. After a number of corporate re-organizations and purchases, Boundary Sawmills' successor company, Boundary Forest Products Ltd, was sold to Pope & Talbot Inc., whose Canadian operations were incorporated as Pope & Talbot Ltd.

Management Plan (MP) No. 8 was originally approved on June 24, 1993, for the period July 1, 1993 to December 31, 1995, and subsequently extended to December 31, 1997 or to the date of approval of MP No. 9. The AAC for MP No.8 was 145 000 cubic metres per year. Of this AAC, 7250 cubic metres were administered under the Small Business Forest Enterprise Program. TFL 8 was replaced with a new 25-year replaceable agreement in 1995.

New AAC determination

Effective September 1, 1997, the new AAC for TFL 8 will be 145 000 cubic metres, which remains unchanged from the current AAC. It includes 7250 cubic metres administered under the Small Business Forest Enterprise Program. This AAC will remain in effect until a new AAC is determined, which must take place within five years of this determination.

Information sources used in the AAC determination

Information considered in determining the AAC for TFL 8 includes the following:

- Statement of Management Objectives, Options and Procedures for Management Plan No. 9, February 16, 1995;
- TFL 8 Draft Management Plan No. 9, Pope & Talbot Ltd., re-submitted January 30, 1997;
- TFL 8 Management Plan No. 9 Timber Supply Analysis Report (final submission), Pope & Talbot Ltd. (prepared by Sterling Wood Group, Inc., Consultants), April 14, 1997;
- Twenty-Year Plan for TFL 8; approved January 9, 1996;
- Public input solicited by the Licensee regarding the contents of Management Plan No. 9;
- 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 regarding visual resources;
- Technical review and evaluation of current operating conditions through comprehensive discussions with Forest Service staff, (notably the AAC determination meeting held in Victoria on April 16, 1997);
- *Forest Practices Code of British Columbia Act*, July 1995;
- *Forest Practices Code of British Columbia Regulations*, April 1995;
- *Forest Practices Code Timber Supply Analysis*, BC Ministry of Forests (BCFS) and Ministry of Environment, Land and Parks, February 1996;
- Revised information provided by Pope & Talbot Ltd. (per Sterling Wood Group Inc., Consultants), subsequent to AAC meeting, relating to shelterwood modelling.

Role and limitations of the technical information used

Section 8 of the *Forest Act* requires the Chief Forester to consider biophysical as well as social and economic information in AAC determinations. A timber supply analysis 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 8. 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 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 the TFL 8, I have considered known limitations of the technical information provided, and I am satisfied that the information provides a suitable basis for my determination.

Statutory framework

Section 8 of the *Forest Act* requires the Chief Forester to consider particular factors in determining AACs for timber supply areas and tree farm licence areas. Section 8 is reproduced in full as Appendix 1.

Guiding principles for AAC determinations

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, in respect of which, 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 a range of possible AACs; and

(ii) redetermining AACs frequently, to ensure they incorporate up-to-date information and knowledge—a principle that has been recognized in the legislated requirement to redetermine AACs every five years. The adoption of this principle is central to many of the guiding principles that follow.

In considering the various factors that section 8 of the *Forest Act* requires 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 under the first Timber Supply Review, in the period between 1992 and the coming into force of the Code, 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, and BC Environment, 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 viewed with some caution the timber supply projections in timber supply analyses that pre-dated the Code, or that are based on information packages that largely pre-dated the Code. At the same time, I am mindful that the full force of the Code may not be felt during the ongoing 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 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 full timber supply impact in AAC determinations. 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 overall impact of the land-use decision. Where specific protected areas have been designated by legislation or by order in council, these areas are no longer considered to contribute to timber supply. The legislated requirement for five-year AAC reviews will ensure that future determinations address ongoing plan implementation decisions.

Forest Renewal British Columbia is funding a number of intensive silviculture activities that have the potential to affect timber supply, particularly in the long term. As with all components of my determinations, I require sound evidence before accounting for the effects of intensive silviculture on possible harvest levels. Nonetheless, I will consider information on the types and extent of planned and implemented practices, as well as relevant scientific, empirical and analytical evidence on the likely magnitude and timing of any timber supply effects of intensive silviculture.

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

Others have suggested that, in view of data uncertainties, I should immediately reduce some AACs in the interest 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 TFL 8. 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 8(7) 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*.

The role of the base case

In considering the factors required under section 8 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 AAC 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 model, timber supply forecasts are produced. These include sensitivity analyses to assess the timber supply effects of uncertainties or changes in various assumptions around a baseline option, normally referred to as the "base case" forecast.

The base case forecast represents only one of a number of theoretical forecasts, and may incorporate information about which there is some uncertainty. Its validity—as with all the other forecasts provided—depends on the validity of the data and assumptions incorporated into the computer model 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 may now have changed since the original data package was assembled during the early stages of implementation of the Forest Practices Code.

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.

Timber supply analysis

The timber supply analysis for TFL 8 was conducted by Sterling Wood Group Inc. on behalf of Pope & Talbot Ltd. ("the licensee"). Sterling Wood Group Inc. used a proprietary computer simulation forest estate model called TREEFARM. Based on previous experience in examining results from this model, I am satisfied that it is capable of providing a reasonable projection of timber supply.

In the licensee's timber supply analysis, the "Planned Management Option" reflects current integrated resource management strategies for TFL 8 under MP No. 9, and therefore represents the base case (discussed above, under "The role of the base case").

Sensitivity analyses were provided with the timber supply analysis to assess the risk to timber supply resulting from uncertainty in data assumptions and estimates, and these have assisted me in considering the factors leading to my determination.

An additional sensitivity analysis was provided. It examined the timber supply forecast, using a different method of modelling shelterwood in an attempt to more accurately reflect management assumptions for shelterwood harvesting systems. In effect, this forecast projected different harvest contributions from even-aged and uneven-aged stands compared to the base case. This is discussed below, under "Alternative harvest flows".

For TFL 8, the base case projected an initial harvest rate of 145 000 cubic metres per year for four decades, stepping down to 132 000 cubic metres per year for one decade, and then to the long-term harvest level of 128 000 cubic metres per year at the start of the sixth decade.

