MANAGEMENT OF THE FOREST RESERVES

AN INVESTMENT

IN THE FUTURE

BY

FORESTRY ADVISORY COMMITTEE
MUNICIPALITY OF NORTH COWICHAN
NOVEMBER, 1981

TO: Council, Municipality of North Cowichan
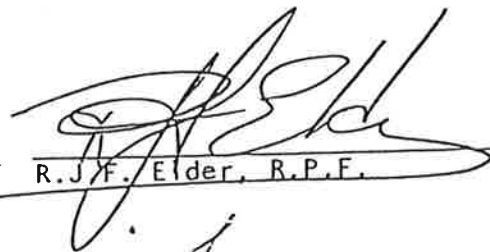
FROM: Forestry Advisory Committee

RE: MANAGEMENT OF THE MUNICIPAL FOREST RESERVES

The voluntary Forestry Advisory Committee submits herewith its final report pertaining to the management of the Municipality of North Cowichan's forest lands: "Management of the Forest Reserves - An Investment in the Future". This report is the product of the Committee's deliberations over the past seven months supplemented by the Report on Timber Inventory and Silvicultural Requirements and field examinations of stand conditions by committee members. It contains a professional assessment of the current level of management of the Forest Reserves, identifys present and future trends of revenues and other benefits being generated by current management, and provides recommendations as to how long-term increases in both revenues and non-monetary values may be achieved.

Various sections of the report outline the expected results of the current exploitation of the forest resource, and proposes specific measures aimed at providing modern forest management. Forests can be a renewable resource providing that, like farming, investments for crop establishment and culture are made according to a predetermined schedule. The long-term nature of forest management requires the development of long-term plans and the essential commitment to sustained support for such managment. Implementation of progressive management practices will not only provide for increased revenues in the near future, but will ensure that the forest resources of the Municipality are improved in both quantity and quality through time so that their financial contributions to the operation of the Municipality are available for utilization by future municipal councils.
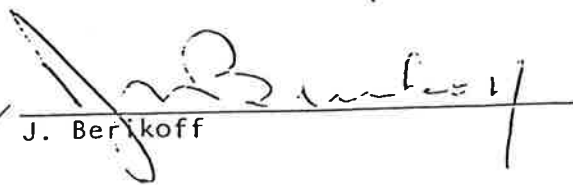
Yours truly,

D.E. McMullan, R.P.F. (Chairman)

R.J.F. Elder, R.P.F.

S.R. Higginson, P.Eng.

T. Walker

W. Schuckel, R.P.F.

J. Berikoff

K. Hart

## EXECUTIVE SUMMARY

The current management policy being applied to the 4,786 hectares of Forest Reserves will result in the progressive decline in sustainable volumes and revenues. While the current levels of cut could conceivably be maintained for about the next 20 years, the quality and productivity of the stands produced would steadily deteriorate in response to the down-grading effects of diameter limit harvesting. As a result, annual revenues by the year 2020 are expected to be $140,000 less than the 1980 level and harvest volume will be down by close to 50%. This will have serious effects on employment opportunities, wood supplies to small local mills and recreational values. In addition, present production is running only about one third of the land's potential which could easily be achieved through a basic forest management program.

The recommended forest management policies and programs are designed to significantly increase volumes harvested and revenues returned to the Municipality through time. Basic Silviculture investments are expected to permit a threefold increase in the level of harvest volumes over the present by the year 2020 yielding net revenues of $675,000* per year. Additional future investments in Intensive Silviculture would eventually generate an Allowable Cut of about 50,000 m3 by the year 2040 when net revenues should approach three quarters of a million dollars* per year.

The Municipal Forest Reserves constitute a public resource of considerable value. The level of these contributions through time is dependent upon whether or not Council continues to regard the resource, as non-renewable as evidenced by the degree by which considerable areas have been down-graded or whether the forests will in future be treated as renewable with Council approving those investments necessary to ensure attainment of that goal.

The state of the resource is such that a decision must be made now as to whether or not the resource will be managed..

*In 1982 dollars.

MANAGEMENT OF THE FOREST RESERVES
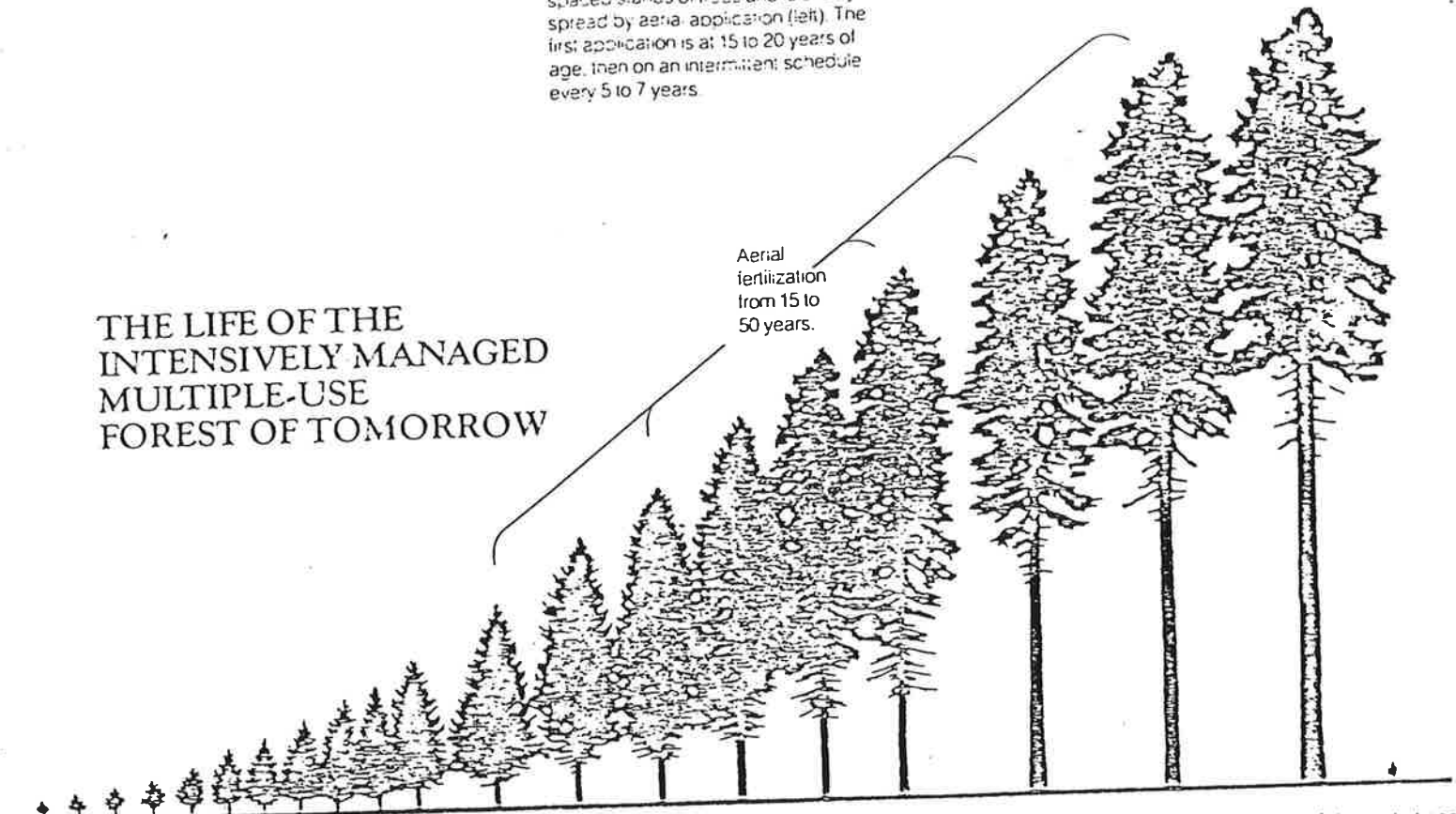
AN INVESTMENT

IN THE FUTURE


BY


FORESTRY ADVISORY COMMITTEE

MUNICIPALITY OF NORTH COWICHAN


NOVEMBER, 1981

# THE LIFE OF THE INTENSIVELY MANAGED MULTIPLE-USE FOREST OF TOMORROW

Aerial
fertilization
from 15 to
50 years.

Plant genetically improved
seedlings immediately following
harvesting 300 to 400 trees
per acre.

Juvenile spacing at age 11 to 13 years or
when trees are 25 feet high. Reduces number
of trees to 200 to 250 per acre.

Commercial thinning at age 30 to 35
years reduces number of trees to 90
to 100 per acre. A small volume of
merchantable timber is produced.

Harvest at age
55 to 60 years
and plant the
next forest.
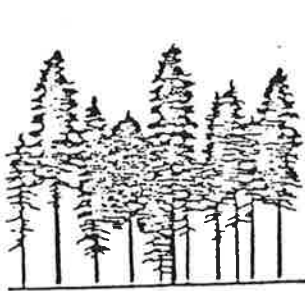
Unmanaged, naturally
seeded forest — coastal B.C.
Harvest at 80 years.
Wood produced 8,000 cu. ft./acre
Average trunk size 10" to 26".
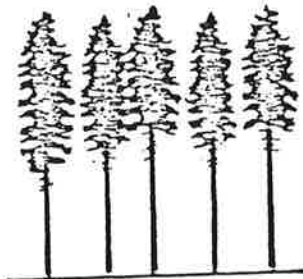
Intensively managed
planted forest — coastal B.C.
Harvest at 55 to 60 years.
Wood produced 11,000 cu. ft./acre
Average trunk size 16" to 24".

Tomorrow's target forest will be planted immediately following
harvesting with genetically improved seedlings developed in seed
orchards from plus trees. The original number of trees planted of 300
to 400 per acre will be spaced to 200 to 250 per acre at 11 to 13 years
of age or when about 25 feet tall. A few years later, the forest will be
fertilized to stimulate growth and when 30 to 35 years of age, further
thinning takes place reducing the number to 90 to 100 trees per acre.
Trees removed at this stage have commercial value which contributes
to total wood volume produced per acre. The more uniform trees will
improve logging and milling economics when harvesting occurs at
age 55 to 60.

Slices from two, 22 year old trees
(below) planted near each other in a
southern Vancouver Island forest in 1956.
The larger tree was spaced in 1966. Notice
that during the first ten years, when trees
were small and competition from
neighbouring trees was less, growth was
about the same for both. Spacing allowed
the larger tree to continue its rate of growth
while the smaller tree was retarded.

7" diameter

Cuts from
Douglas fir
trees —
both planted
1956.

11" diame
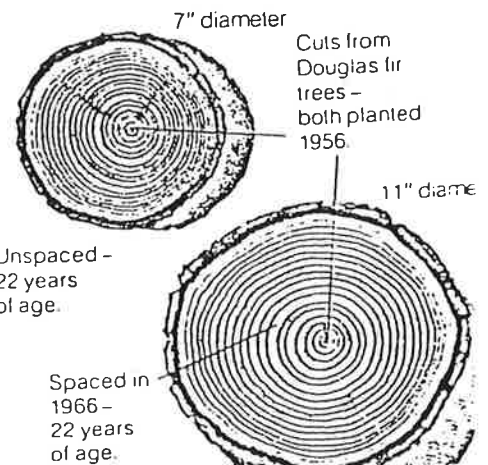
Unspaced —
22 years
of age.

Spaced in
1966 —
22 years
of age.
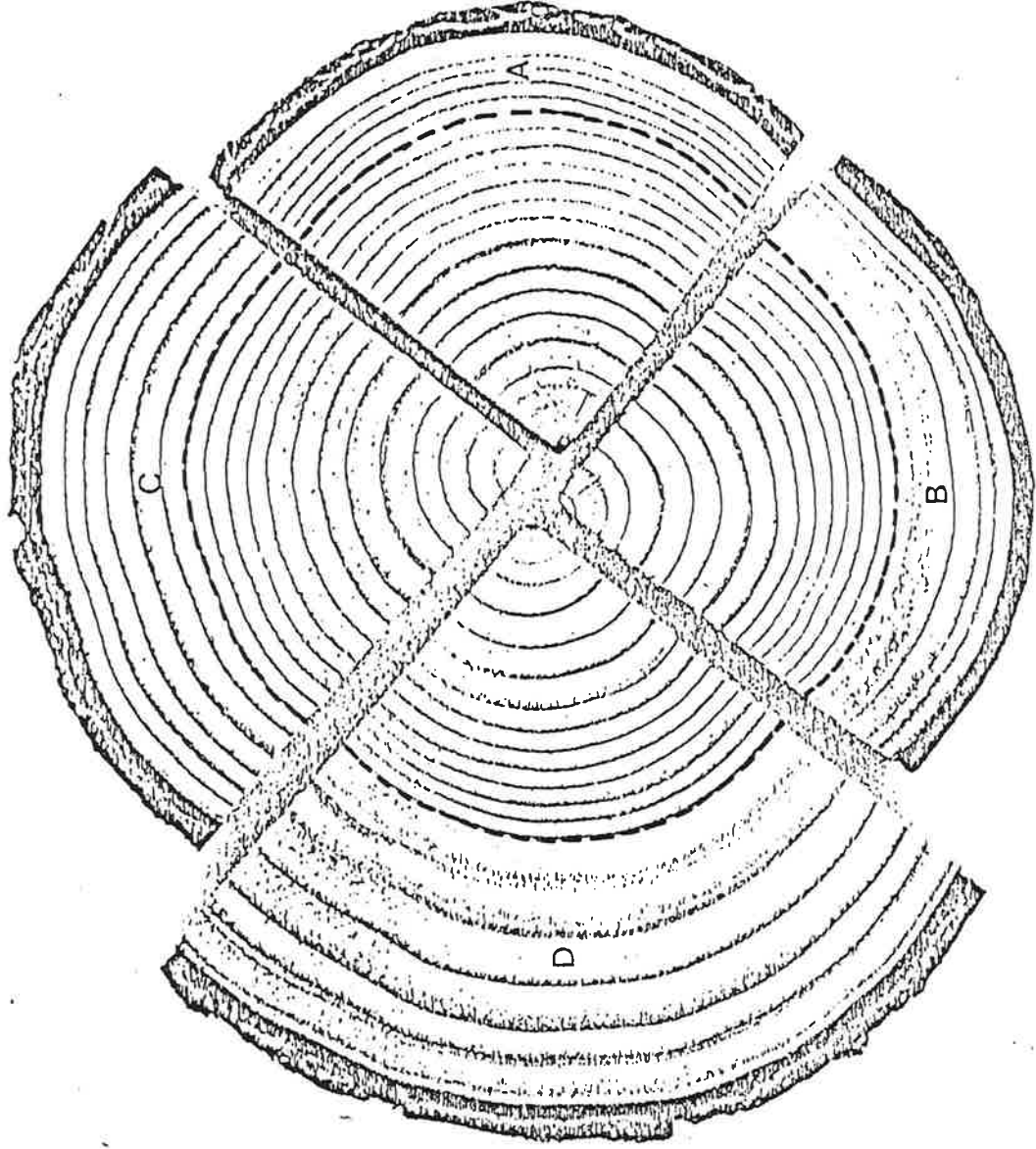
Stem sections showing 6 year growth response to various silvicultural treatments. The diameters of the trees at the time of treatment is indicated by the broken lines.

| | Average Diameter Growth Over Past 6 Years |
|---|---|
| A = Untreated Control | 9.1 cm |
| B = Response from Juvenile Spacing Only | 14.1 cm |
| C = Response from Fertilization Only | 11.1 cm |
| D = Response from a Combination of Juvenile Spacing and Fertilization | 16.7 cm |

# I N D E X

# GLOSSARY

**AAC. - Allowable Annual Cut**

The volume of wood harvested per year should, on the average over a period of years, equal the amount grown for any given management area. Fluctuations in cut should be permited within any single year in order to take advantage of market conditions. Management practices can either increase or decrease AAC.

**Basic Forestry**

Those silvicultural practices which must be undertaken in order to ensure that harvested areas are returned to a fully stocked condition counting only those species which are both adapted to the site and which will have the most future commercial value.

**Clearcutting**

A harvesting practice which is dictated by the nature of the species being harvested and the management goals of the unit. For all coastal species, production of maximum commercial returns requires that the stands be managed so that the height of all trees within the stands be approximately equal at any given point in time.

**Commercial Thinning**

A partial harvest of a stand prior to rotation age undertaken on the basis that the operation will at least break-even financially. The prime intent of the project must be to improve the commercial value of the remaining stems (final crop).

**Culmination Age**

The age at which a particular stand peaks in terms of its average annual rate of growth expressed in cubic meters per hectare per year.

**Diameter Limit Cutting**

A system of controlling harvest which permits only the harvesting of those stems beyond a certain set diameter. In the case where only the removal of the larger stems is specified (as in the existing municipal woodlot operators contract), the residual stand is continually down-graded in terms of quality, volume, species desirability, and desirable genetic qualities.

| | |
|---|---|
| Falldown | The difference in volume between the amount being grown or which could be grown and the actual or desirable rate of harvest or growth. |
| Intensive Forestry | Silvicultural practices designed to increase average annual growth rates (MAIs) and the financial returns per harvested cubic meter of volume. |
| Juvenile Spacing | An intensive forestry practice which involves the control of stocking through the cutting out of stems of undesirable quality or size. It is an absolutely essential investment if the value of the final crop is to be maximized. |
| M.A.I. - Mean (Average) Annual Increment | The average growth per hectare per year for a given stand. Maximization of merchantable MAI is the prime goal of both basic and intensive forest management. |
| Merchantable Volume | The volume grown per hectare which is produced on trees of sufficient size to enable harvesting to take place at a profit. Juvenile spacing is the technique which permits the concentration of the growth potential of a hectare on a selected number of stems of relatively large size. |
| Multiple Use Management | Management philosophy which requires that all the resources of a unit of forest land be integrated so that benefits to the owner of that land be optimized. This involves trade-offs for certain areas where two or more values may exist and may involve the designation of a portion of the unit as Single Use for the exclusive production of a single product, whether it be water, wildlife, wood or recreation and aesthetic values. |
| NSR - Not Sufficiently Restocked | Areas which have been harvested or otherwise denuded of commercial species which have not yet been fully restocked with species of maximum commercial value. |
| Professional Forester | An individual registered with the Association of B.C. Professional Foresters. Such individuals are required to adhere to a strict code of ethics and to maintain standards of work to the levels set by the Association. |

| | |
|---|---|
| Residual Stand | Trees remaining standing after a partial harvest such as a selective cut or a diameter limit cut. |
| Rotatión Age | The age at which a stand of timber is harvested. This age may be determined by the point of Culmination, by Financial considerations or by management contraints. |
| Selective Cutting | The harvest prior to rotation age of certain stems from within a stand with the prime purpose of producing some intermediate volume while at the same time promoting growing conditions which would result in the improvement in volume and value of the residual stems. |
| Silviculture | The practice of forest management techniques designed to meet the management objectives of a forest unit.  Such objectives usually give high priority to the maximization of financial returns to the unit owner. |
| Small Business | A Small Business Enterprise is defined by the B.C. Forest Service as a person or small company which meet the following criteria: |

Small Business

1. Do not already hold an annual allowable cut of over 10,000 cubic meters.

2. Do not hold more than 10% of the outstanding voting shares of a Licensee or agreement excepting only farmwood lot and woodlot licences.