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

The *Forest Act*, section 8 (7)

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

(a) the rate of timber production that may be sustained on the area, taking into account

(i) the composition of the forest and its expected rate of growth on the area

Forest land base contributing to timber harvest

- *general comments*

The total area of TFL 8 is 77 664 hectares. Non-forest areas account for approximately 3425 hectares (4 percent) of the total area. As part of the process used to define the timber harvesting land base—i.e., the land base estimated to be economically and biologically available for harvesting—a series of area deductions were made from the productive forest. These deductions take into account factors such as environmental sensitivity and the presence of deciduous stands and riparian areas, which may render an area unsuitable to harvest for economic or ecological reasons. In reviewing this process I am aware that some areas may have more than one classification; e.g., environmentally sensitive areas may also lie in riparian areas. Hence, the figure shown for a given category in the land base table in the timber supply analysis or mentioned in the AAC rationale does not necessarily reflect the total area with that classification; much of it may have been deducted earlier for other reasons. The area deduction factors are described in more detail below.

- *economic and physical operability*

The timber harvesting land base, as reflected in the base case, is 64 658 hectares or approximately 83 percent of the total TFL area. The licensee assumed that the entire TFL is accessible for timber harvesting except where limited for consideration of other resources. After completing a field examination of the TFL, I concur with the licensee's and BC Ministry of Forests' (BCFS) conclusions regarding operability.

- *estimates for roads, trails, and landings*

In the adjacent Boundary TSA, to account for existing roads, trails and landings not represented in the inventory, a 5 percent deduction was applied to the productive forest area in stands less than 61 years old. The licensee intended to apply the same percentage reduction in calculating the roaded area for TFL 8, which would have amounted to 923 hectares. However, in the

analysis only 783 hectares were deducted, amounting to 4.4 percent of stands less than 61 years old.

The lower deduction resulted because the land base to which the 5 percent was applied in calculating the area for existing roads, trails and landings inadvertently excluded 4040 hectares of not-satisfactorily restocked (NSR) area. The smaller area reduction is equivalent to 4.4 percent.

For future roads, trails and landings, the licensee applied a 4.5 percent reduction (2158 hectares) to the area in stands currently more than 60 years old. This reduction was applied in year 100, while in practice road development takes place gradually as stands are accessed and harvested. While I would prefer a modelling method for future road reductions that more closely reflects actual operations, I do not expect significant differences to timber supply in this case using either method.

I recognize that the best available related information was used; however, for future analyses I expect an estimate for roads, trails and landings specific to the TFL, rather than data derived from the Boundary TSA. Because the uncertainty affecting both existing and future roads will have long-term rather than short-term implications, and the deductions applied are reasonable for the purposes of this determination, I have made no further adjustments to the assumptions for roads, trails and landings.

- *low sites*

In the timber supply analysis, 939 hectares of sites with low productivity were deducted from the timber harvesting land base.

In identifying these low productivity sites, the licensee used site index classes based on older site curves instead of basing them on current site curves and associated site classes. As a result, some stands may be assigned to incorrect site classes. However, the ultimate effect on the amount of area to be deducted is not certain since individual stands could be assigned to the correct site class or to an incorrect one that is either more or less productive.

The area identified as low site productivity in the analysis could be either under- or overestimated, however, the area affected is relatively small. I do not consider this uncertainty to introduce a significant risk to timber supply, in particular in the short term, and I have made no adjustment for this factor in this determination. Nonetheless, for the next determination I expect the licensee to use current site index assignments to determine areas of low productivity for deduction in the timber supply analysis.

- *deciduous (broadleaf) stands*

In the base case, all leading-deciduous stands were deducted from the timber harvesting land base with the exception of some minor deciduous volumes found in coniferous-leading stands. These minor volumes were included in the harvest forecast although in practice the deciduous trees are not usually harvested. For the last twenty years the licensee's management practice has been to reserve all deciduous trees in harvested areas to provide wildlife habitat. The licensee's records show that these volumes are less than one percent of the total contributing inventory.

In reviewing the contribution of the deciduous volumes, I have examined a sensitivity analysis which shows that if existing and regenerated stand volumes had been overestimated by 10 percent, there would be no impact in the short term. I am satisfied that deducting the minor deciduous volume in the base case would have a negligible effect. However, I note that there is a potential to utilize more fully the deciduous resource, given increasing trends throughout the province. I suggest further review of alternative strategies applicable to the management of deciduous species. For the purposes of this determination, I have made no adjustments to the assumptions for deciduous volumes.

- *non-merchantable and non-commercial forest types*

In the analysis, 4801 hectares were deducted from the productive forest land base to account for areas occupied by timber stands of low volume or by non-merchantable species, or by stands of insufficient height or with overly dense stocking. A further 113 hectares of non-commercial brush were deducted. I have reviewed these factors and consider them to represent current practices and therefore to be appropriate for this determination.

- *age of inventory*

The most recent complete inventory of TFL 8 was prepared by Timberline Forest Inventory Consultants Ltd. over a two-year period ending in 1995. An inventory audit is planned for 1998 which will examine forest classification and provide a quantitative assessment of the accuracy of volume predictions based on the inventory. The findings will be considered and incorporated in the next analysis and AAC determination for TFL 8.

I note that the inventory has been kept up to date and I accept the data as the best available information and suitable for the purposes of this determination.

- *species profile*

Stands dominated by Douglas-fir cover 49.7 percent of the timber harvesting land base. Lodgepole pine is the next most prevalent species, in pure, mixed and dense stands, totalling 35.9 percent of the timber harvesting land base, followed by spruce (14.1 percent), with minimal quantities of redcedar and other species (0.3 percent).

- *age class distribution*

Over half (approximately 56 percent) of the timber harvesting land base is covered by stands more than 100 years old, 49 percent by stands more than 120 years old, 45 percent by stands more than 140 years old, and 7 percent by stands more than 250 years old. Approximately 20 percent of the timber harvesting land base is covered by stands less than 21 years old. The abundance of higher volume older stands provides for short- to mid-term harvest levels above the long-term harvest level.

- *volume estimates for existing stands*

Volumes estimates for existing natural stands over 11 years old were derived using the Variable Density Yield Projection (VDYP) model. Modified VDYP yields were applied to reflect shelterwood management. VDYP is based on information gathered from a large number of sample plots throughout the province, and is generally accepted in B.C. as an adequate model for projecting volumes in existing natural stands. As a general rule in making AAC determinations, and in the absence of statistically valid contradictory evidence for a particular area, I rely on VDYP estimates for existing natural stands.

I note that an inventory audit is planned for 1997-1998 which will examine volume estimates for existing stands. I will consider the inventory audit results in my next determination.

<u>Expected rate of growth</u>

- *site productivity estimates*

The productivity of a site determines how quickly trees will grow and therefore affects: the time seedlings will take to reach green-up; the volume of timber that will grow in regenerated stands; and the time required for stands to reach a merchantable size or harvestable age. Site index is a measure of site productivity and is based on the relationship between tree heights and ages in forest stands. It is commonly expressed in terms of expected tree height at 50 years and used to project stand volumes.

For the licensee's analysis, inventory site indexes were assigned using BCFS methods. However, BCFS Research Branch and the licensee consider the site indexes for some stands to underestimate actual site productivity. The most accurate measurements of site productivity

come from stands between 30 and 150 years old—34 percent of the timber harvesting land base within TFL 8. Outside that range the estimates are believed to be less reliable due to variables affecting growth, such as stocking density, competition from other vegetation and top damage.

The licensee is currently studying site productivity estimates. Results for lodgepole pine and spruce from other site productivity studies undertaken by the BCFS are very encouraging for timber supply, particularly in the long term. As discussed below, under "Reasons for decision" I have considered the likelihood that site productivity has been underestimated and could increase the estimates of long-term timber supply.

- *volume estimates for uneven-aged regenerated stands*

In the licensee analysis, a shelterwood silviculture system was modelled to reflect a number of different uneven-aged silvicultural systems: seed tree, shelterwood, and selection systems.

In 1997, BCFS staff conducted a review of volume projections and assumptions used by the licensee for uneven-aged (shelterwood) stands. The review found some concerns regarding both the volume projections and the modelling methods used in the base case.

In the base case, assumptions for the shelterwood area were planned to reflect three harvesting entries to occur at 30-year intervals, removing only portions of the standing volume at each entry (50 percent for the first entry, 35 percent for the second entry and 41 percent for the final entry). However, the data structure applied in the model inadvertently led to a substantial amount of older stands in the shelterwood area being modelled as clearcut harvesting (even-aged management). In addition—on all shelterwood stands—total volumes per hectare harvested over three harvesting entries was planned to be approximately 87 percent of the equivalent clearcut volume at the time of final harvesting entry. However, the model incorrectly harvested 100 percent of the volume over the three entries.

In contrast, some of the modelling methods used underestimated volumes harvested from shelterwood stands, particularly in the long term. Three harvesting entries were planned to occur over a 60-year period. However, in the base case, for the younger existing stands and for all regenerated stands, the three entries were modelled to occur over a 140-year period.

The base case projects an initial harvest level of 145 000 cubic metres per year which is maintained for 40 years before declining to the long-term harvest level. The portion of the timber supply attributable to shelterwood in the first decade is approximately 63 000 cubic metres per year, declining to approximately 24 000 cubic metres per year for the subsequent 90 years, then to a level that fluctuates below 24 000 cubic metres per year for the remainder of the projected planning period.

After reviewing the modelling methods applied to shelterwood stands there is some uncertainty about the projections attributable to these stands. To examine the magnitude of the potential

impact to the base case, I have examined an alternative harvest flow which shows that if there were no contribution from shelterwood stands, the harvest level projected in the base case could still be maintained in the short and medium term.

In addition the licensee provided a harvest forecast with shelterwood volumes for stands older than age 250 reduced by 50 percent and this had no impact on the short- and medium-term timber supply.

Although the base case assumed a higher contribution from older stands in the shelterwood harvesting area than was intended, the 20-year plan demonstrates that there is more than adequate spatial feasibility to support this contribution over the next 20 years.

Volume estimates from uneven-aged silvicultural systems are currently being developed provincially, and I expect better information will be available in the next five to ten years. Due to the flexibility in short-term supply shown by the sensitivity analysis, the alternative harvest flow and the 20-year plan, for this determination I accept the shelterwood harvest level as modelled in the base case.

- *volume estimates for even-aged regenerated stands*

Volume estimates for regenerated stands were derived using: for even-aged managed areas, the Table Interpolation Program for Stand Yields (TIPSY) growth and yield model; and for uneven-aged (shelterwood) managed areas, VDYP. Existing stands less than 11 years old, all stands regenerated after future harvesting and all spaced stands between 11 and 30 years old are assumed to be managed.

The licensee used two sets of TIPSY yield tables—one for naturally-regenerated stands and one for planted stands. All yield tables were reviewed and approved by BCFS Research Branch staff for use in the analysis.

Operational Adjustment Factors (OAFs) are applied to TIPSY yield predictions to account for the loss of timber productivity due to such factors as openings in stands (OAF1), as well as age-dependent losses to factors such as insects, disease and decay which can affect waste and breakage (OAF2). For Douglas-fir stands on TFL 8, OAF1 was estimated as 15 percent, and OAF2 as 10 percent. For all other species the licensee assigned a value of 15 percent for OAF1 and 5 percent for OAF2. Research Branch staff have reviewed and approved all assigned OAFs and suggest the upwards adjustment of OAF2 factors for Douglas-firs reflects a prudent, cautious approach.

As noted above, under *"site productivity estimates",* yield estimates for even-aged regenerated stands may be somewhat underestimated, but this uncertainty in regenerated stand yields would only affect medium- and long-term timber supply. Having evaluated the assumptions and

methodology for projected regenerated stand volumes, I consider the volumes applied in the analysis to be reasonable, and I will accept them for the purposes of this determination.

- *minimum harvestable ages*

Minimum harvestable age is an estimate of the age at which a forest stand reaches a harvestable condition. Within the TFL, minimum harvestable ages range from 32 to 163 years for even-aged managed stands, and the average first entry age for shelterwood areas is 110 years. In the base case, the average projected age of stands harvested is 186 years during the first five decades, and 135 years during the fifteen decades after that.

BCFS staff state that the minimum harvestable ages used in the timber supply analysis are consistent with current practices in the TFL. I am satisfied that no adjustments are required and accept the minimum harvestable ages employed in the analysis as suitable for this determination.

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

Regeneration delay

The licensee's analysis assumed that, within two years of harvesting, the harvested areas would be reforested with a mixture of natural regeneration and planted stands. This two-year regeneration delay was assumed for all stands in the even-aged management area.

However, as stated in Management Plan No. 9, the licensee plans to reforest areas within an average of three years from the time of harvesting. The actual regeneration delays in TFL 8 are 4 years for planted areas and 7 years for naturally regenerated areas. The application of a two-year regeneration delay in the analysis was intended to reflect the licensee’s plan to reduce the delay.