3. Am an adult who has been resident in B.C. for at least one year or a corporation registered in this province.

| | |
|---|---|
| Utilization Standard | The specifications which define the minimum piece size which the logging operator is required to remove from a harvest unit.  These specifications usually refer to a minimum piece top diameter and length. |
| VAC - Volume/Age Curves | The curves developed by the B.C. Forest Service which represent the standing volume to a given utilization standard for a given stand type. They represent the average standing volume at given points in time for untouched naturally established stands and are used to calculate Allowable Annual Cuts. |

## CALCULATION OF ALLOWABLE ANNUAL CUT

The 1981 Timber Inventory prepared by T.M. Thompson & Assoc. supplemented by in-field examination of representative stand types was used to modify the existing B.C. Forest Service Volume/Age Yield Curves. The detailed cut calculation procedure is contained in Appendix I and is summarized below:

### Current Stands

Present Average Annual Cut $12,700m^3$

Calculated Allowable Annual Cut (Present Stands) $23,400m^3$

This indicates that the current cut level could be increased by approximately 84%.

### Comparable Natural Stands Which Have Not Been Diameter Limit Cut

Allowable Annual Cut $34,800m^3$

The falldown of $11,400m^3$ between this value and the Calculated Allowable Annual Cut of the present stands is the result of growth losses incurred by the past policy of Diameter Limit Cutting.

### Basic Forest Management Program Yields

Basic Forestry consists of immediate reforestation followed by control of competing vegetation. Such a program is expected to increase yields by 15% over natural stands. Implementation of such a program would eventually permit Annual Allowable Cut rates to reach $40,000m^3$.

### Intensive Forest Management Program Yields

Intensive management projects of juvenile spacing and fertilization would increase yields 25% on stands produced through a Basic Forestry Program. Implementation of such a program would eventually permit Annual Allowable Cuts to reach at least $50,000m^3$.

## IMPLICATIONS OF MAINTENANCE OF PRESENT LOW-MANAGEMENT POLICY

Continued diameter limit cutting will result in further down-grading of the existing stands and rapid escalation of the proportion of low value deciduous stands. While cut levels and revenues could be maintained for the next few years, they would eventually necessarily decline drastically. Revenues flowing to the municipality would become a fraction of those now being received and the general condition of the forest stands would generally inhibit recreational opportunities and aesthetic values.

## PROJECTED RESULTS OF CONTINUATION OF CURRENT POLICIES

Current Average Cut (1976-80) - 12,700 $m^3$, all in conifer portion.

Current Average Revenue (1976-80) - $170,600.

### Present Stand Composition:*

| Conifer: | Fir | 55% |
|---|---|---|
| | Hemlock | 10% |
| | Cedar | 7% |
| | Misc. | 3% |

The quality of the remaining coniferous stands is being progressively down-graded as a result of the removal of the larger better trees and damage incurred to the residuals during harvesting.

Deciduous:

Alder/Maple 25%

100%

The deciduous proportion is increasing rapidly as diameter limit harvesting proceeds.

### Present Area Composition:*

| Coniferous | 3,678.7 ha |
|---|---|
| Deciduous | 885.3 |
| Brush N.S.R. | 222.4 |
| | 4,786.4 ha |

Coniferous area decreasing as harvesting proceeds and as deciduous species suppress conifer growth. Overstocking is also decreasing area of stands of sufficient size to harvest.

*Estimated from values supplied in Report on Timber Inventory and Silviculture Requirements.

Continuation of the present policy of diameter limit cutting with no forestry investments will result in rapid declines in harvestable volumes and revenues as indicated in Graph 1. Employment opportunities and wood supply to local mills will also decline drastically.

Graph 1 is a very rough estimate of how the combined effects of decreasing stand quality, decreasing harvestable volume per hectare, decreasing harvestable areas, and decreasing operator flexibility impact on long-term harvest volumes and revenues. More precise values cannot be generated because of the lack of information as to past average harvest volumes per hectare logged and the number of hectares logged.

GRAPH 1 – ESTIMATED EFFECTS OF CONTINUATION OF PRESENT POLICIES
ON HARVEST VOLUME AND VALUE
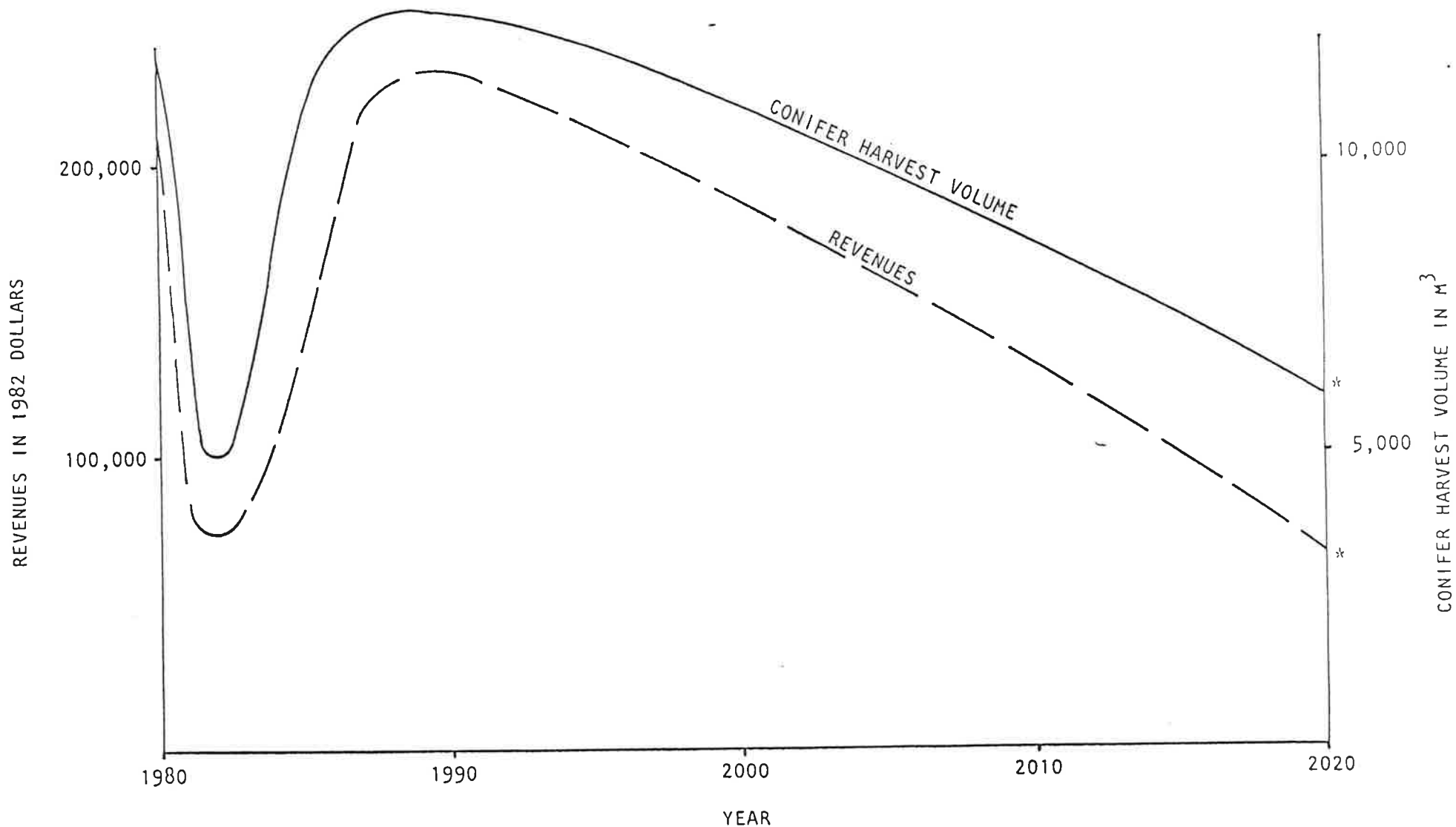
NOTE: The severe decline in 1980-82 is the result of the current depressed market conditions.

*The increasing gap between harvest volume and revenues is a reflection of the down-grading in quality caused by diameter limit cutting.

RECOMMENDATIONS WITH RESPECT TO MANAGEMENT OF THE MUNICIPAL FOREST RESERVES

The Forestry Advisory Committee has completed an extensive review of the forestry potential of the Municipal Forest Reserves and has utilized its collective exper- ience in interpreting the Report on Timber Inventory and Silvicultural Requirements in the development of long-term forest management policies and programs. In general terms, the committee finds that the 4,786 hectares of forest lying within the Reserves have very considerable potential for management and constitute an adequate base on which to construct a sustaining revenue producing enterprise. The present degraded condition of the forests requires urgent action if revenues are to be maintained, let alone enhanced through time. The inventory indicates that the present stand composition includes a 25% deciduous component, a proportion which is increasing rapidly, and which will only contribute marginally to future revenue production.

The considerable area of municipally owned forest lands not now part of the Forest Reserves should be evaluated as to their current and long-term management potential. Those portions not suited to development should be accorded Forest Reserve status. The balance should be administered by the Municipal Forester until required for development so that their forest revenue production may be maximized.

The overall growth potential of the Reserve lands and the proximity to a variety of markets justifys selective forestry investments designed to increase both the growth and quality of forest stands thereby increasing revenues dramatically through time. Implementation of such a program demands foresight on behalf of the present Council and a commitment to forest management. The decisions made relative to the attached Recommendations will determine the quality of the future forests, the extent to which the municipal residents will be able to utilize the Reserve lands for recreation and aesthetic enjoyment, the level of contribution to local employment opportunities, and the degree to which harvesting of the forests will contribute revenues which would be to the benefit of the Municipality.

The Municipal Forest Reserves constitute a public resource of considerable value. The level of these contributions through time is dependent upon whether or not Council continues to regard the resource as non-renewable as evidenced by the degree by which considerable areas have been down-graded or whether the forests will in future be treated as renewable with Council approving those investments necessary to ensure attainment of that goal.

The state of the resource is such that a decision must be made now as to whether or not the resource will be managed. The following sections provide Council with the necessary information on which to base rational decision making.

## RECOMMENDED FOREST LAND MANAGEMENT POLICIES

The following policy statements cover all major aspects of forest land management and' are the Advisory Committee's recommendations as to the guidelines under which the Forest Reserves should be managed. They provide the framework within which Council would administer its forest resource.

These policies are designed to promote improved revenue production through time, creation of a wide range of recreational opportunities, provide both temporary and full-time employment opportunities for residents of the municipality, and ensure protection and enhancement of a wide range of other values.

### FINANCIAL POLICY

Forest harvest, stand establishment and improvement, road construction and maintenance and other forest management investments will be financed entirely through cumulative revenues generated by sales of forest resource products. All revenues shall be accumulated in a Forest Account contained within the Reserve Fund until required for specific municipal needs or for financing forest improvement programs.

All forest improvement programs undertaken by the Municipality will be evaluated in terms of costs and revenues and will only be undertaken if economically viable.

### FOREST LAND MANAGEMENT POLICY

1. Multiple Use management will be the philosophy under which all parts of the Forest Reserves will be managed. Wherever justified, other forest resource values will be protected and enhanced. As forest management proceeds, improvements will be made to year-round outdoor recreational resources, the availability of firewood, aesthetic values, and water and wildlife values.

2. Municipal Forest Reserves shall be managed to provide maximum revenue through time under a modified sustained yield management program which will permit significant fluctuations in the annual rate of harvest in order to best meet market opportunities.

3. The primary source of revenue will be generated through the harvest of merchantable timber at the point of optimization of volume growth and crop value. Revenue will also be derived from sales of floral greenery, firewood, Christmas trees, specialty products such as poles and pilings, and gravel deposits.

4. The wood growing potential of the Forest Reserve lands will best be captured through the production of merchantable volumes in relatively large piece sizes of sawlog or better quality.

5. The management regime required to produce optimum merchantable average annual increments will include immediate reforestation through natural or artificial means, control of competition and undesirable species, and the management of stocking levels through juvenile spacing.

6. Wherever practical, the productive capacity of the Forest Reserves will be improved through the careful implementation of such practices as drainage and fertilization.

7. The attainment of these objectives can best be met through the harvesting of relatively large trees at the time of optimization of increment and value by applications of such sound forest management harvesting systems as selective cutting, clearcutting, and commercial thinning.

8. Wherever possible, management programs will be implemented in conjunction with on-going projects being undertaken by neighbouring ownerships in order to achieve economies of scale.

9. Where beneficial, management programs will facilitate research trials undertaken by various research agencies such as the B.C. Forest Service, Canadian Forestry Service and the Forest Engineering Research Institute of Canada.


## FOREST ADMINISTRATION POLICY

Management of the municipal Forest Reserve should encompass both short and long-term goals and be administered and controlled by a Professional Forester in order to:

1. Ensure that all activities on the Forest Reserve are compatible with the Municipal Forest Land Management Objectives and Policies as established by Council.

2. Collaborate with municipal management in the preparation of long and short-term management plans designed to optimize economic returns through time.

3. Co-ordinate and maintain communications with forest land co-users and ensure the maintenance of public relations consistent with municipal policy.

4. Maintain treatment history maps and records of all forest management activities carried out on municipal lands.

5. Co-ordinate, direct and control the activities of all forest contractors working on the municipal Forest Reserves.

6. Prepare and submit to Council, Five Year Plans including a detailed production and cost budget for the next calendar year. Compile annual reports of activities, revenues and expenditures for all activities relating to the Forest Reserves.

7.  Co-ordinate, direct and control all silvicultural activities to ensure that maximum, merchantable volume is produced on a sustained yield basis.

8.  Co-ordinate or direct the continual up-date of the forest inventory data and prepare revised annual allowable cut figures as required.

9.  Co-ordinate, direct and control activities relating to forest protection (fire, insects, disease) to ensure that the objective of maximizing merchantable volume on a sustained yield basis is attained.

10. Co-ordinate or direct the layout and timing of logging activities consistent with both short and long-term management plans.

11. Ensure that maximum economic returns from products harvested from the Forest Reserves are maintained or enhanced.

Control over the performance of the Professional Forest Manager will be exercised through an annual review of activities conducted by a voluntary Forestry Advisory Committee appointed by the Mayor. This committee would be comprised of residents of the Municipality who have expertise in fields related to the management of the Forest Reserves. The review would constitute an appraisal of the efficiency of past operations and also would include an analysis of the proposed budget and the Five Year Plan.


FOREST MANAGEMENT POLICY

Forest management programs shall be implemented in order to achieve the objectives of the Forest Land Management Policy. Such programs will include:

1.  Site Preparation - Requirements for each area to be logged shall be identified and implemented. The project will be undertaken where possible by the contract timber operator in the same year as harvesting. The harvesting method selected shall be compatible to the silvicultural requirements of the specific site.

2.  Undesirable Species Control - Problem areas identified by the 1981 forest inventory shall be scheduled for treatment. Control measures shall include manual, mechanical and chemical techniques with the final choice being the result of a careful evaluation of worker safety, environmental, silvicultural and economic concerns.

3.  Reforestation - All areas shall be fully restocked with a desirable crop species within two years following harvest. Preference will be given to local suppliers of planting stock.

4.  Stand Management - Management programs designed to enhance the value and volume of the crop will be implemented where economically justified.

Stand rehabilitation projects will be undertaken on all stands identified as currently growing at less than 60% of the yields which would be expected from natural stands on equivalent sites. These projects will be integrated with the harvesting program in order to ensure that costs will be minimized and all values present will be recovered.

A Five Year Plan will be prepared and submitted to the Council by November 1st of each year. The first year of this plan will identify specific areas, treatment requirements, capital expenditures, treatment methods, and estimated operational costs. The Five Year Plan will identify anticipated project levels, costs, revenues, and the predicted effect on the Allowable Annual Cut.

Approved projects will be completed through youth educational and training programs, corrections programs, and the use of contractors. Preference will be given to residents of the Municipality or to those living within the Cowichan Valley Regional District.


## PUBLIC RELATIONS POLICY

The Municipality accepts the responsibility to economically manage its forest land resources in such a way as to maintain social and environmental values. Co-operative programs will be initiated with various local agencies so as to promote a continuing public awareness of and to demonstrate the value of good forest management practices. The Multiple Use management concept will accommodate recreation, fish and wildlife, water and forest management requirements.

A high level of co-operation is to be maintained with the Forest Museum and the Cowichan Valley Demonstration Forest including the preparation of maps and brochures for the public, posting of access roads and points of interest, co-operating with the media and making information available to the Chamber of Commerce.

Educational and training opportunities for youth will be promoted through the accommodation of school, club, or other special interest group needs and short-term work experience opportunities for students from Pearson College, Malaspina College and the Pacific Vocational Institute. A significant proportion of the required management projects could be undertaken as part of educational work experience opportunities for students from these schools.

Public access will be promoted through designation of scenic viewpoints, campgrounds, forest parks and permanent forest park areas such as Maple Mountain and Mount Prevost. Restricted access will be applied to operational areas and during periods of high fire hazard.

Protection of adjacent private property rights and water rights and watersheds will ensure maintenance of both "good neighbour" and general public relations.