Any possible underestimation of regeneration delay periods can imply longer green-up periods and a slight increase in rotation ages. A sensitivity analysis shows that if the time to achieve green-up height is increased by 5 years there is no impact in the short-term. However, the sensitivity analysis shows that an underestimation of regeneration delay represents a small downward pressure in the medium and long term.

I acknowledge the licensee's commitment to reduce the regeneration delay, but as discussed above, under "Guiding Principles," while I am prepared to accept reasonable extrapolations of current forest practices, I cannot account for future plans. Nonetheless, the intention to reduce regeneration delay does imply some optimism for future timber supplies. For this determination, this factor represents a slight overestimation of timber supply in the medium and long term, and I have considered this as discussed below, under “Reasons for decision”.

Not-satisfactorily-restocked areas

Not-satisfactorily-restocked (NSR) areas are those areas where timber has been removed through harvesting or natural causes, and where stands of suitable species and stocking density have not yet been established.

There are 3366 hectares of current NSR within TFL 8 which are planned to be satisfactorily restocked within three years. As well, there are 674 hectares of backlog NSR areas within TFL 8. These areas are predominantly small sites, only partially stocked because of adverse conditions such as high water tables, riparian vegetation or cattle grazing. The licensee expects to restock all the backlog NSR areas within ten years. BCFS district staff advise that the total NSR area within TFL 8 is actually less than was modelled in the analysis. About 800 hectares of the total area modelled is now considered satisfactorily restocked.

Although the NSR areas are planned to be restocked over the next 3 to 10 years, in the base case there were no delays scheduled and all the areas were assumed to be regenerated immediately. Not accounting for regeneration delays associated with NSR results in an unquantified overestimation of medium- and long-term timber supply as shown by the sensitivity analysis which examines increasing the time to achieve green-up by 5 years (as discussed above, under "Regeneration delay". On the other hand, the 800 hectares of recently restocked area reduces the magnitude of the overestimation of timber supply in the medium and long term.

Although, there are some concerns about the assumptions applied to account for NSR, the sensitivity analysis shows that this uncertainty relates to future harvest levels; in the short term there is little risk to timber supplies. Therefore, I have made no adjustments for this factor in this determination.

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

Silvicultural Systems

Silvicultural systems applied in TFL 8 include: clearcutting, seed tree, shelterwood, small patch cut, group selection and single tree selection. The licensee is planning to increase the use of non-clearcut systems in response to meeting objectives for biodiversity, adjacency and green-up, and to the *West Kootenay-Boundary Land Use Plan* (see below, under "*West Kootenay-Boundary Land Use Plan"*).

- *juvenile spacing*

In the licensee analysis, incremental juvenile spacing is assumed to apply to 3 229 hectares of younger stands between 11 to 30 years old. As a result, volume estimates and minimum harvestable ages were adjusted to reflect this treatment. BCFS staff and the licensee state that the assumptions for incremental juvenile spacing reflect current practices. I am satisfied that these assumptions reflect current practice and have therefore made no adjustments for this determination.

(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 standards

The standard of timber utilization defines the species, dimensions and quality of trees that must be removed from an area during harvesting operations. The utilization standards are incorporated into the analysis to estimate minimum merchantable stand volume. The base case reflects current utilization standards for harvesting and removal: a 10-centimetre minimum top diameter for all species, and a 17.5-centimetre minimum diameter for all species, except for lodgepole pine which has a 12.5-centimetre minimum diameter at a height of 1.3 metres. Stump height must not exceed 30 centimetres for all species.

I am satisfied with the utilization standards applied in the base case, and accept them for use in this determination.

Decay, waste and breakage factors

Pope and Talbot's timber supply analysis used the standard Metric Diameter Decay, Waste and Breakage factors for Kettle PSYU, obtained from Resources Inventory Branch, and applied these to volume estimate for existing unmanaged stands. I accept the factors and find them suitable for use in this determination. As discussed under "*volume estimates for regenerated stands"* above, operational adjustment factors were applied to regenerated stand volume estimates in part to account for losses of timber to decay, waste and breakage. These estimates constitute the best available information and I accept them for use in 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 resources management (IRM) objectives

The BCFS 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 that 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 for various forest resources and values affect the timber supply must be considered in AAC determinations.

- *non-timber resource inventories and assessments*

Non-timber resource inventories for TFL 8 for visual landscape, recreation and environmentally sensitive areas (ESAs) were completed between 1993 and 1995, and approved by BCFS staff. Draft maps of potential deer winter range in the Boundary Forest District, including TFL 8, were developed by the Ministry of Environment, Lands and Parks (MELP) in 1994, and are being used as a guide in forest development planning. These inventories were used in developing the data assumptions for the timber supply analysis as further discussed below under the appropriate sections.

- *sensitive soils*

Environmentally sensitive soils identified in the TFL are classified as either extremely fragile and unstable, or as moderately unstable and sensitive to disturbance.

In the base case analysis, 100 percent of each area with extremely fragile or unstable soils, and 40 percent of each area with moderately sensitive soils was deducted when determining the timber harvesting land base. In addition, 40, 80 or 100 percent of each ESA classified as sensitive due to combined soil and regeneration considerations was deducted, depending on the degree of sensitivity. Overall, 1604 hectares were deducted from the total productive forest to account for ESAs. These deductions were applied based on recommendations from the district staff. I find the reductions reasonable and have made no further adjustments.

- *archaeological sites and cultural heritage resources*

An archaeological overview assessment has not been completed but is planned for 1997 for the Boundary Forest District including TFL 8. There are seven cultural heritage sites located near or within the TFL. At this time, I have no information to suggest whether or to what extent timber supply in the TFL may be affected by archaeological, historical, or heritage values. I expect that there will be better information for the next determination. If the outcome of the pending

overview assessment involves the exclusion of archaeological sites, the impact on timber supply will be considered in future AAC determinations.

- *recreation*

Using BCFS recreation standards, the licensee completed a recreation and landscape inventory in December 1995 to assist in the development of recreation management objectives and strategies for Management Plan No. 9.

There are numerous recreation opportunities on TFL 8, including hunting, hiking and boating. The licensee has made a commitment to evaluate the need for development of a recreation plan during the term of MP No.9. I have reviewed the recreation information, and I am satisfied that the licensee has taken recreation concerns into account appropriately for the purposes of this determination.