## DISPOSAL OF HARVESTING RIGHTS POLICY

The objective is to harvest all merchantable volumes in such a manner as to increase the average annual growth increment on forest lands through time while providing for maximum short-term financial returns by control of harvest areas and volumes. Contracts will be awarded based on sealed tender for a fixed term, subject to performance and will designate specific harvest areas and utilization standards, minimum and maximum annual harvest volumes, silvicultural site preparation requirements where necessary, and possible limitations in the type of equipment which may be used on some sites.

Contracts will be awarded to only those operators who quality as a 'Small Business' under the standards employed by the B.C. Forest Service.

## PUBLIC FOREST ACCESS POLICY

The Municipality will maintain and develop main arterial routes, taking advantage of existing or abandoned roads, with contract operators developing timber extraction roads from these routes at their own expense and to current B.C. Forest Service standards. The operator will maintain these roads during the period of his operation and, when completed, ensure that they are left in such a condition as to minimize erosion and other damage.

## FIRE PROTECTION POLICY

Fire protection is the responsibility of the Municipality as is stated in the Forest Act. Initial suppression action will be taken by the Municipality on all fires within and adjacent to municipal lands as defined in a Suppression Plan to be prepared in conjunction with the Duncan Forest District. The basic principles of the existing agreement with the Forest Service should be perpetuated but modified in order to conform to the new Forest Act. An agreement will be maintained with the Ministry of Forests whereby fire fighting assistance will be supplied by the Forest Service subject to preparation of an annual protection plan and payment of the required fees.

PROJECTED FIVE YEAR OPERATING BUDGET

Appendix II contains a detailed projection of the Five Year Logging Plan and provides estimates of annual revenues. Appendix III shows the Five Year Silvicultural Plan which must be implemented concurrently with the Logging Plan.

Some funds generated by past harvest activities on the Forest Reserves will be utilized to permit the rapid start-up of silvicultural operations in 1982. The benefits of these investments are projected in Graph 2, page 16, and indicate that growth increases generated by silvicultural expenditures will permit Annual Allowable Cut levels to reach 30,000 $m^3$ by the year 2000 and 40,000 $m^3$ by the year 2020 from a level of 15,000 $m^3$ planned for 1982.

### STATEMENT OF PROJECTED COSTS AND REVENUES, 1982-1986

(All in 1982 Dollars)

| COST ESTIMATES: | 1982 | 1983 | 1984 | 1985 | 1986 |
|---|---|---|---|---|---|
| Basic Forestry Projects[1] | $110,000 | $194,500 | $164,300 | $116,300 | $133,200 |
| Intensive Forestry Proj.[1] | 75,000 | 75,000 | 75,000 | 120,000 | 120,000 |
| Forestry Manager[2] | 40,000 | 45,000 | 45,000 | 45,000 | 50,000 |
| Protection | 10,000 | 5,000 | 7,000 | 7,000 | 10,000 |
| Development Roads | 20,000 | 10,000 | 10,000 | 15,000 | 20,000 |
| | $255,000 | $329,500 | $301,300 | $303,300 | $333,200 |

| REVENUES: | | | | | |
|---|---|---|---|---|---|
| Coniferous Harvest | $141,400[3] | $374,500 | $374,500 | $311,000 | $311,000 |
| Alder Harvest | 7,000 | 7,000 | 21,700 | 28,700 | 36,050 |
| Poles and Piling | 10,000 | 15,000 | 20,000 | 25,000 | 30,000 |
| Miscellaneous[4] | 1,000 | 2,000 | 5,000 | 5,000 | 5,000 |
| | $159,400 | $398,500 | $421,200 | $369,700 | $382,050 |

| NET PROFIT/(LOSS) | $(95,600)[5] | $69,000 | $119,900 | $66,400 | $48,850 |

NET PROFIT/(LOSS) 1982-86:  $208,550

[1] Cost estimates are based on current industrial experience so to the extent that many of these projects are undertaken by work experience crews or by service clubs earning funds, actual costs for basic and intensive projects could be much less.

[2] Total costs including salary and benefits.

[3] The low 1982 harvest revenue is a reflection of the current depressed market conditions which will result in low volume production and depressed sales values through the first half of the year.

[4] Specialty products such a fencing, floral greenery, Christmas trees and firewood sales from slash residue.

[5] To be covered by the Forest Reserve Fund.

## ALLOWABLE CUT INCREASES RESULTING FROM SILVICULTURAL INVESTMENTS

The projects proposed in the Annual and Five Year Silvicultural Plans will result in immediate increases in Allowable Annual Cuts (as well as very great increases in crop value at the time of future harvest).  Estimates of gains in AAC are:

| | 1982 | 1983 | 1984 | 1985 | 1986 |
|---|---|---|---|---|---|
| Hectares Treated - Basic | 105ha | 240ha | 277ha | 200ha | 230ha |
|        - Intensive | 100 | 100 | 100 | 300 | 300 |
| EARNED INCREASES IN AAC: | | | | | |
|    - Basic (+3.9m$^3$/ha)* | 410m$^3$ | 936m$^3$ | 1,080m$^3$ | 780m$^3$ | 897m$^3$ |
|    - Intensive (+1.8m$^3$/ha)** | 180 | 180 | 180 | 540 | 540 |
|      TOTAL EARNED | 590m$^3$ | 1,116m$^3$ | 1,260m$^3$ | 1,320m$^3$ | 1,437m$^3$ |
| | | | | | |
| ACTUAL PRESENT STAND AAC | 23,000m$^3$ | 23,000m$^3$ | 23,000m$^3$ | 23,000m$^3$ | 23,000m$^3$ |
| CUMULATIVE EARNED AAC | 590 | 1,706 | 2,966 | 4,286 | 5,723 |
| ACTUAL + EARNED AAC | 23,590m$^3$ | 24,706m$^3$ | 25,966m$^3$ | 27,286m$^3$ | 28,723m$^3$ |
| | | | | | |
| PLANNED CUT 'LEVELS*** | 15,000m$^3$ | 25,000m$^3$ | 29,200m$^3$ | 31,200m$^3$ | 33,300m$^3$ |

*Basic forestry projects are expected to raise cut levels to 120% of Natural Stand Yields as represented by the B.C.F.S. Volume/Age Curves, an eventual AAC of 41,000m$^3$ which is a gain of 78% over current calculated cut levels.  The current calculated Mean Annual Increment (MAI) is 5.0m$^3$/ha/yr which would increase to 8.9m$^3$/ha for areas treated.

**Intensive forestry projects will increase Basic stand yields of 8.9m$^3$/ha/yr by 20%, a gain in MAI on treated areas of 1.8m$^3$/ha.

***Actual cut levels are planned to exceed calculated Annual Allowable Cuts for the first five to ten years of management in order to rapidly harvest those stands which are not now producing to their potential and to convert many mature alder stands to conifers.  Cuts will be brought into balance with growth by the tenth year of management and the temporary overcut will be within current acceptable limits.

ESTIMATES OF LONG-TERM FINANCIAL BENEFITS TO BE GENERATED

BY THE PROPOSED PROGRAM

The proposed Five Year program will result in future significant improvements
in the overall quality of the Forest Reserves including roadside aesthetics,
recreational access, and wood production.  From the financial point of view,
the heavy initial investments needed during this period are necessary so that
the forest may recover some of the volume growth potenital lost through past
neglect and so that the resulting accelerated growth may be concentrated on
high quality merchantable stems.  The expected future costs, revenue and profit
trends are depicted in Graph 2, page 16.  Also shown on this graph is the expected
profit trend resulting from continuation of the present management policies.

AAC levels should reach 30,000 $m^3$ by the year 2000 and 40,000 $m^3$ by 2020.  The
quality of the timber being harvested by the latter date will also be greatly
improved as a result of silvicultural investments made commencing in 1982 and
should command at least a 25% increase in the average sales price per cubic
meter.

GRAPH 2 - PROJECTED COSTS, REVENUES AND PROFITS
1982 - 2020

Year 2000, Cut level at 30,000m$^3$, costs are estimated to be $310,000/yr, and revenues $445,000/yr.
Year 2020, Cut level at 40,000m$^3$, costs are estimated to be $360,000/yr, and revenues $675,000/yr.

COSTS AND REVENUES IN 1982 DOLLARS

700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
-100,000

REVENUES

COSTS

PROFITS WITH FOREST MANAGEMENT

PROFITS WITH NO FOREST MANAGEMENT

1990    2000    2010    2020

YEAR
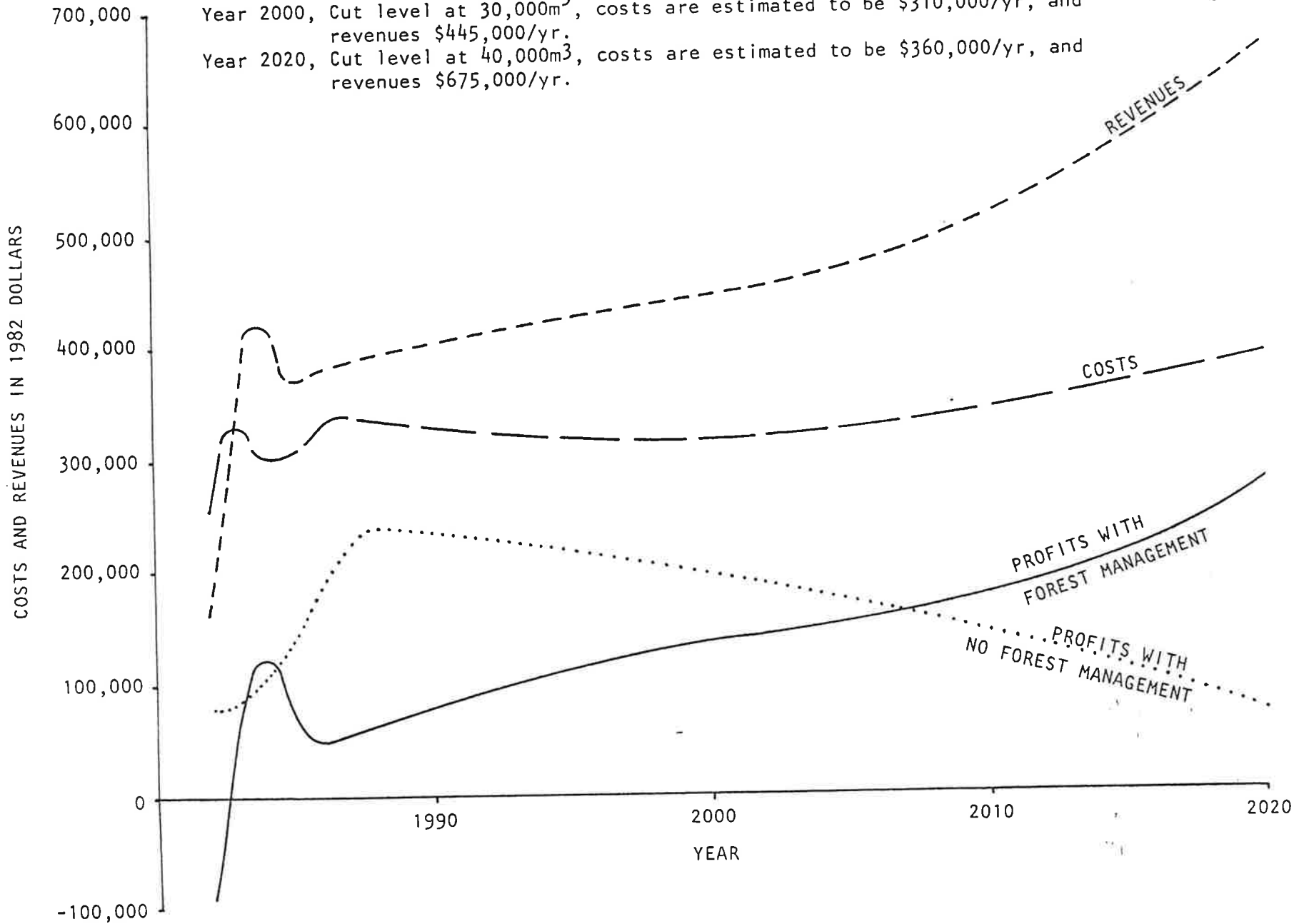
## RECOMMENDED MANAGEMENT STRUCTURE

The Committee considered two options for the management of the Forest Reserves. The first would involve the engaging of a Professional Consultant who would undertake management to the level specified by Council. After serious consideration, this option was discounted because of the inability of the consultant to provide intimate knowledge of the Reserve lands through time, the lack of continuity as far as personnel involved is concerned, costs would probably be more than the other alternative and the incentive to maximize economic returns to the municipality would be indeterminate.

The recommended option would be for the municipality to hire a competent professional forest land manager. This arrangement would result in providing the necessary continuity of management, strict cost control and project definition, assigned responsibilities in the areas of overall land mangement and the development of a sense of proprietorship. The performance of the manager would be monitored by the Forest Advisory Committee. The responsibilities and objectives of the forest land manager would be to:

1. Ensure that all activities on the Forest Reserves are compatible with the municipal objectives and policies as established by Council.

2. Collaborate with municipal management in the preparation of long and short-term management plans designed to optimize economic returns through time.

3. Co-ordinate and maintain communications with forest land co-users and ensure the maintenance of public relations consistent with municipal policy.

4. Maintain treatment history maps and records of all forest management activities carried out on municipal lands.

5. Co-ordinate, direct and control the activities of all forest contractors working on the municipal Forest Reserves.

6. Prepare and submit to Council 5 year plans including a detailed production and cost budget for the next calender year. Compile annual reports of activities, revenues and expenditures for all activities relating to the Forest Reserves.

7. Co-ordinate, direct and control all silvicultural activities to ensure that maximum, merchantable volume is produced on a sustained yield basis.

8. Co-ordinate or direct the continual up-date of the forest inventory data and prepare revised annual allowable cut figures as required. Co-ordinate, direct and control activities relating to forest protection,(fire, insects, disease) to ensure that the objective of maximizing merchantable volume on a sustained yield basis is attained.

An evaluation of the manpower required to implement the proposed forest management program including both harvesting and silvicultural activities indicates that a professional manager is needed full-time. Periodic support would also be required during peak load periods. The salary range for an experienced professional forester, including benefits, would require an initial budget of approximately $40,000 per year. The forest manager would report to the administrator and would be advised by the Forestry Advisory Committee.

## RECOMMENDATIONS PERTAINING TO THE POTENTIAL APPLICATION FOR

## A MUNICIPAL TREE FARM LICENCE

Within, adjacent to, or close by North Cowichan Municipality there lies approx-
imately 9,200 hectares of Crown forest land currently being managed by the Forest
Service (see Map page 19). A brief examination of these lands indicates that
they are generally in better condition than the Forest Reserves in that they have
not been diameter limit cut. Their projected sustainable allowable annual cut of
the present stands is estimated, to be approximately 55,000 m$^3$ per year (a detailed
calculation of this cut is contained in Appendix IV).

The Advisory Committee considers that inclusion of all or most of these lands
within a Municipal Tree Farm Licence would be of considerable benefit to the
municipality in that it would provide for considerable increases in flexibility
of harvesting operations, provide economics of scale for both harvesting and
forestry operations, justify a more substantial forestry staff which could be
more cost effective in managing municipal forest lands, and provide an additional
source of revenue. Prior to considering applying for inclusion of these lands in
a Tree Farm Licence, Council must commit itself to a sound forest management
program for the Forest Reserves.

The Advisory Committee recommends that during this first 5 Year Plan period,
Council request the then Forestry Advisory Committee re-examine the potential and
ramifications of assuming responsibility for managing adjacent Vacant Crown Lands
under a Tree Farm Licence form of tenure.

# CROWN LANDS PROPOSED FOR INCLUSION
## IN A NORTH COWICHAN MUNICIPAL TFL

BANON CK.
1,675 ha

CHEMAINUS

*Chemainus River*

CORONATION MOUNTAIN

3,564 ha

LAKE
COWICHAN

MOUNT
PREVOST

MUNICIPALITY

OF

NORTH

COWICHAN

1,937 ha

*Cowichan River*

SKUTZ

1,181 ha

DUNCAN

SAHTLAM

870 ha
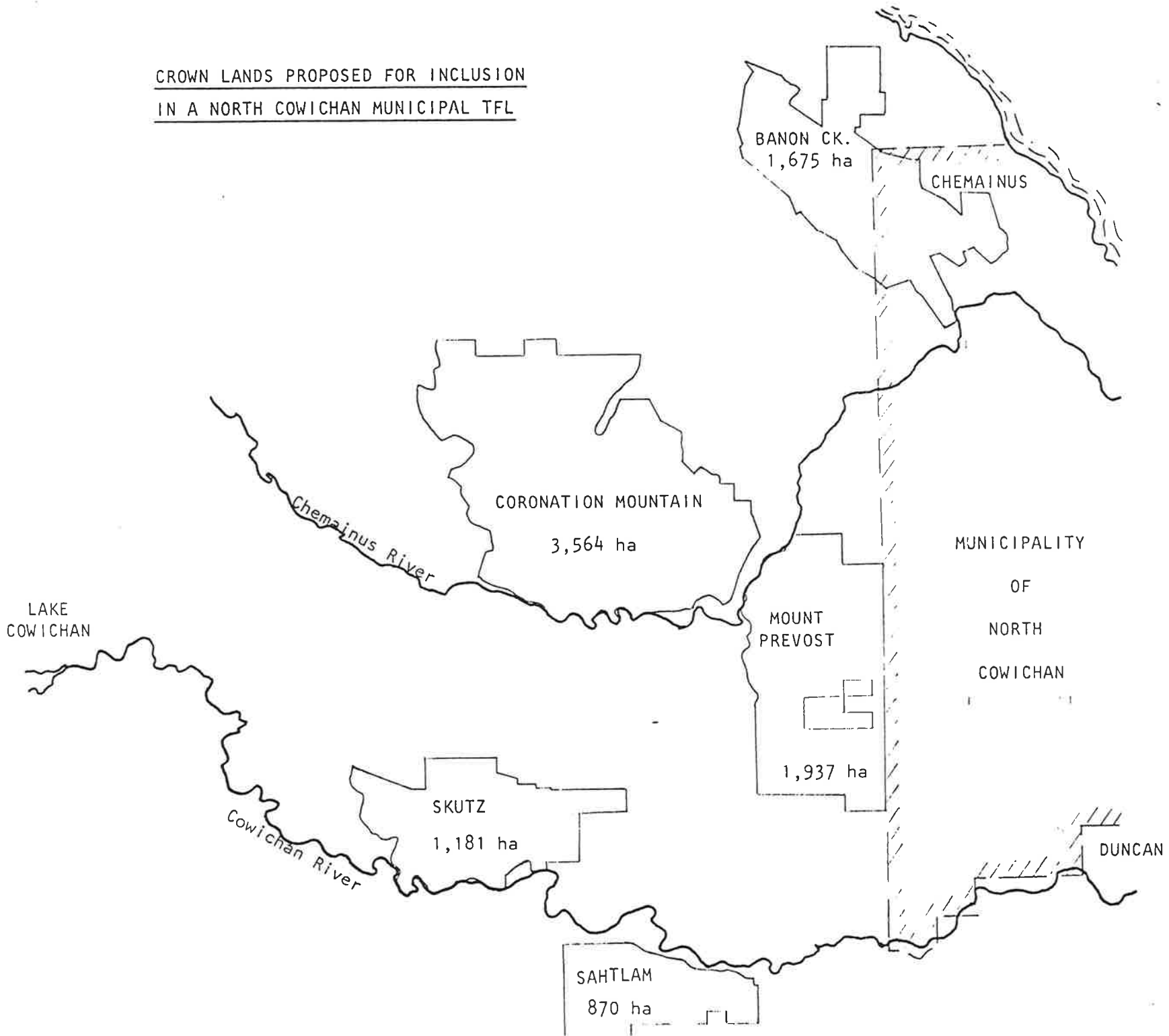
## APPENDIX I

## CORPORATION OF THE DISTRICT OF NORTH COWICHAN

## FOREST RESERVES - CALCULATION OF ALLOWABLE ANNUAL CUT

The 1981 timber inventory prepared by T.M. Thompson & Associates provided the essential data upon which the calculation was based. A representative in-field examination of site and growth characteristics by R.J.F. Elder and D.E. McMullan of the Forest Advisory Committee provided a realistic interpretation of stand conditions.

The diameter limit cutting and sporatic nature of the logging program over time resulted in stocking levels not necessarily compatible with current Volume/Age data as supplied by the Ministry of Forests. It was necessary, therefore, to redraw the VAC curves for the individual stands utilizing the data as indicated in Table I (estimated yields at 80 years). Growth culmination age and volume at culmination was then calculated from the newly constructed curves (Appendix A).

Gross and net indicated yield and gross and net annual yield are provided in Table II. Table II also indicates Ministry of Forests natural stand yields for comparison purposes.

The indicated rotation of the present stand is 87.8 years with an average M.A.I. (mean annual increment or average growth per year) of 5.0 cubic meters per hectare per year. An area-volume allotment check was carried out at a cutting level of 23,450 cubic meters per year, which is the calculated net annual yield. This exercise examined the availability of "mature" or harvestable wood on a continual basis through the number of years to the indicated rotation age. This check indicates that 50.2 years of cutting are available in the oldest age classes and the youngest age cut would be 62 years with the oldest being 81.5 years. This suggests that a real rotation age of about 60 years, assuming some forest management is undertaken, is readily attainable.

Assuming that reforestation occurs on all areas cut in the future and that some intensive management such as stocking control and fertilization is carried out, it is expected that the AAC could increase to 50,000 cubic meters.

# TABLE I - CALCULATION OF ANNUAL ALLOWABLE CUT

| | PREDICTED PRESENT STAND YIELDS | | | PREDICTED B.C.F.S. NATURAL STAND YIELDS*** | | | |
|---|---|---|---|---|---|---|---|
| STAND TYPE | AREA | GROSS YIELD M³ | ANNUAL YIELD M³ | YIELD @ CULMINATION | GROSS YIELD M³ | M.A.I. | ANNUAL YIELD M³ |
| 1 | 336ha | 200,900 | 1,828 | 580.8 | 195,100 | 8.8 | 2,957 |
| 2 | 203 | 120,000 | 1,250 | 580.8 | 117,900 | 8.8 | 1,786 |
| 3 | 79 | 54,100 | 732 | 635.9 | 50,200 | 11.4 | 901 |
| 4 | 91 | 43,200 | 497 | 465.1 | 42,300 | 7.9 | 719 |
| 5 | 659 | 389,500 | 3,974 | 580.8 | 382,700 | 8.8 | 5,799 |
| 6 | 327 | 94,800 | 1,115 | 281.0 | 91,000 | 4.1 | 1,341 |
| 7 | 430 | 201,700 | 2,460 | 465.1 | 200,000 | 7.9 | 3,397 |
| 8 | 67 | 49,600 | 522 | 644.1 | 43,500 | 10.8 | 724 |
| 9 | 384 | 182,400 | 2,004 | 465.1 | 178,600 | 7.9 | 3,034 |
| 10 | 154 | 50,800 | 1,337 | 295.9 | 45,600 | 7.2 | 1,109 |
| 11 | 250 | 63,700 | 1,180 | 295.9 | 74,000 | 7.2 | 1,800 |
| 12 | 145 | 67,000 | 697 | 465.1 | 67,400 | 7.9 | 1,146 |
| 13 | 582 | 270,000 | 2,840 | 465.1 | 270.700 | 7.9 | 4,598 |
| 14 | 456 | 129,500 | 1,409 | 281.0 | 128,100 | 4.1 | 1,870 |
| 15 | 344 | 65,400 | 991 | 295.9 | 101,800 | 7.2 | 2,477 |
| 16 | 100 | 59,100 | 518 | 580.8 | 58,100 | 8.8 | 880 |
| 17 | 177 | 80,500 | 821 | 465.1 | 82,300 | 7.9 | 1,398 |
| | 4,784ha | 2,122,200 | 24,175 | | 2,130,200 | | 35,936 |

| | | |
|---|---|---|
| NET INDICATED YIELD* | 2,058,534 M³ | 2,066,294 M³ |
| NET ANNUAL YIELD* | 23,450 M³ | 34,858 M³ |
| NET HECTARES** | 4,688 ha | |
| INDICATED ROTATION | 87.8 yrs. | 59 yrs. |
| AVERAGE M.A.I. | 5.0 M³/ha/yr | 7.4 M³/ha/yr |

*Net Deductions for: Fire, Disease, Insects — 1%
Improvements, Roads, Gravel Pits — 1%
Alienation — 1%
3%

**Net deductions for improvements and alienation - 2%.

***Estimated yields for natural stands which have not undergone partial cuts.

# TABLE II - CALCULATION OF GROWTH TYPE VOLUMES

| VAC GROWTH TYPE | SITE | VAC NO. | EST. YIELD @80 YEARS M³/Ha. | AREA Ha. | CULMINATION VOLUME M³/Ha. | CULMINATION AGE | M.A.I. TO CULMINATION M³/Ha/yr. |
|---|---|---|---|---|---|---|---|
| 1-B | M | 3420-B | 270 | 336 | 598 | 110 | 5.44 |
| 2-B | M | 3420-B | 450 | 203 | 591 | 96 | 6.16 |
| 3-G | G | 3426-B | 744 | 79 | 685 | 74 | 9.26 |
| 4-A | M | 3418-B | 404 | 91 | 475 | 87 | 5.46 |
| 5-B | M | 3420-B | 439 | 659 | 591 | 98 | 6.03 |
| 6-A | P | 3419-B | 271 | 327 | 290 | 85 | 3.41 |
| 7-A | M | 3418-B | 453 | 430 | 469 | 82 | 5.72 |
| 8-A | G | 3417-B | 598 | 67 | 740 | 95 | 7.79 |
| 9-A | M | 3418-B | 359 | 384 | 475 | 91 | 5.22 |
| 10-0 | M | 3430-B | 488 | 154 | 330 | 38 | 8.68 |
| 11-0 | M | 3430-B | 337 | 250 | 255 | 54 | 4.72 |
| 12-A | M | 3418-B | 265 | 145 | 462 | 96 | 4.81 |
| 13-A | M | 3418-B | 291 | 582 | 464 | 95 | 4.88 |
| 14-A | P | 3419-B | 236 | -456 | 284 | 92 | 3.09 |
| 15-0 | M | 3430-B | 215 | 344 | 190 | 66 | 2.88 |
| 16-B | M | 3420-B | 218 | 100 | 591 | 114 | 5.18 |
| 17-A | M | 3418-B | 243 | 177 | 455 | 98 | 4.64 |

# APPENDIX A

VOLUME/AGE CURVES* FOR STANDS NOW OCCUPYING FOREST RESERVES

*Modified from B.C.F.S. F.I.Z. B, Utilization:  17.5cm DBH to 10cm Top

VOLUME/AGE CURVE INDEX 3420-B    GROWTH TYPE: 1-B

SPECIES: FC, FGT, FA, FS.

SITE: MEDIUM

CULMINATION AGE: 110

M³ @ CULMINATION: 598

M.A.I. @ CULMINATION: 5.44 M³/Ha/YR

C.U. VOLUME (M3) TO (7.5CM DBH LIMIT)

AGE

10 MM/CM
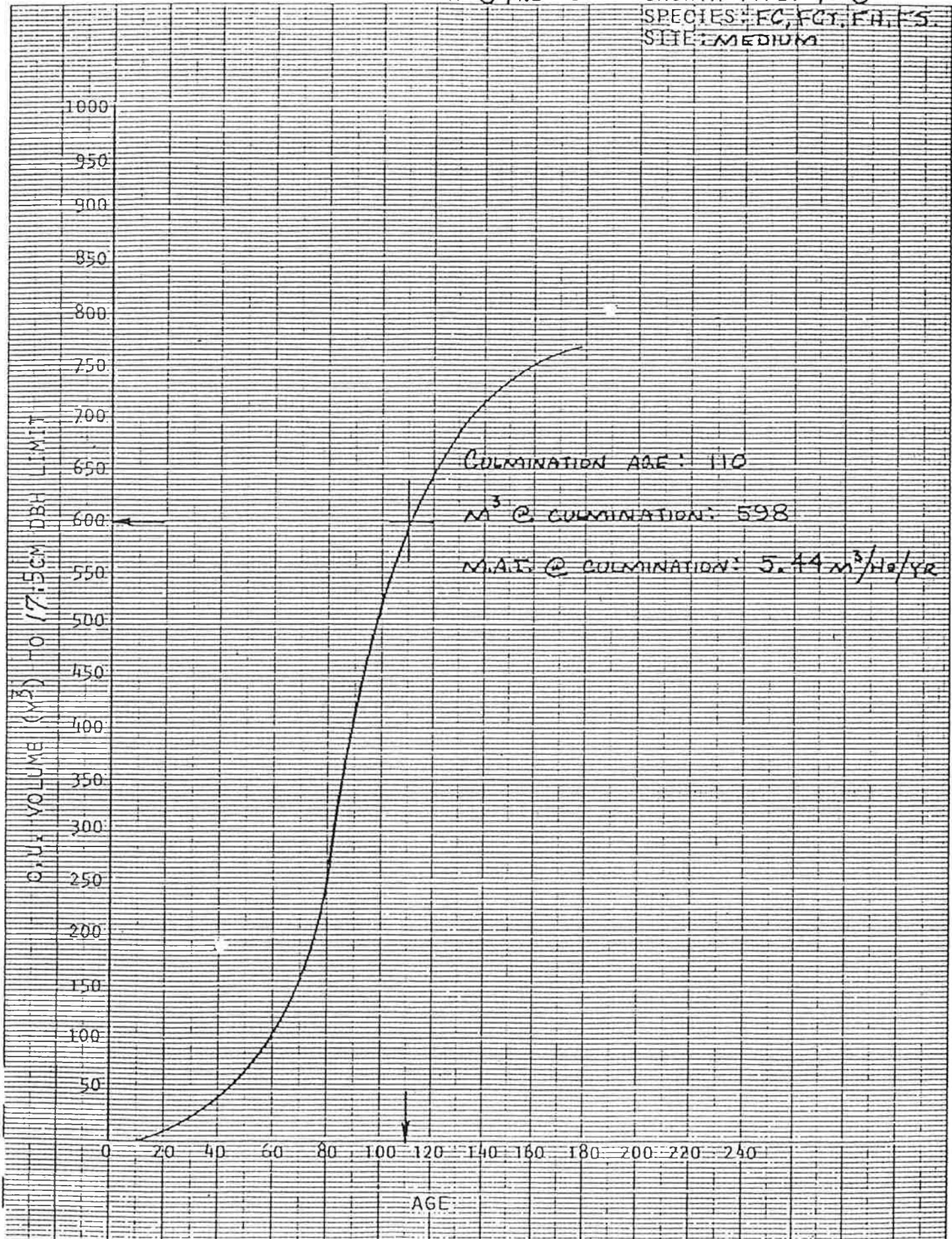
VOLUME/AGE CURVE INDEX 3420-B   GROWTH TYPE: 2-B
SPECIES: FC, FCY, FH, FS
SITE: MEDIUM

O.U. VOLUME (M3) TO 17.5CM DBH LIMIT

CULMINATION AGE: 96

M³ @ CULMINATION: 591

M.A.I. @ CULMINATION: 6.16 M³/Ha/YR.

AGE   3420-B   GROWTH TYPE: 2-B

10 MM/CM
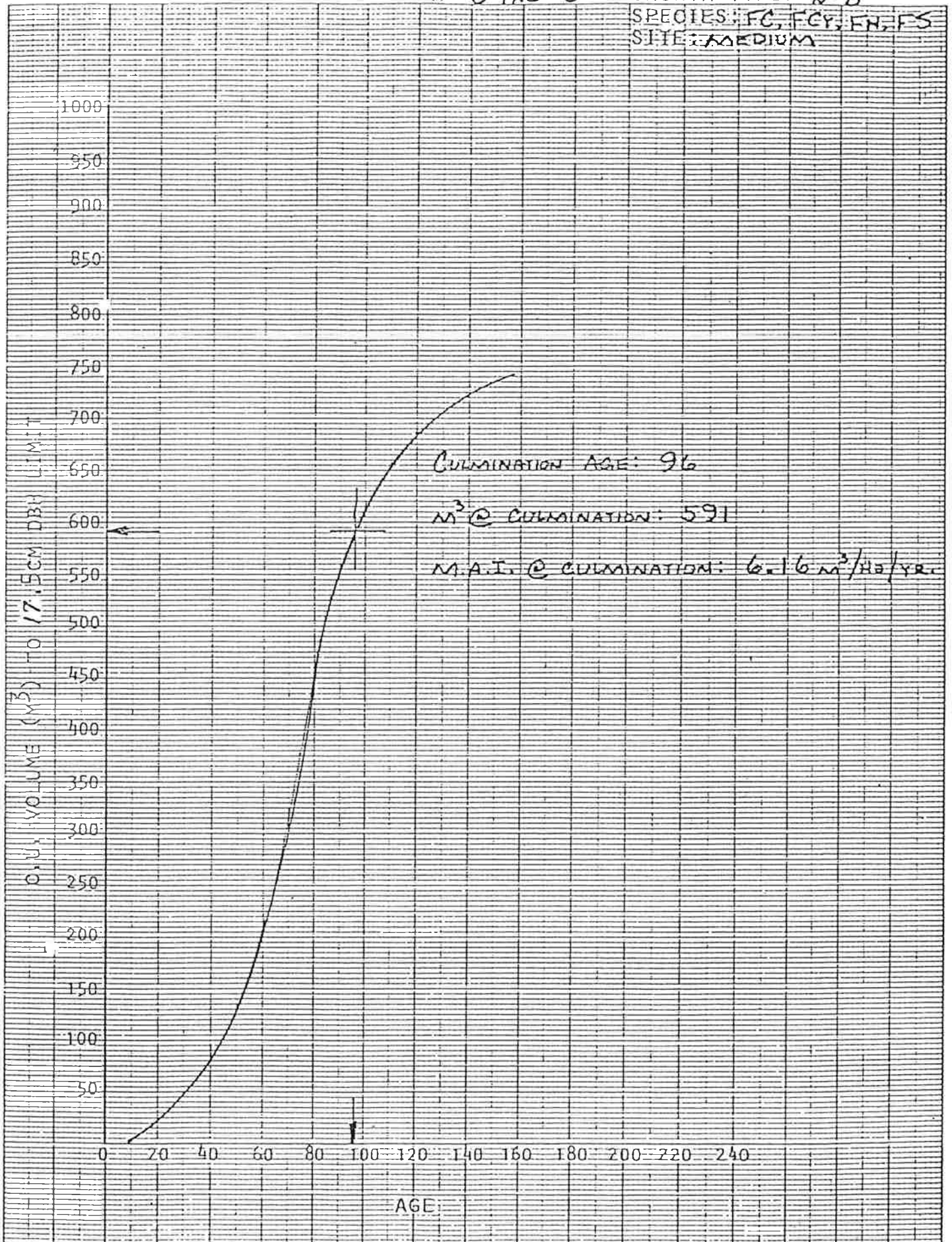
VOLUME/AGE CURVE INDEX 3426-B     GROWTH TYPE: 3-G
SPECIES: HF, HC, HB, HS.
SITE: GOOD.

CULMINATION AGE: 74

M³ @ CULMINATION: 685

M.A.I @ CULMINATION: 9.26 m³/Ha/yr.