- *wildlife*

TFL 8 provides habitat for a number of regionally significant large mammal species. Their habitat requirements are taken into account in the analysis by a combination of areas removed from the timber harvesting land base, such as non-commercial cover, ESAs, low sites, leading-deciduous areas, non-merchantable and riparian habitat (11.9 percent of the total productive forest), and by that part of the timber harvesting land base within the shelterwood zone (22 percent), and within the wildlife zone (5 percent).

Draft maps of potential deer winter range in the Boundary Forest District, including TFL 8, were developed by the Ministry of Environment, Lands and Parks in 1994, and are being used as a guide in forest development planning. MELP maintains that biodiversity and wildlife habitat has not been given sufficient emphasis in the licensee's Management Plan. However, as discussed in the preceding paragraph, the licensee considers wildlife requirements to be met within areas outside of the timber harvesting land base, by the shelterwood management zone, and by forest cover constraints within the various other zones.

One sensitivity analysis examined the impact of uncertainty regarding wildlife management by doubling the size of the wildlife zone. Another sensitivity analysis examined MELP's proposal to increase forest cover requirements in Douglas-fir and larch stands. Both sensitivity analyses show no impact to timber supply in the short term when constraints are increased.

I am aware both of the high wildlife values in the area and of the licensee's commitment over the years to forest practices which accommodate wildlife values. I am also mindful of MELP's position on the likelihood of further constraints on timber supply.

For the next determination, I expect further guidance regarding wildlife management as a result of implementing the *West Kootenay-Boundary Land Use Plan*. I encourage the licensee and

MELP staff to work cooperatively to secure resources to evaluate and model MELP's wildlife habitat and old-growth concerns—once these are clearly identified and detailed—before the next determination, and to establish clearly defined wildlife management objectives. Given the constraints applied in the analysis and the stability of the timber supply, I accept the base case assumptions regarding wildlife for this determination.

- *riparian areas*

To protect and manage riparian habitat, the Forest Practices Code requires the establishment of buffers—riparian reserve areas and riparian management zones—along watercourses and lakeshores.

The licensee estimated reserve areas along streams using Forest Practices Code riparian classes, the length of each class of watercourse being multiplied by the appropriate reserve width to estimate area. For the purposes of the timber supply analysis, six stream classes (S1-S6) consistent with the *Riparian Management Area Guidebook* were used to estimate reserve width. However, assignments of riparian classes are preliminary only and still require field verification to meet Code requirements. Preliminary estimates of fish habitat value also need field verification to meet Code requirements.

For the timber supply analysis, a total of 980 hectares (1.3 percent of the productive land base) of reserve area was deducted from the timber harvesting land base. In reviewing the percent reduction applied, I find there is no provision made in the analysis to account for the riparian management zones.

I note that the assessment of the reserve classes is preliminary, and hence the timber supply implications of requirements for riparian habitat 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 more than assumed in the analysis, and I expect this to be further refined in future timber supply analyses. After considering this matter, I have concluded that the assumptions for riparian management zones represent an unquantified downward influence on timber supply in the short- to long-term and I have considered this as discussed below, under "Reasons for decision."

I expect inventory information to be improved, riparian class assignments to be verified by field inspection, and required management practices to be refined for the next analysis and determination.

- *biodiversity*

Biological diversity, or biodiversity, refers to the full range of living organisms in all their forms and levels of organization, and includes the diversity of genes, species and ecosystems, and the evolutionary and functional processes that link them. The Forest Practices Code requires planning and management for biodiversity in a given management unit, at a stand and landscape level.

- *stand-level biodiversity*

Provisions for stand-level biodiversity ensure maintenance of structural diversity and habitat for wildlife through retention of wildlife tree patches, leave trees and coarse woody debris.

Pope and Talbot considers that requirements for stand-level biodiversity have been adequately factored into the analysis through land base reductions and shelterwood management, and that no further area or volume reductions are necessary to meet the Forest Practices Code biodiversity requirements. Pope and Talbot submits that even prior to the Code they have maintained forest practices which are comparable to stand-level biodiversity requirements—leaving individual seed trees and tree stubs, reserving deciduous species (individual trees or in clumps), and maintaining both coarse woody debris and wildlife tree patches. The licensee notes that the riparian reserve reduction of 980 hectares also contributes to various aspects of biodiversity.

Whether the impact on timber supply—from implementing requirements for stand-level biodiversity—is fully accounted for by the existing assumptions in the analysis is uncertain, but assessments of the impact, conducted on a regional scale, indicate that there is an additional downward influence on the regional timber supply of about 1.5 percent. I have considered this uncertainty as I have discussed further in the "Reasons for decision". I expect that as a result of implementing the *West Kootenay-Boundary Land Use Plan* there will be more clarity regarding this factor for my next determination.

- *landscape-level biodiversity*

Landscape-level biodiversity objectives involve ensuring that forests contain a full range of seral stages (forests at different stages of development), old-growth patches, and forested corridors (i.e., forest ecosystem networks or FENs). Landscape-level biodiversity objectives are generally based on emphasis options and applied to landscape units. In TFL 8, neither biodiversity emphasis options nor landscape units have yet been established.

The licensee states that future management practices will contribute significantly to landscape-level biodiversity throughout all four Management Zones, whether in the course of meeting visual quality objectives, providing winter range habitat and wildlife corridors, or in observing the retentions and reserves already in place. Nonetheless, no area or volume reductions were

factored into the analysis to account for landscape-level biodiversity. Sensitivity analysis indicates a small impact to timber supply in the long term from the retention of old growth.

For this determination, as indicated by the sensitivity analysis, I do not consider the uncertainty of landscape-level biodiversity requirements for TFL 8 to introduce a significant risk to the short-term timber supply. The implementation of the *West Kootenay-Boundary Land Use Plan* will bring more certainty to developing plans and meeting objectives for landscape-level biodiversity and this matter will be reviewed closely in the next AAC determination.

- *adjacency and green-up*

Current harvesting practices limit the size and shape of cutblocks, and prescribe minimum green-up conditions that must be met before adjacent areas may be harvested. Green-up time refers to the period following harvesting needed for a regenerating stand to reach a specified height. Adjacency and green-up requirements ensure the provision and distribution of harvested areas and retained forest cover across the landscape.

In the even-aged management areas, the licensee assumed a three-pass harvesting system. In the analysis, at least 67 percent of the IRM zone must be covered by trees at least 3 metres tall at any time, at least 75 percent of the visually sensitive management zone by trees at least 4 metres tall at any time, and at least 67 percent of the wildlife management zone by trees at least 10 metres tall at any time.