_Gross Volume (M³) to 17.5cm DBH Limit_

AGE 3426-B

10 MM: CM
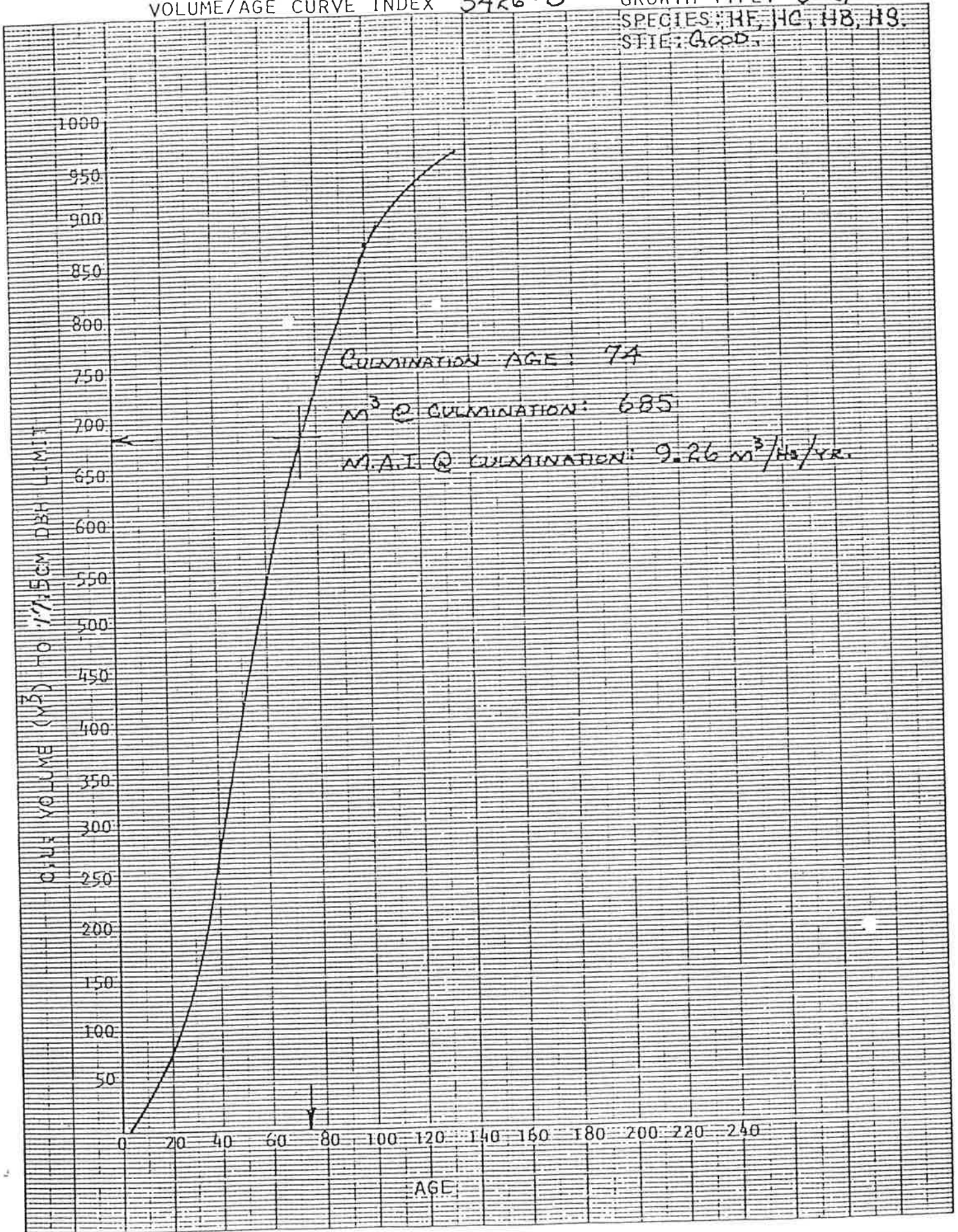
VOLUME/AGE CURVE INDEX  3418-B    GROWTH TYPE: 4·A
SPECIES: F, FPI, F DECID, PW
STIE: MEDIUM

CULMINATION AGE:  87

M³ @ CULMINATION:  475

M.A.I. @ CULMINATION:  5.46 M³/Ha/YR.

O.U. VOLUME (M3) TO 1/2 1.5 CM DBH LIMIT

AGE

10 MM/CM
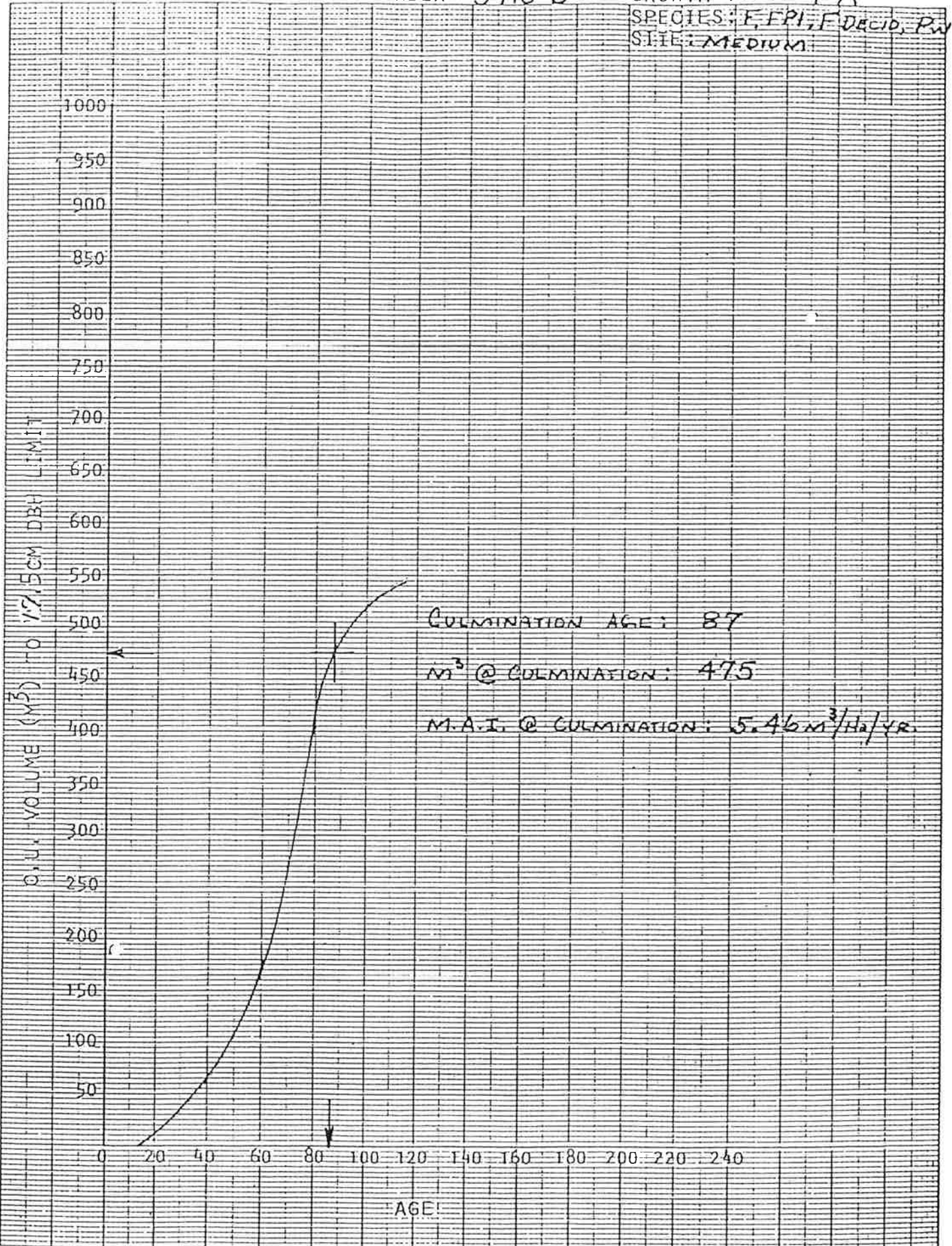
VOLUME/AGE CURVE INDEX 3420-B    GROWTH TYPE: 5-B

SPECIES: FG, FG, FH, FS
SITE: MEDIUM

10 MM./CM

**Chart (Volume/Age Curve):**

Y-axis: G.U. VOLUME (M3) TO 17.5CM DBH LIMIT — labeled from 50 to 1000
X-axis: AGE — labeled 0, 20, 40, 60, 80, 100, 120, 140, 160, 180, 200, 220, 240

Annotations:
CULMINATION AGE: 98

M³ @ CULMINATION: 591

M.A.I. @ CULMINATION: 6.03 M³/Ha/YR.

SPECIES: F, FPl, F DECIP, P. ?
SITE: Poor

O. U. VOLUME (M3) TO 17.5 CM. DBH LIMIT

CULMINATION AGE: 85

M³ @ CULMINATION: 290

M.A.I. @ CULMINATION: 3.41 m³/Ha/yr

AGE  3419-B    GROWTH TYPE: 6-A

10 MM/CM
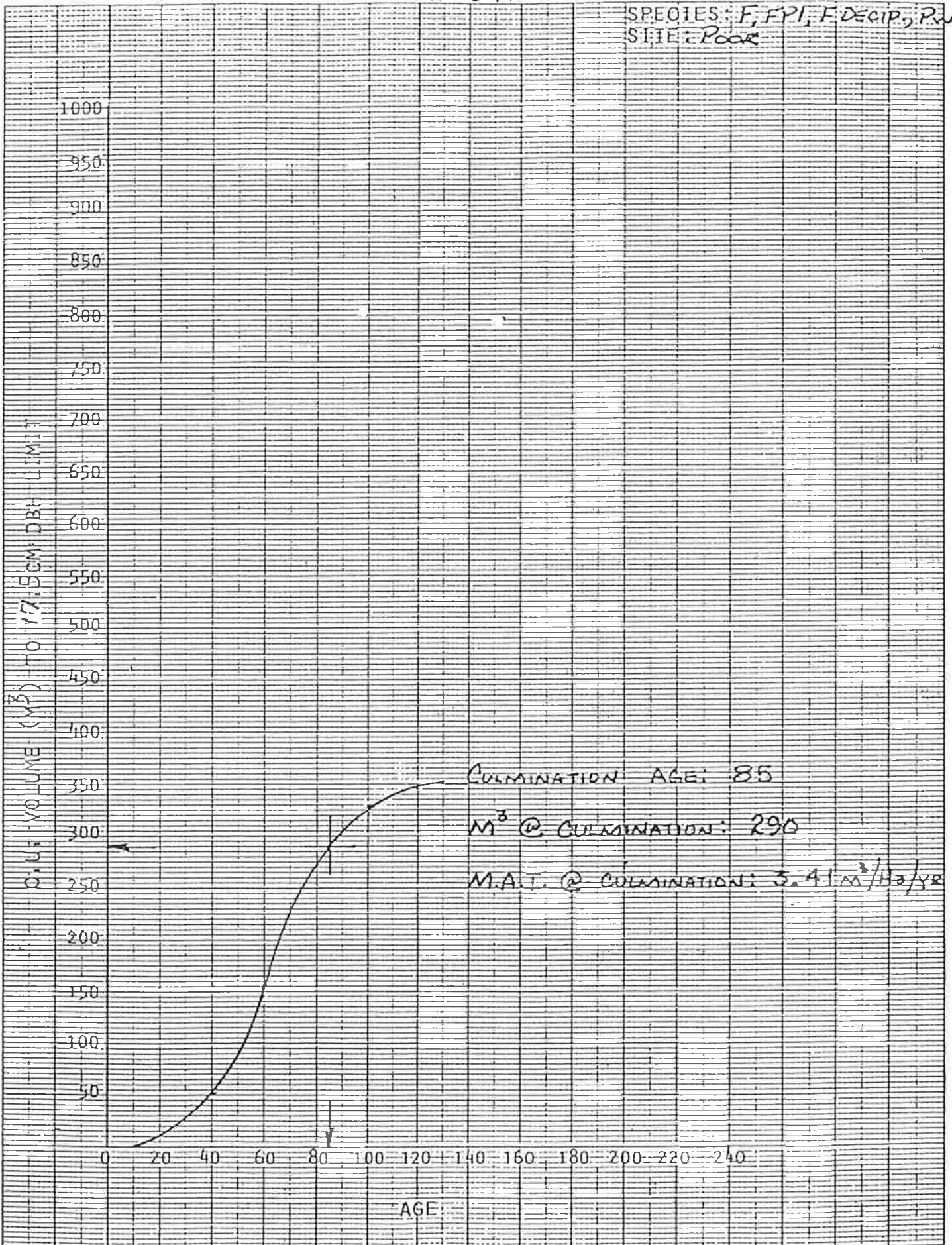
VOLUME/AGE CURVE INDEX  3418-B     GROWTH TYPE: 7·A

SPECIES: F, FPl, F Decid, Pw

SITE: MEDIUM

CULMINATION AGE: 82

M³ @ CULMINATION: 469

M.A.I. @ CULMINATION: 5.72 m³/Ha/Yr.

O.U. VOLUME (M3) TO 17.5CM DBH LIMIT

AGE

10 MM/CM
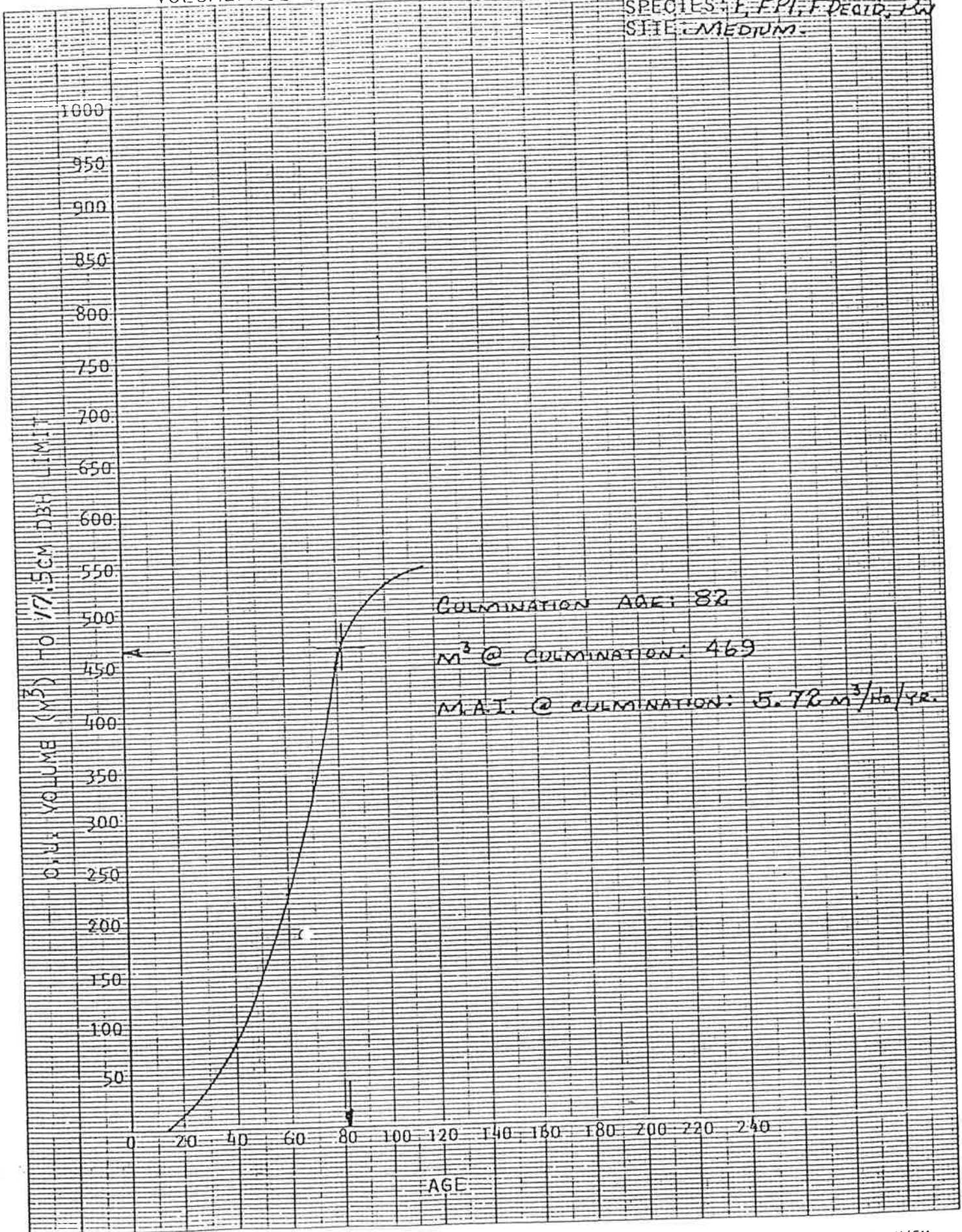
VOLUME/AGE CURVE INDEX 3417·B     GROWTH TYPE: 8-A

SPECIES: F, F-PI, F-Dcold, PW
SITE: Good

CULMINATION AGE: 95

$M^3$ @ CULMINATION: 740

M.A.I. @ CULMINATION: 7.74 $m^3$/Ha/yr.

*Y-axis:* C.u. VOLUME (M3) TO 17.5CM DBH LIMIT

*X-axis:* AGE

10 MM/CM
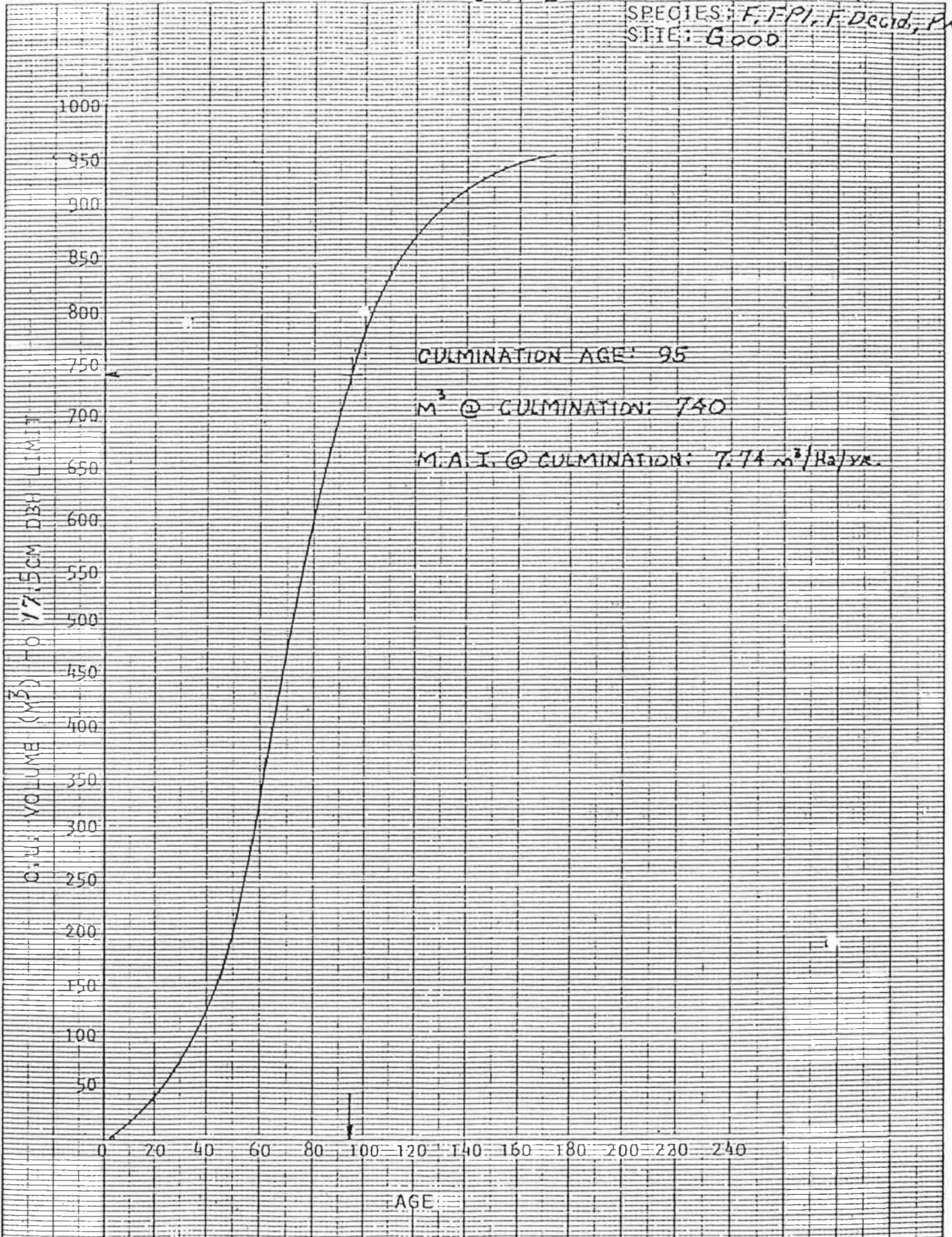
VOLUME/AGE CURVE INDEX  3418-B   GROWTH TYPE: 9-A
SPECIES: F, FPl, F Decid, Pw
SITE: MEDIUM



CULMINATION AGE: 91

M³ @ CULMINATION: 475

M.A.I. @ CULMINATION: 5.22 m³/ha/yr.

AGE  3418-B    GROWTH TYPE: 9-A

10 MM, CM
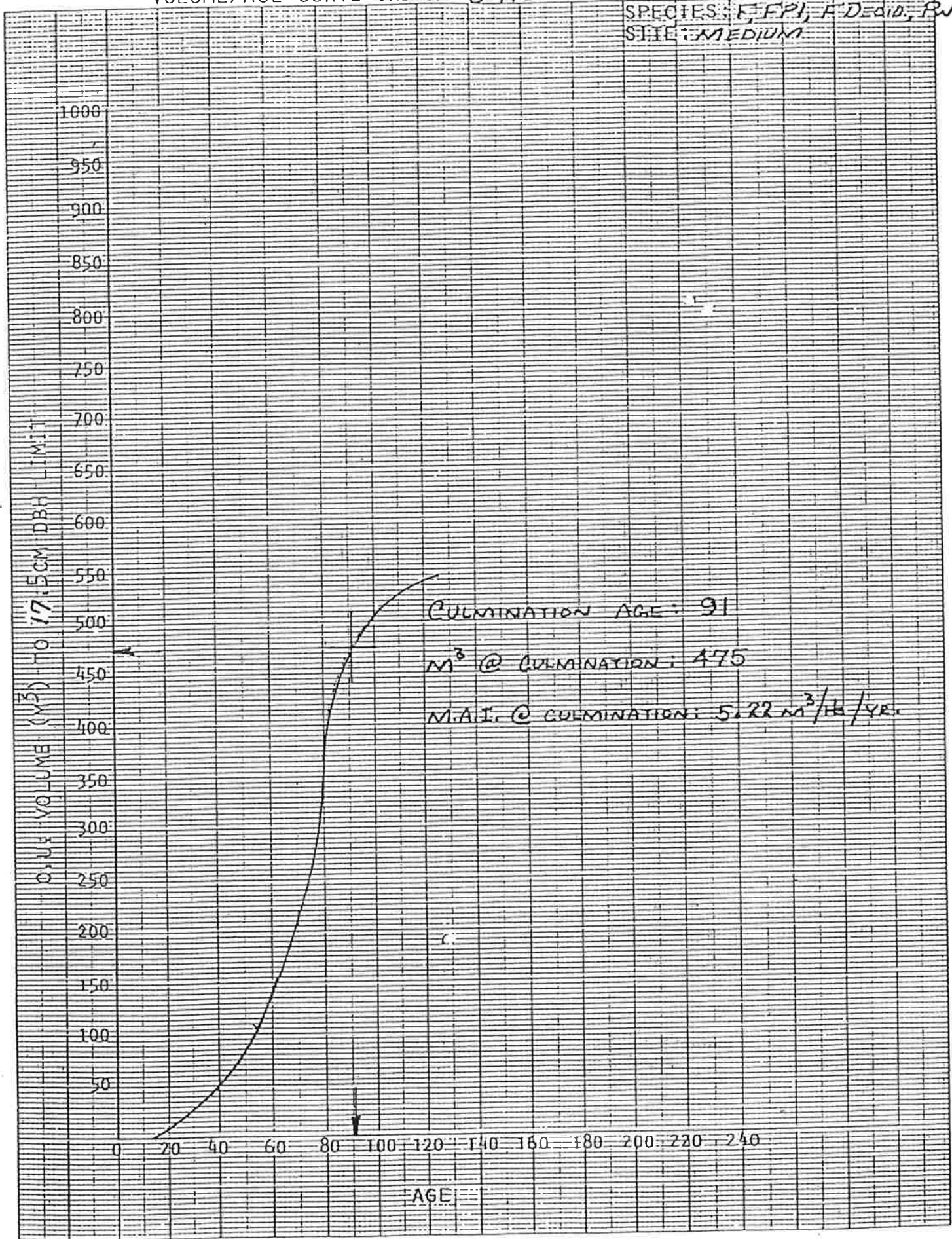
VOLUME/AGE CURVE INDEX   3430-B      GROWTH TYPE: 10-0

SPECIES: Decid. Conif.
SITE: MEDIUM

O.U. VOLUME (M3) TO 17.5CM DBH LIMIT

1000
950
900
850
800
750
700
650
600
550
500
450
400
350
300
250
200
150
100
50

CULMINATION AGE: 58

M³ @ CULMINATION: 330

M.A.I. @ CULMINATION: 8.68 m³/Ha/yr.

0    20   40   60   80  100  120  140  160  180  200  220  240

AGE   3430-B      GROWTH TYPE: 10-0

10 MM/CM
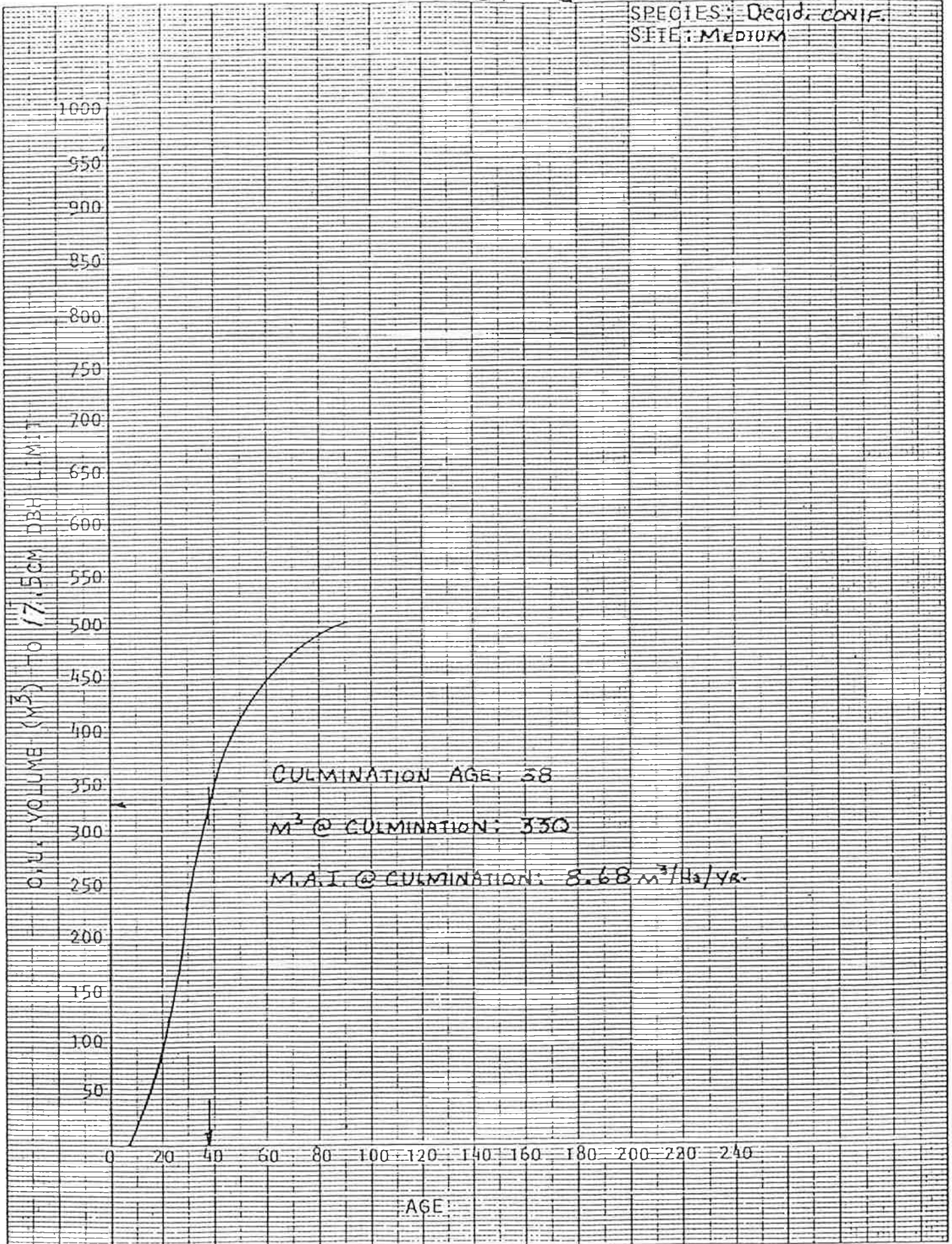
VOLUME/AGE CURVE INDEX   3430-B     GROWTH TYPE: 11-0

SPECIES: Decid. Conif.
SITE: MEDIUM

C.U. VOLUME (M3) TO 17.5CM DBH LIMIT

CULMINATION AGE: 54

M³ @ CULMINATION: 255

M.A.I. @ CULMINATION: 4.72 M³/Ha/yr.

AGE   3430-B

10 MM·CM
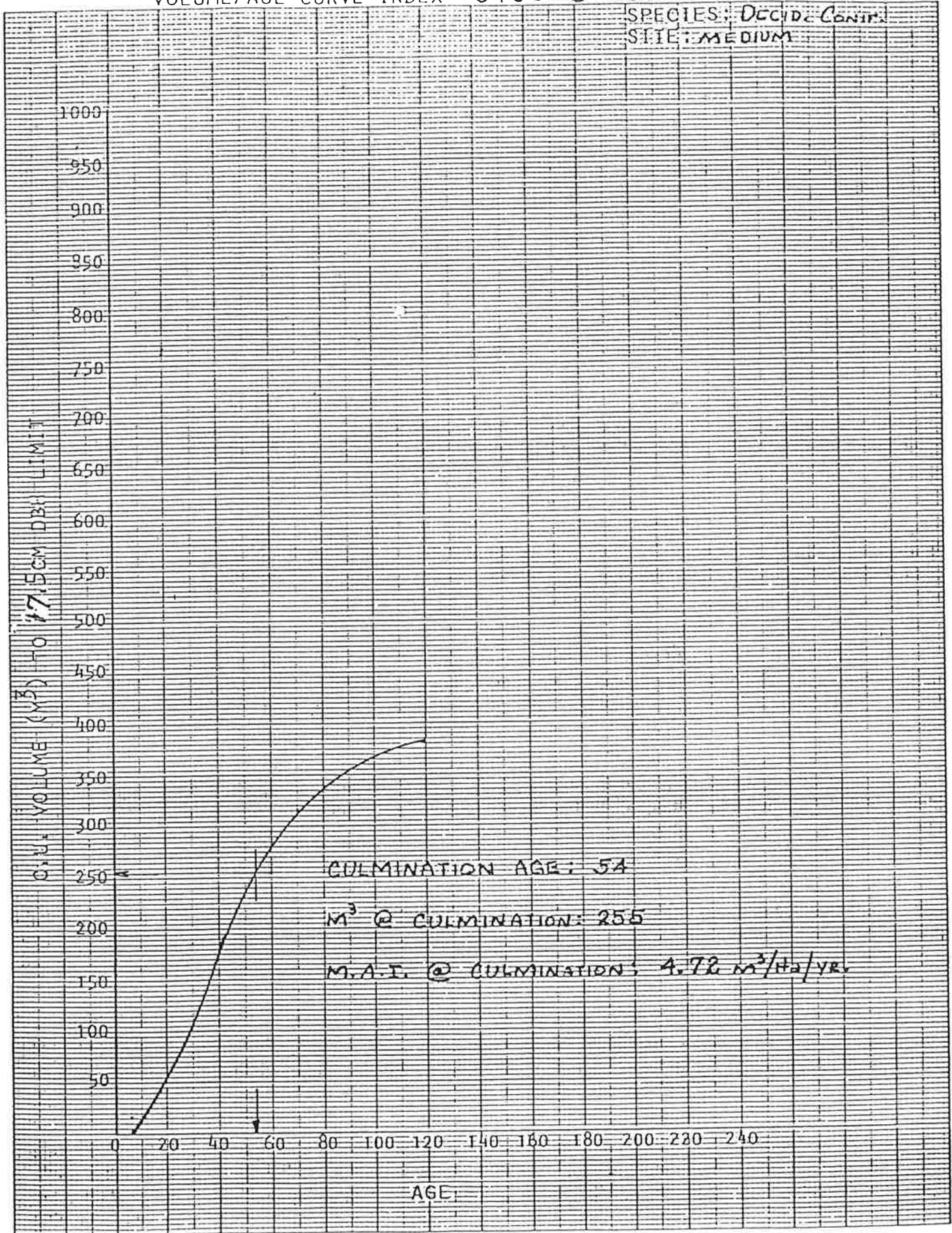
VOLUME/AGE CURVE INDEX   3418-B   GROWTH TYPE: 12-A.
SPECIES: F, FPI, F DECID, PW
SITE: MEDIUM.

CULMINATION AGE: 96

M³ @ CULMINATION: 462

M.A.I. @ CULMINATION: 4.81 M³/Ho/YR

O.U.F. VOLUME (M³) TO 17.5 CM DBH LIMIT

1000
950
900
850
800
750
700
650
600
550
500
450
400
350
300
250
200
150
100
50

0   20   40   60   80   100   120   140   160   180   200   220   240

AGE   3418-B

10 MM/CM
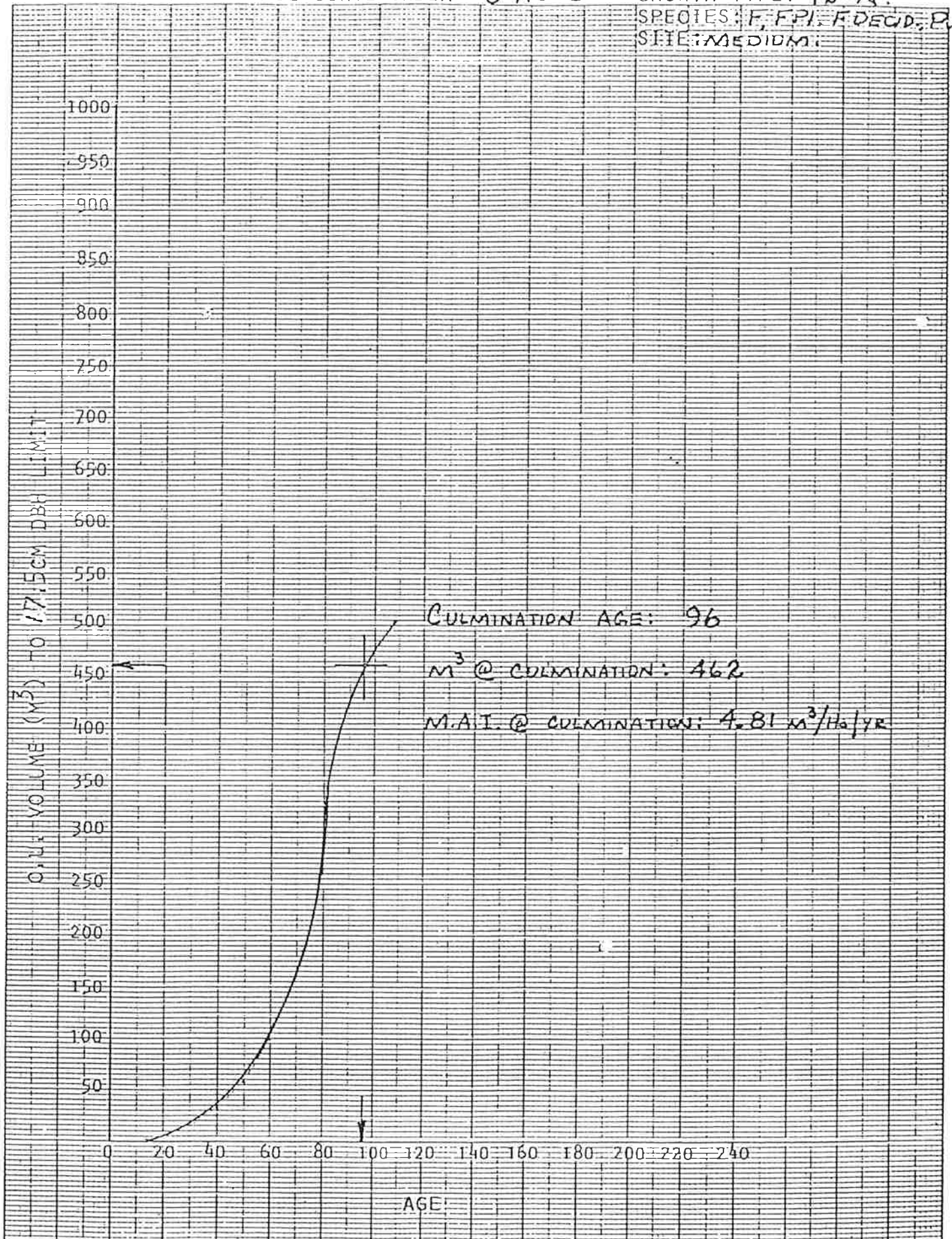
VOLUME/AGE CURVE INDEX 3418-B    GROWTH TYPE: 13-A

SPECIES: F, FPl, F DECID, PW
SITE: MEDIUM

CULMINATION AGE: 95

M³ @ CULMINATION: 464

M.A.I. @ CULMINATION: 4.88 M³/Ha/YR.