A sensitivity analysis, assuming an increase to the green-up age of 5 years in the even-aged management zone, shows no impact in the short term. However, the sensitivity analysis shows that an underestimation of green-up age represents a small downward pressure in the medium and long term.

No specific constraints were applied for adjacency and green-up in the uneven-aged management areas because it was assumed that uneven-age management systems would provide adequate forest cover at all times. As I have noted under "*volume estimates for uneven-aged regenerated stands,*" 50 percent of the uneven-aged stand volume is harvested on the first entry.

As the Management Plan indicates, uneven-aged harvesting systems will increasingly be used in TFL 8. With more experience using these systems, I expect that assumptions regarding adjacency for the uneven-aged management areas will be further clarified. Nonetheless, prior to the next determination, I expect a careful evaluation of, and quantification by system and species, of the total amount of area that will be subject to uneven-aged harvesting systems.

As I have discussed above, under "*volume estimates for uneven-aged stands*", I have examined an alternative harvest flow which shows that if there were no contribution from shelterwood stands, the harvest level projected in the base case could still be maintained in the short and

medium term. Having reviewed the data and assumptions, I accept the adjacency and green-up requirements as modelled for this determination.

- *visual quality objectives*

The *Forest Practices Code of British Columbia Act* specifies that one of the forest resources to be managed in B.C. is the recreation resource, which includes a "scenic or wilderness feature or setting that has recreational significance or value." In order to manage visual resource features, the Code provides for the identification of scenic areas and the opportunity to establish Visual Quality Objectives (VQOs). VQOs take into account both physical and social factors — including visual sensitivity ratings based on topography, slope and other biophysical considerations, and the number of viewers and their perceptions—and provide recommended visual quality objectives (VQOs) for those visually sensitive areas. The VQOs limit the amount of visible disturbance that is acceptable in each VQO class.

To ensure that visual resources are managed in the context of the Crown's broader social and economic objectives, a balance must be maintained between the protection of visual resources and the maintenance of timber supply. The Crown's objectives are explained in the Minister of Forests' memo, dated February 26, 1996 (attached).

In visually sensitive areas, timber harvesting, road construction and other forest practices are limited. These limitations are expressed in terms of forest cover requirements which relate to "visually effective green-up" (i.e., the height at which regeneration is perceived by the public as visually satisfactory), and to the maximum allowable percentage of a landscape that is permitted to be shorter than the prescribed minimum green-up height at any time.

In TFL 8, a forest landscape features inventory, which mapped and classified all the visual features and scenic areas visible from viewpoints along Highways 3 and 33, identified 2687 hectares (4 percent) of the timber harvesting land base as visually sensitive. The base case, however, did not reflect this degree of detail. All areas of visual sensitivity in the base case were aggregated into two zones, one for each TFL block, and a forest cover requirement was applied which allows a maximum of 25 percent of the area to support stands less than four metres tall at any time.

The majority of the visually sensitive areas are classified as modification and partial retention VQOs for which more stringent forest cover requirements apply than those modelled in the base case. Timber supply analysis information shows that some flexibility exists to increase the requirements assumed in base case on some areas without affecting the short-term timber supply. In considering the uncertainty that visual quality assumptions introduce to timber supply, I note the area affected is small and that there is sufficient flexibility in the short-term to accommodate any potential risk to timber supply. Nonetheless, there is some potential for impacts in the medium to long term and I considered this below, as discussed under “Reasons for decision”. I expect the next timber supply analysis to more accurately account for VQOs.

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

Twenty-year plan

The current 20-year plan, covering the years 1994 to 2013, is based on terms of reference approved by the Boundary District Manager. The main purpose of the plan is to demonstrate whether or not the harvests projected in the base case over the next 20 years are spatially feasible, taking into account constraining factors such as Forest Practices Code requirements, timber harvesting land base deductions and the volume assignments per hectare on each entry.

The plan indicates that at the current AAC there is sufficient flexibility in the spatial distribution of the cutblocks to integrate the needs of other resources and to support the proposed harvest level for the 20-year period.

West Kootenay-Boundary Land Use Plan

The *West Kootenay-Boundary Land Use Plan* was published and released in March 1995. The plan made a number of recommendations regarding the Integrated Management Zone and Enhanced Resource Development Zone which cover TFL 8. More recently, on July 8, 1997, the *Kootenay-Boundary Land Use Plan Implementation Strategy* was announced.

The strategy outlines resource management guidelines and objectives for the planning area. It has also set a regional timber target of 4.7 to 5.2 million cubic metres per year. The targets have been established as timber supply goals for the Kootenay-Boundary planning area after factoring in potential impacts of the land-use plan.

The strategy encourages the application of alternative harvesting systems, and I note that the licensee plans to increase the use of these systems consistent with the land-use plan. Also, the plan endorses the proposal that, if deemed appropriate by the district manager, the general green-up height (outside of scenic areas and community watersheds) will be changed from three metres to two metres. The change in green-up height could increase timber supply or offset future declines in timber supply; however, given that the implementation strategy was only recently released, any changes to forest practices were not explicitly modelled in the licensee's analysis. While I am mindful of the announcement, there are no protected areas affecting this unit, and I am satisfied that the analysis adequately reflects the timber supply for the purposes of this determination. The land-use plan will be implemented over the next few years and until implications to timber supply are better known, as discussed in "Guiding principles for AAC determinations," I am unable to speculate about the possible timber supply impacts for TFL 8. Future determinations for TFL 8 will reflect the ongoing implementation of the plan.

If, as a result of implementing the resource management guidelines and objectives, it can be demonstrated that timber supply has been significantly affected, then I am prepared to revisit this determination at an earlier date than the maximum five years permitted by the *Forest Act*.

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

Alternative harvest flows

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 large volumes of older wood permits harvest levels above long-term levels without jeopardizing future timber supply. In keeping with the objectives of good forest stewardship, AACs in British Columbia have been, and continue to be, determined to ensure that current and medium-term harvest levels will be compatible with a smooth transition toward the usually (but not always) lower long-term harvest level. Thus, timber supply should remain sufficiently stable so that there will be no inordinately adverse impact on current or future generations. To achieve this the AAC determined must not be so high as to cause later disruptive shortfalls in supply nor so low as to cause immediate social and economic impacts that are unnecessary to maintain forest productivity and future harvest stability.

A sensitivity analysis, which assumed reduced volumes being harvested from even-aged management (clearcutting) and increased volumes being harvested from uneven-aged management (shelterwood), showed that an initial harvest level of 145 000 cubic metres per year could be maintained for seven decades, stepping down to 132 000 cubic metres per year for one decade, and then to a long-term level of 128 000 cubic metres per year at the start of the ninth decade.