G.U.F. VOLUME (M3) TO 17.5CM DBH LIMIT

AGE 3418-B

10 MM/CM
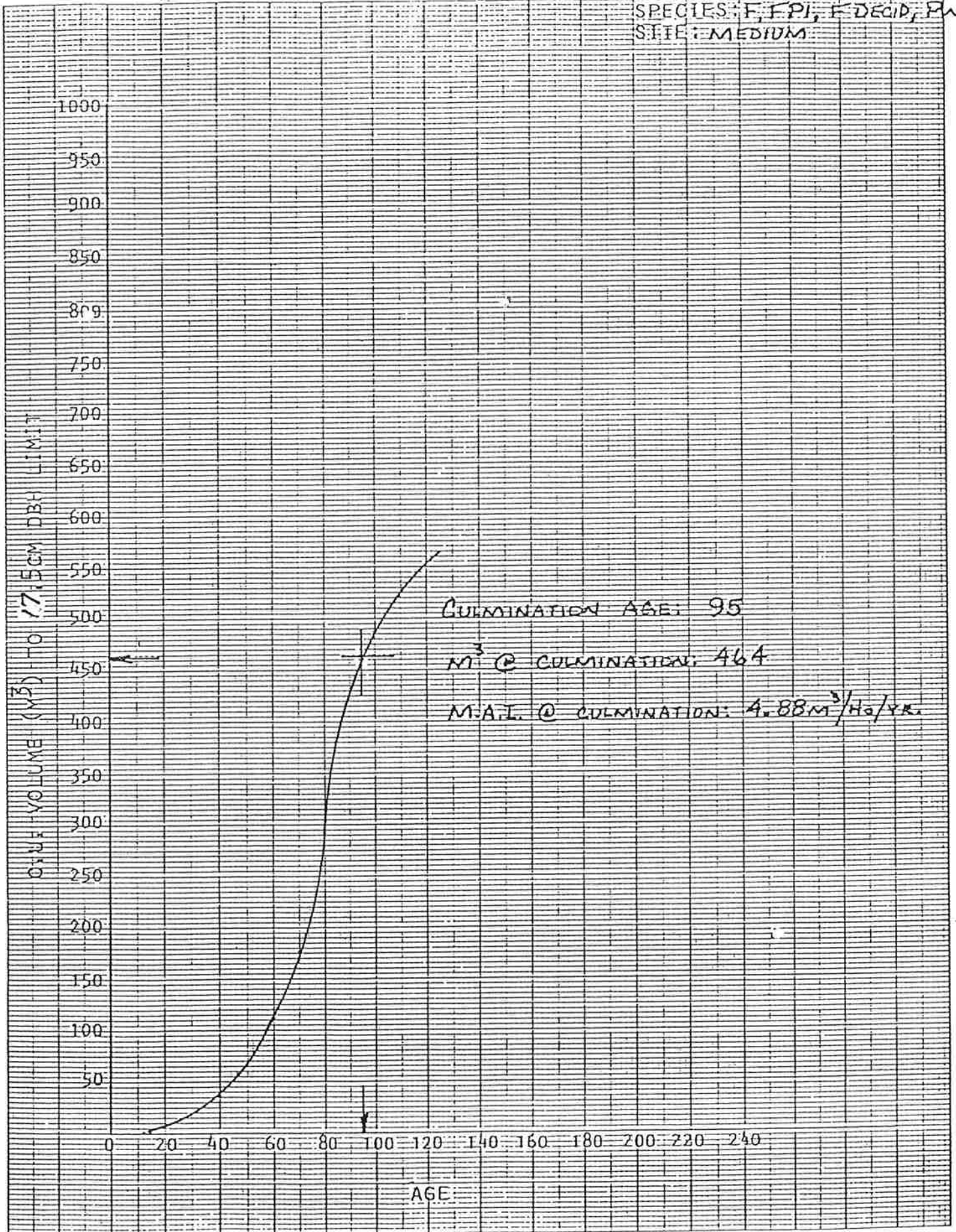
VOLUME/AGE CURVE INDEX 3419-B    GROWTH TYPE: 14-A

SPECIES: F, FPl, F DECID, P.W
SITE: POOR

CULMINATION AGE: 92

M³ @ CULMINATION: 284

M.A.I. @ CULMINATION: 3.09 M³/Ha/YR.

Y-axis: G.U. VOLUME (M3) TO 17.5CM DBH LIMIT

1000
950
900
850
800
750
700
650
600
550
500
450
400
350
300
250
200
150
100
50

X-axis: 0  20  40  60  80  100  120  140  160  180  200  220  240

AGE  3419-B    GROWTH TYPE: 14-A

10 MM/CM
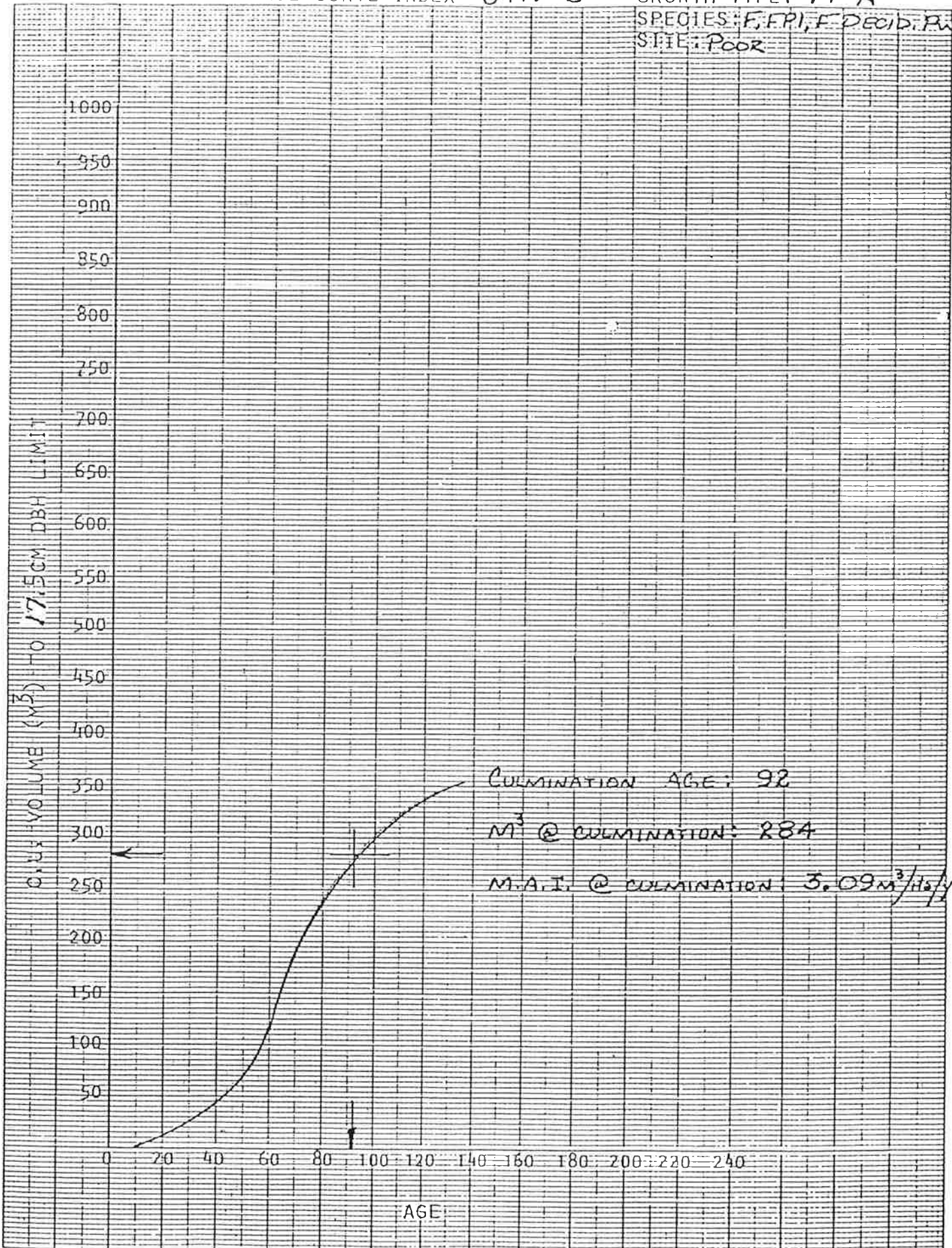
VOLUME/AGE CURVE INDEX 3430-B GROWTH TYPE: 15-0
SPECIES: DECID., CONIF.
SITE: MEDIUM.

O. U. F. VOLUME (M3) TO 17.5CM DBH LIMIT

CULMINATION AGE: 66

M³ @ CULMINATION: 190

M.A.I. @ CULMINATION: 2.88 M³/HA/YR.

AGE 3430-B

10 MM. CM
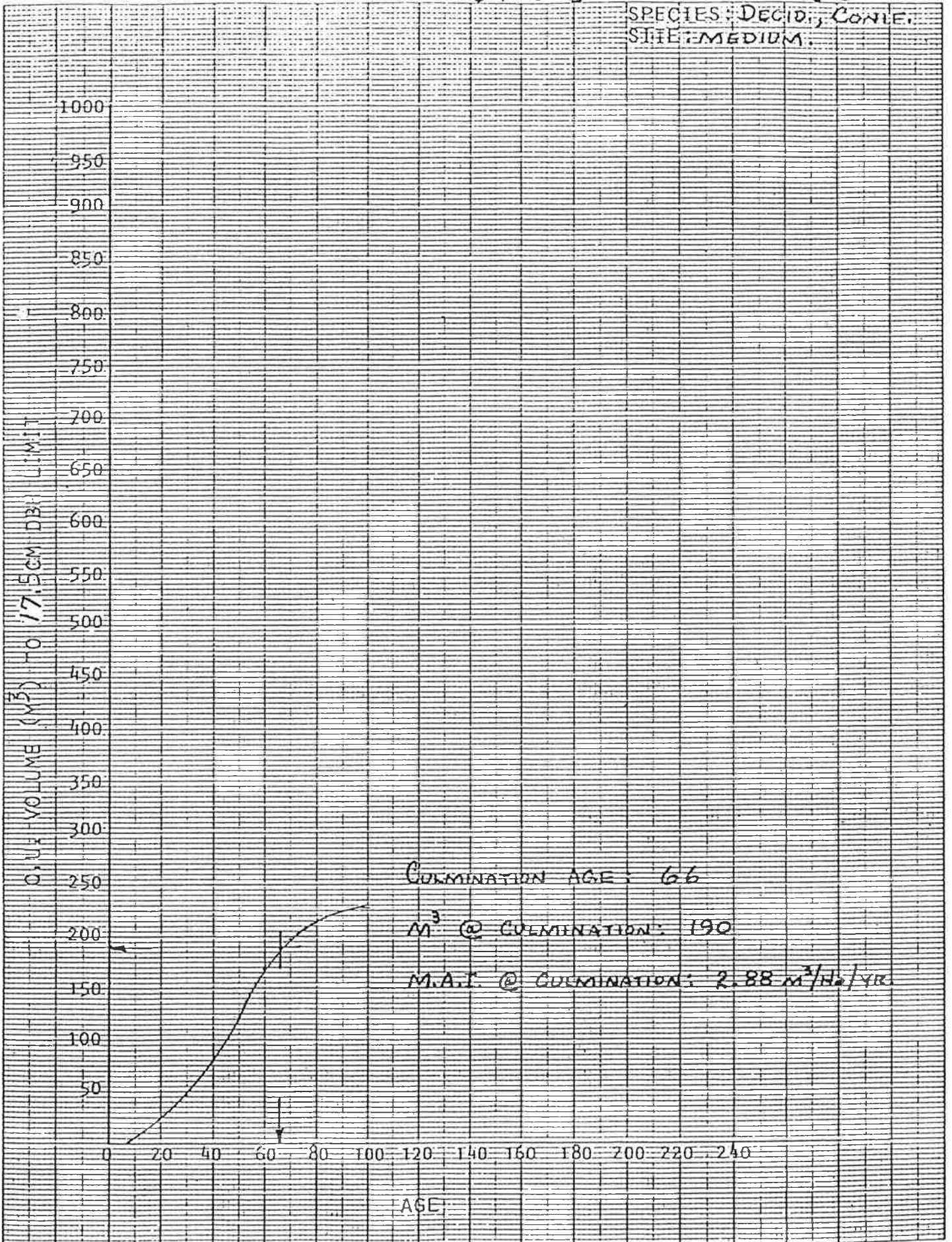
VOLUME/AGE CURVE INDEX 3420-B    GROWTH TYPE: 16-B
SPECIES: FC, FCY, FH, FS
SITE: MEDIUM



CULMINATION AGE: 114

m³ @ CULMINATION: 591

M.A.I. @ CULMINATION: 5.18 m³/Ho/Yr.

AGE

C.U. VOLUME (M3) TO 17.5CM D3H LIMIT

10 MM CM
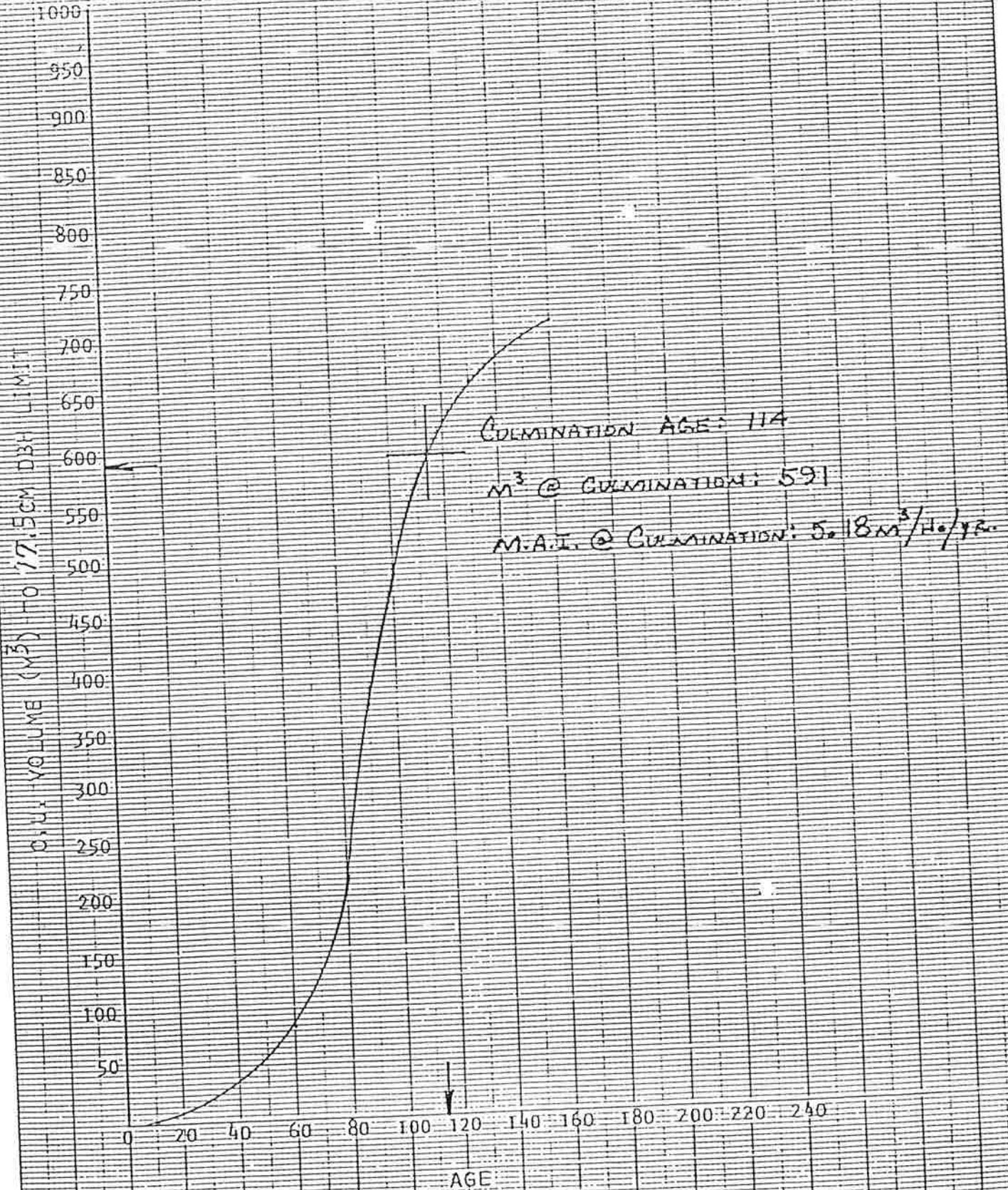
VOLUME/AGE CURVE INDEX 3418·B   GROWTH TYPE: 17-A
SPECIES: F, F PI, F DECID, RW
SITE: MEDIUM