An alternative harvest forecast for TFL 8, applying the same land base, timber yield and management assumptions that were used in the base case, shows an initial harvest level of 222 000 cubic metres per year for one decade, declining by slightly more than 10 percent per decade for six decades to the long-term harvest level of 118 000 cubic metres per year. This alternative forecast shows that a higher initial harvest level is possible if lower levels than projected in the base are accepted in the long term. Pope and Talbot contends that it is not recommending that the current AAC (145 000 cubic metres per year) be increased because of its concerns about possible future changes in regulatory policy and their potential effect on timber supply. I consider, however, that the base case harvest flow provides adequate flexibility to deal with risks and uncertainties that may arise in the future.

For this determination, I accept the base case forecast as a suitable reference on which to base my determination.

Community dependence on the forest industry

In the Grand Forks area, which has a reasonably high dependence on forest resources and the associated forest industry, 35 percent of the basic income in the area is derived from the forest industry. Three of the four largest employers in the area are involved in forestry-related manufacturing.

BCFS, Economics and Trade Branch, states that the average employment associated with the current AAC is 170 to 195 person-years, and that provincial forestry revenues from the TFL totalled approximately $4 861 000 in 1996.

I am aware of both the level of dependence of the local communities on the forest industry and the full implications of any change in harvest level.

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

Timber processing facilities

Pope and Talbot currently operates two sawmills, one located in Grand Forks and the other in Midway. Total annual wood consumption capacity is about 960 000 cubic metres. In addition to the wood supply from the TFL, the licensee purchases up to 387 000 cubic metres per year from private suppliers to maintain both sawmills on a two-shift basis.

(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 has 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 8. 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 I 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 I consider partitioned AACs. I have also considered the Minister's memorandum dated February 26, 1996, which suggests that the attainment of visual quality objectives be innovatively achieved and carefully balanced with economic impacts.

I am mindful of the varying impact of different harvest levels (see above, under Alternative harvest flows). Regarding commercial thinning, the licensee is already utilizing a shelterwood harvesting system. Therefore, I have not considered any further effects on timber supply from

commercial thinning in this determination. With respect to harvesting in previously uneconomic areas, there are few opportunities as most of the TFL is considered economically accessible. As well, I have considered visual quality objectives and find there are no offsetting opportunities for timber supply at this time.

Local objectives

The Minister's letter suggests that the Chief Forester should consider important social and economic objectives that may be derived from the public input in the timber supply review where these are consistent with government's broader objectives.

The licensee provided four separate opportunities for public input from the start of the process to the final submission of their proposed management plan in January, 1997.

No responses to the initial advertisement were received, but six responses to questionnaires were received. In the Management Plan, the licensee reported that some common concerns were expressed in the responses: maintenance of water quality and the importance of water as a resource; the need for more liaison and consultation with the ranching community; reduce access restrictions for recreational activities; approval of selection cutting practices; more complete utilization, and the importance of the forestry sector to the local economy.

Two submissions were received from the public in response to the licensee's draft statement of management of objectives, options and procedures. One, from the BC Woodlot Association, expressed concern that the licensee should do more to improve non-timber resources, maintain wildlife inventories, complete resource plans for community watersheds and improve co-operation and communication with local ranchers. The other, from the Grand Forks Chamber of Commerce, supported the Management Plan for TFL 8. I have considered the input received and I am mindful of the views which were brought forward.

First Nations

The Osoyoos, Penticton, Westbank, Okanagan, Spallumcheen and Sinixt/Arrow Lake First Nations bands, all of whom are consulted with regard to forest management activities within the District, have identified traditional territory in the vicinity of TFL 8. The Westbank band has also registered a land claim which includes the northern portion of the Boundary Forest District, covering part of TFL 8. The outcome of treaty negotiations or their possible impact on the TFL is unknown.

No archaeological sites or evidence of native settlements within TFL 8 have been reported or discovered. An archaeological overview assessment—see above under "*archaeological sites and cultural heritage resources*"—is planned for the Forest District (including the TFL) during 1997. When the assessment has been completed or when treaty negotiations conclude, the results can be reflected in future determinations to the extent that they affect timber supply.

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

Non-recoverable losses

Non-recoverable losses are timber volumes that are destroyed or damaged by natural causes such as wind, fire, insects or disease and not recovered through salvaging operations. The licensee has a fairly extensive salvage program aimed at recovering losses from Mountain Pine Beetle infestations and windthrow damage.

I acknowledge that there is considerable uncertainty surrounding the estimates of such losses generally in the province, and that empirical data on non-recoverable losses specific to TFL 8 is not presently available. Until better data is available, Pope and Talbot has adopted an approach of pro-rating by area the reduction used in the adjoining Boundary TSA for insects, disease, fire, wildlife trees, wind and seed trees. This resulted in an estimated annual loss of 8467 cubic metres. It is noted that these estimated losses are in addition to those accounted for in the OAFs used in TIPSY yield predictions as noted above, under "*volume estimates for regenerated stands*."

I find this to be a reasonable approach, recognizing that it is based on review of information in an adjacent area with similar features. Nonetheless, I request that the licensee work to compile information specific to this TFL that will assist in future analyses and determinations. For this determination, as the deductions seem reasonable, I have made no further adjustments for this factor.

Reasons for decision

In reaching my decision on an AAC for TFL 8, I have considered all of the factors presented above and have reasoned as follows:

The base case indicates that the current harvest level of 145 000 cubic metres per year could be maintained for four decades, declining to 132 000 cubic metres per year at the start of the fifth decade and then to 128 000 cubic metres per year at the start of the sixth decade.

In reviewing the information for this determination, I have identified a number of factors indicating that the actual timber supply in the TFL may be greater or less than that projected in the base case. For this determination, the factors influence timber supply by adding an element of risk or uncertainty to the decision that cannot be reliably quantified at this time.

Factors that exert an unquantifiable downward influence on the timber supply as projected in the base case in the short to long term are as follows:

- *riparian:* in the timber supply analysis, a total of 980 hectares (1.3 percent of the productive land base) of reserve area was deducted from the timber harvesting land base. In reviewing the percent reduction applied, I find there is no provision made in the analysis to account for the riparian management zones. I consider the assumptions for riparian habitat to result in an unquantifiable overestimation of the timber supply in the short to long term.

- *biodiversity:* no area or volume reductions were factored into the base case analysis to account for stand-level biodiversity. While I acknowledge the contributions to stand-level biodiversity from non-clearcut areas, I have nonetheless considered this factor as representing a downward pressure on the short- to long-term timber supply.

- *visual quality objectives:* the analysis did not reflect the degree of detail of the landscape features inventory. As a result of not explicitly accounting for actual visual quality objectives, the timber supply has likely been overestimated in the mid to long term.

There is one factor which exerts an unquantified upward influence in the mid- to long-term:

- *site productivity*: BCFS Research Branch and the licensee considers that the site productivity of some older stands has been underestimated. Site productivity affects factors such as volume estimates for regenerated stands, green-up ages and minimum harvestable ages. Accounting for increased site productivity will enhance these and thereby increase timber supply and possibly eliminate projected future declines in timber supply.

I acknowledge that there may be some uncertainty in the factors identified above, but when considered in isolation, none of the downward factors indicates a need to consider reducing the initial harvest level projected in the licensee's base case. Nevertheless, the timber supply in TFL 8 is likely somewhat less stable in the medium to long term than indicated in the base case. In order to reduce the uncertainty for future determinations I have specified a number of issues to be resolved and have outlined conditions in my approval of MP No. 9.

Some of the outstanding issues are the result of uncertainty associated with implementing the *Forest Practices Code* and the *West Kootenay-Boundary Land-Use Plan*, which primarily involve the setting of objectives—for wildlife habitat, stand- and landscape-level biodiversity, riparian areas and the resource management guidelines and prescriptions. I do not wish to speculate about implementation details and I am confident that the next AAC determination, which must occur within 5 years, will account for any new information and experience gained.

The flexibility shown by the alternative harvest flow demonstrates that the uncertainty associated with the downward influences on timber supply can be accommodated, particularly in the short term. Furthermore, I am mindful of community dependence on the forest sector in this area and specifically on the timber supply derived from TFL 8.

Over the last few years, a number of site productivity studies have been undertaken and are now complete. Results from these studies are very encouraging for timber supplies, particularly lodgepole pine and spruce, in some areas of the province. The final conclusions for TFL 8, however, are uncertain at this time until a more extensive examination has been carried out and appropriate adjustments are made to site productivity estimates. Nonetheless, I have reviewed the results of the current studies as providing a potential shift in site productivity which could possibly offset some of the downward influences and thereby increase projections of the long-term timber supply for TFL 8.

In addition to reviewing the analysis, my field examination of TFL 8 indicates that the licensee is very successfully managing the TFL area. On the harvested areas, I observed acceptable regeneration site occupancy with no obvious extensive problems in reaching a free-growing state, and a large proportion of highly productive areas with good growth rates.

From the foregoing reasoning, it is my determination that a timber harvest level that accommodates objectives for all forest resources during the next five years, that provides for requirements of the Forest Practices Code as they are currently implemented, that ensures integrated resource management objectives can be met, and that meets provincial objectives and that avoids disruptive shortfalls in future timber supply can best be achieved in this TFL at this time by maintaining the AAC at 145 000 cubic metres.

Determination

Effective September 1, 1997, the new AAC for TFL 8 will be 145 000 cubic metres, which remains unchanged from the current AAC. It includes 7250 cubic metres which is administered under the Small Business Forest Enterprise Program. This AAC will remain in effect until a new AAC is determined, which must take place within five years of this determination.

Implementation

In the period following this determination and leading to the next determination I expect the licensee to perform the following:

- Evaluate alternative strategies for managing deciduous and mixed stands.
- Re-assess and compile data specific to the TFL in respect of roads, trails and landings.
- Develop a plan for the management of landscape-level biodiversity, incorporating all relevant *West Kootenay-Boundary Land Use Plan* guidelines, boundaries, objectives and prescriptions, and including designated landscape units and biodiversity emphases.
- Test accuracy of site indexes applied in current analysis.

- Work with BC Environment staff to update non-timber resource inventories, particularly for wildlife habitat.

- Review riparian class assignments and verify by field inspection.

- Evaluate and quantify by system and species, the total amount of area that will be subject to uneven-aged harvesting systems.

- Compile data specific to the TFL for loss due to natural causes, to improve accuracy of non-recoverable loss estimates.

I also expect BCFS staff to conduct an archaeological overview assessment of TFL 8.

I expect BCFS staff and the licensee to work together on the above items and submit results and conclusions as soon as available. Should the information suggest significant changes to the timber supply situation for this TFL, I am prepared to revisit the AAC determination before expiry of the five-year period specified in the *Forest Act*.

Other requirements have been noted in my approval letter for Management Plan No. 9.

Larry Pedersen
Chief Forester
August 6, 1997

Appendix 1: Section 8 of the *Forest Act*

Section 8 of the *Forest Act* reads as follows:

Allowable annual cut

8. (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.

(2) If, after October 1, 1992, the minister

(a) makes an order under section 7 (b) respecting a timber supply area, or

(b) amends or enters into a tree farm licence to accomplish the result set out under section 39 (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.

(3) If

(a) the allowable annual cut for the tree farm licence is reduced under section 9 (3), and

(b) the chief forester subsequently determines, under subsection (1) of this section, the allowable annual cut for the tree farm licence area,

the chief forester must determine an allowable annual cut at least once every 5 years from the date the allowable annual cut under subsection (1) of this section is effective under section 9 (6).

(4) If the allowable annual cut for the tree farm licence area is reduced under section 9 (3), the chief forester is not required to make the determination under subsection (1) or (2) of this section at the times set out in subsection (1) or (2) (c) or (d), but must make that determination within one year after the chief forester determines that the holder is in compliance with section 9 (2).

(5) In determining an allowable annual cut under 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 government of British Columbia, the federal government, or both.

(6) The regional manager or district manager must determine a volume of timber to be harvested from each woodlot licence area during each year or other period of the term of the woodlot licence, according to the licence.

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

(a) the rate of timber production that may be sustained on the area, taking into account

(i) the composition of the forest and its expected rate of growth on the area,

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

(iii) 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 the chief forester's opinion, relates to the capability of the area to produce timber,

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

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

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

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

Appendix 2: BC *Ministry of Forests Act,* section 4

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

to the chief forester re: Economic and Social Objectives of the Crown.

Appendix 4: Minister of Forests memorandum of February 26, 1996

to the chief forester re: The Crown's Economic and Social Objectives Regarding Visual Resources.