O.U. VOLUME (V3) TO 17.5CM DBH LIMIT
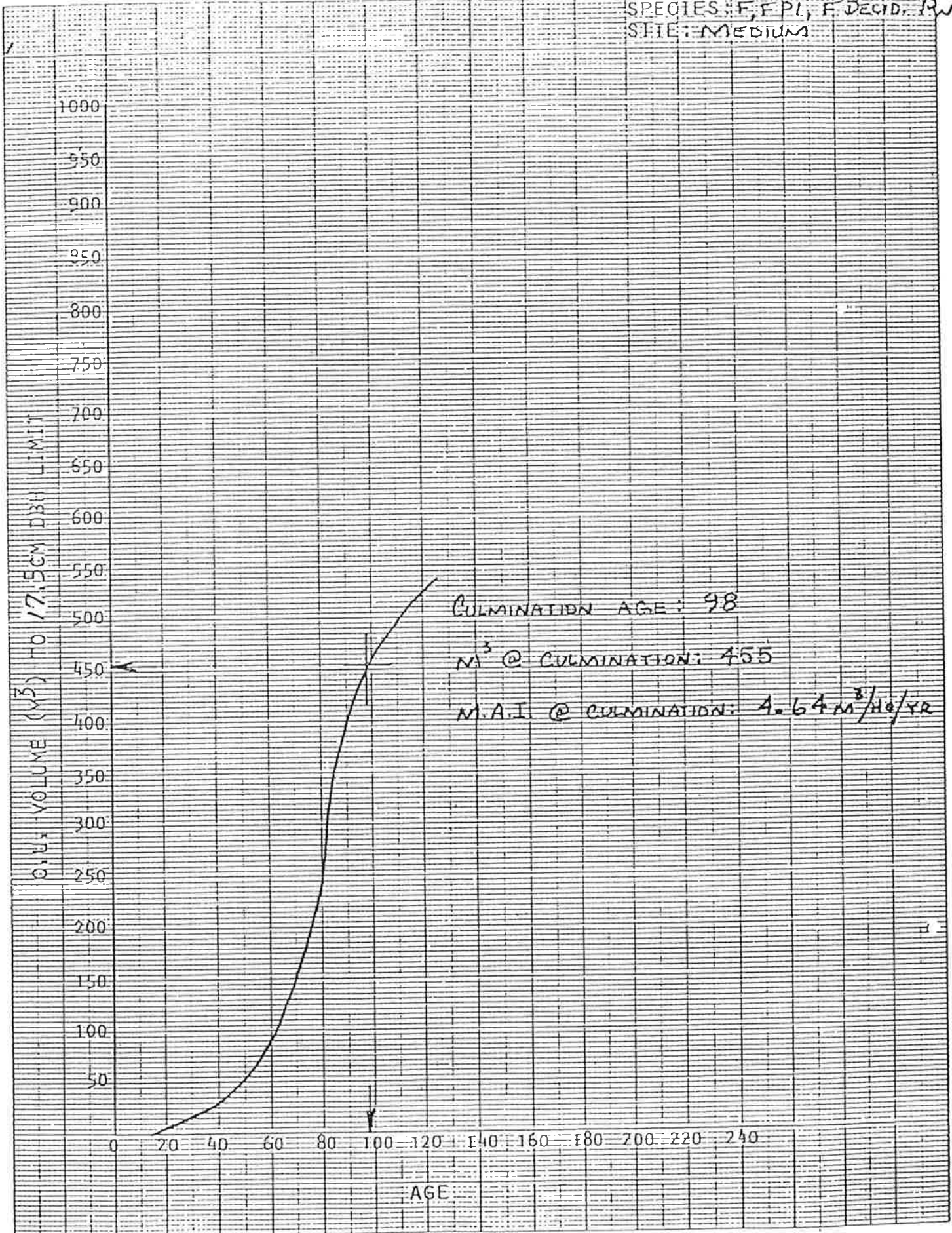
CULMINATION AGE: 98

M³ @ CULMINATION: 455

M.A.I @ CULMINATION: 4.64 M³/HA/YR

AGE 3418·B

10 MM CM

# APPENDIX B

## AREA VOLUME ALLOTMENT CHECK

# Area Volume Allotment Check.

Midpoint of this age class ___67___

Accumulated years of cutting ___0___

Cutting age of this age class ___67___

Volume being checked ___23,450___

Gross yield of this age class ___70,560___

Number of years cutting this age class ___3.0___

Accumulated years of cutting for next age class. ___3.0___

| Growth Type | Hectares | Ave. Volume per Hectare at Cut Age | Gross Yield of Type at Cutting Age |
|---|---|---|---|
| 1 | 336 | 210 | 70,560 |

# Area Volume Allotment Check:

Midpoint of this Age Class    59.0

Accumulated Years of Cutting    3.0

Cutting Age of this Age Class    62.0

Volume being Checked    23,450

Gross Yield of this Age Class    70,070

Number of Years Cutting this Age Class    3.0

Accumulated Years of Cutting for Next Age Class.    6.0

| Growth Type | Hectares | Ave. Volume per Hectare at Cut Age | Gross Yield of Type at Cutting Age |
|---|---|---|---|
| 10 | 154 | 455 | 70,070 |

# Area Volume Allotment Check.

Midpoint of this age class _56.0_

Accumulated years of cutting _6.0_

Cutting age of this age class _62.0_

Volume being checked _23,450_

Gross yield of this age class _43,645_

Number of years cutting this age class _1.9_

Accumulated years of cutting for next age class. _7.9_

| Growth Type | Hectares | Ave. volume per hectare at cut age | Gross yield of type at cutting age |
|---|---|---|---|
| 2 | 203 | 215 | 43,645 |

# Area Volume Allotment Check.

Midpoint of this Age Class    54

Accumulated Years of Cutting    10.4

Cutting Age of this Age Class    64.4

Volume Being Checked    23,450

Gross Yield of this Age Class    18,585

Number of Years Cutting this Age Class    0.8

Accumulated Years of Cutting for Next Age Class.    11.2

| Growth Type | Hectares | Ave. Volume per Hectare at Cut Age | Gross Yield of Type at Cutting Age |
|---|---|---|---|
| 17 | 177 | 105 | 18,585 |

# Area Volume Allotment Check.

Midpoint of this age class ___52___

Accumulated years of cutting ___11.2___

Cutting age of this age class ___63.2___

Volume being checked ___23,450___

Gross yield of this age class ___45,030___

Number of years cutting this age class ___1.9___

Accumulated years of cutting for next age class. ___13.1___

| Growth Type | Hectares | Ave. Volume per Hectare at Cut Age | Gross Yield of Type at Cutting Age |
|---|---|---|---|
| 3 | 79 | 670 | 45,030 |

# Area Volume Allotment Check.

Midpoint of this age class ___51___

Accumulated years of cutting ___13.1___

Cutting age of this age class ___64.1___

Volume being checked ___23,450___

Gross yield of this age class ___17,820___

Number of years cutting this age class ___0.8___

Accumulated years of cutting for next age class. ___13.9___

| Growth Type | Hectares | Ave. Volume per Hectare at Cut Age | Gross Yield of Type at Cutting Age |
|---|---|---|---|
| 4 | 91 | 198 | 17,820 |

## Area Volume Allotment Check.

Midpoint of this Age Class ___50___

Accumulated Years of Cutting ___13.9___

Cutting Age of this Age Class ___63.9___

Volume Being Checked ___23,450___

Gross Yield of this Age Class ___111,800___

Number of Years Cutting this Age Class ___4.8___

Accumulated Years of Cutting For Next Age Class. ___18.7___

| Growth Type | Hectares | Ave. Volume Per Hectare At Cut Age | Gross Yield Of Type At Cutting Age |
|---|---|---|---|
| 7 | 430 | 260 | 111,800 |

# Area - Volume Allotment Check.

Midpoint of this age class    48.0

Accumulated years of cutting    18.7

Cutting age of this age class    66.7

Volume being checked    23,450

Gross yield of this age class    87,300

Number of years cutting this age class    3.7

Accumulated years of cutting for next age class.    22.4

| Growth Type | Hectares | Ave. volume per hectare at cut age | Gross yield of type at cutting age |
|---|---|---|---|
| 13 | 582 | 150 | 87,300 |

Area Volume Allotment Check.

Midpoint of this age class ___45.0___

Accumulated years of cutting ___25.7___

Cutting age of this age class ___70.7___

Volume being checked ___23,450___

Gross yield of this age class ___67,924___

Number of years cutting this age class ___2.9___

Accumulated years of cutting for next age class ___28.6___

| Growth Type | Hectares | Ave. Volume per Hectare at Cut Age | Gross Yield of Type at Cutting Age |
|---|---|---|---|
| 15 | 344 | 196 | 67,924 |

# Area Volume Allotment Check.

Midpoint of this age class ___42.0___

Accumulated years of cutting ___28.6___

Cutting age of this age class ___70.6___

Volume being checked ___23,450___

Gross yield of this age class ___78,750___

Number of years cutting this age class ___3.4___

Accumulated years of cutting for next age class. ___32.0___

| Growth Type | Hectares | Ave. Volume per Hectare at Cut Age | Gross Yield of Type at Cutting Age |
|---|---|---|---|
| 11 | 250 | 315 | 78,750 |

# Area Volume Allotment Check.

Midpoint of this age class ___41.0___

Accumulated years of cutting ___32.0___

Cutting age of this age class ___73.0___

Volume being checked ___23,450___

Gross yield of this age class ___14,700___

Number of years cutting this age class ___0.6___

Accumulated years of cutting for next age class. ___32.6___

| Growth Type | Hectares | Ave. Volume per Hectare at Cut Age | Gross Yield of Type at Cutting Age |
|---|---|---|---|
| 16 | 100 | 147 | 14,700 |

## Area Volume Allotment Check:

Midpoint of this age class __39.0__

Accumulated years of cutting __46.1__

Cutting age of this age class __85.1__

Volume being checked __23,450__

Gross yield of this age class __56,260__

Number of years cutting this age class __2.4__

Accumulated years of cutting for next age class. __48.5__

| Growth Type | Hectares | Ave. volume per hectare at cut age | Gross yield of type at cutting age |
|---|---|---|---|
| 12 | 145 | 388 | 56,260 |

# Area Volume Allotment Check.

Midpoint of this Age Class ___33.0___

Accumulated ; Years of Cutting ___48.5___

Cutting Age of this Age Class ___81.5___

Volume being checked ___23,450___

Gross Yield of this Age Class ___41,004___

Number of Years Cutting this Age Class ___1.7___

Accumulated Years of Cutting for Next Age Class. ___50.2___

| Growth Type | Hectares | Ave. Volume per Hectare at Cut Age | Gross Yield of Type at Cutting Age |
|---|---|---|---|
| 8 | 67 | 612 | 41,004 |

## APPENDIX II

### ANNUAL AND FIVE YEAR HARVESTING PLAN

The harvesting and silvicultural operations are integrated thereby providing for cost effective treatment of silvicultural problem areas. The harvest plan therefore calls for the harvesting of relatively pure alder areas containing large trees along with predominantly coniferous stands. The basic assumptions on which this plan is based are:

1.  An average of 10 hectares per year of alder will be harvested for firewood purposes and is expected to sell for about $10/cord ($3.50/m3).

2.  Commencing in 1984, alder sawlog harvesting will commence on 20 hectares and expanding to 30 hectares in 1985 and 40 hectares in 1986. The sales value of this wood will also average approximately $3.50 per m3.

3.  Alder harvesting arrangements will depend upon the management objective of a particular stand. Some areas will be strictly firewood sales while others could be part of the woodlot operators harvesting responsibilities.

4.  The present logging contract will remain in force until expiry in December, 1984. At that time it will be changed to a fixed rate per cubic meter irrespective of the grade of timber harvested. To the extent permitted by the current contract, standards would be changed commencing in 1982 so as to promote operations which will meet municipal forest management objectives while at the same time promoting the financial strength of the operators.

5.  Coniferous production will remain at the current level of about 13,000 m3 for 1982 and then will increase to 23,000 m3 annually for the period 1983 to 1986 inclusive.

6.  Coniferous log prices for 1982 will be equivalent to those paid by Nanoose Forest Products (Domans) at mid-year 1981 and from 1983 to 1986 inclusive will be approximately the same as the 1979 prices.

| Sales Price 1982 | #3 Sawlog 10"+ | Chip & Saw 5"-9" |
| --- | --- | --- |
| Fir | $180/Mfbm | $50/Cunit (approx. $100/Mfbm) |
| Cedar | $130 | $50 |
| Hem/Bal | $145 | $50 |

| Sales Price 1983-86 | | |
| --- | --- | --- |
| Fir | $250/Mfbm | $85/Cunit (approx. $170/Mfbm) |
| Cedar | $220 | $85 |
| Hem/Bal | $220 | $85 |

Size distribution is estimated to be 60% 10"+ (#3 Sawlog) and 40% 5-9" (Chip & Saw). Species percent logged will be in proportion to the standing volumes as indicated in the inventory report: Fir 72.6%, cedar 10.2%, hemlock/balsam 16.3%, and pine 0.9%.

7. A phased-in program involving the production of poles and piling which command premium prices will commence in 1982 and expand progressively throughout the planning period. This project could be undertaken by the existing operators, a separate contractor, or a combination of them both. The volumes produced would be relatively small and would have an insignificant effect on cut control considerations.

8. By 1985, the returns to the contractor would increase to an average realistic level of $24.00 per $m^3$ of volume produced from a current level of about $14.00 per $m^3$. This will permit operators to keep operations and equipment efficient and up to standard and will permit them sufficient flexibility in their operations to meet the silvicultural goals of the municipality. It will also compensate for the increased cost of operations which will occur in response to improved utilization and road construction standards.

9. Serious consideration will also be given to the following:

   - Issuing of one year contracts on the present basis until market price improves. This decision can be deferred until 1984.

   - Minimum and maximum volumes to be harvested each year should be set.

   - Specific areas and methods of logging should be designated for each year.

   - Clearly defined logging and utilization standards which re commensurate with good forest management are necessary. During this time of poor market conditions, early 1982, it may be necessary to increase the payment to the contractors to enable them to achieve this goal.

## TABLE 1

### 5 YEAR HARVEST AND REVENUE PLAN 1982-1986

#### ALDER HARVEST (Sales @ $3.50/m³)

| YEAR | FIREWOOD VOLUME | FIREWOOD REVENUE | SAWLOGS VOLUME | SAWLOGS REVENUE | TOTALS VOLUME | TOTALS REVENUE |
|------|--------|--------|--------|--------|--------|--------|
| 1982 | 2,000m³ | $ 7,000 | -- | -- | 2,000m³ | $ 7,000 |
| 1983 | 2,000 | 7,000 | -- | -- | 2,000 | 7,000 |
| 1984 | 2,000 | 7,000 | 4,200m³ | $14,700 | 6,200 | 21,700 |
| 1985 | 2,000 | 7,000 | 6,200 | 21,700 | 8,200 | 28,700 |
| 1986 | 2,000 | 7,000 | 8,300 | 29,050 | 10,300 | 36,050 |
|  | 10,000m³ | $35,000 | 18,700m³ | $65,450 | 28,700m³ | $100,450 |

#### CONIFER HARVEST

| YEAR | VOLUME | AV.SALES VALUE/M³ | TOTAL REVENUE | CONTRACTOR REVENUE* /M³ | CONTRACTOR REVENUE* TOTAL | MUNICIPAL REVENUE /M³ | MUNICIPAL REVENUE TOTAL |
|------|--------|--------|--------|--------|--------|--------|--------|
| 1982 | 13,000m³ | $25.00/m³ | $325,000 | $14.12 | $183,600 | $10.88 | $141,400 |
| 1983 | 23,000 | 37.52 | 863,000 | 21.24 | 488,500 | 16.28 | 374,500 |
| 1984 | 23,000 | 37.52 | 863,000 | 21.24 | 488,500 | 16.28 | 374,500 |
| 1985 | 23,000 | 37.52 | 863,000 | 24.00 | 552,000 | 13.52 | 311,000 |
| 1986 | 23,000 | 37.52 | 863,000 | 24.00 | 552,000 | 13.52 | 311,000 |
|  | 105,000m³ |  | $3,777,000 |  | $2,264,600 |  | $1,512,400 |

*Contractor revenues per current contract, moving to a fixed rate in 1985.

#### COMBINED ALDER AND CONIFER HARVEST

| YEAR | TOTAL VOL. | MUNICIPAL REVENUE |
|------|-----------|-------------------|
| 1982 | 15,000m³ | $ 148,400 |
| 1983 | 25,000 | 381,500 |
| 1984 | 29,200 | 396,200 |
| 1985 | 31,200 | 339,700 |
| 1986 | 33,300 | 347,050 |
|  | 133,700m³ | $1,612,850 |

- All revenues given in 1982 dollars.
- Assumes markets for 1983-1986 remain at 1979 levels, an average year.

## APPENDIX III

### PROPOSED ANNUAL & FIVE YEAR SILVICULTURAL PLANS AND PROJECTS

The Report on Timber Inventory and Silvicultural Requirements has provided the basic data on which these plans and budgets have been prepared. Specific implementation of portions of the plan will require detailed field assessment prior to any project being initiated. The Forest Manager will be responsible for identifying and confirming areas for treatment, and will specifically identify treatment requirements and provide the detailed data base necessary to permit contracting out of the required work.

### SILVICULTURAL PRESCRIPTIONS*

| | | | |
|---|---|---:|---:|
| 1. | No treatment, leave until rotation age | 742.5 ha | 15.5% |
| 2. | Presently loggable: clearcut | 274.0 | 5.7 |
| 3. | Presently loggable: selective cut | 243.8 | 5.1 |
| 4. | Commercial thinning | 224.9 | 4.7 |
| 5. | Juvenile Spacing | 2,193.5 | 45.8 |
| 6. | Alder control | 300.4 | 6.3 |
| 7. | Alder logging | 559.9 | 11.7 |
| 8. | Planting | 50.4 | 1.1 |
| 9. | Brush Control | 197.0 | 4.1 |
| | | 4,786.4 ha | 100.0% |
| 10. | Aerial fertilization | 600.5** | |
| 11. | Site preparation | 624.5** | |

*Summarized from T.M. Thompson Report, Table 4.1 (Area Summary), Appendix 4 (2) and Table 6.3 (Summary of Silvicultural Prescriptions). Appendix 6 (16). These areas are estimates of treatments required on existing stand conditions. Future logging will require further selective treatments.

**These treatments will be applied over portions of the above hectares.

### PROJECTED ONE AND FIVE YEAR PLANS

The proposed Silvicultural Plan is designed to bring the Forest Reserves to the point where all backlog Basic Forestry requirements are caught up by the end of the five year period and a start is made on implementing Intensive Forest management. To achieve this goal, funds generated by past harvesting and currently held in the Forest Reserve will be utilized in 1982 as they would have been had forest management commenced some years ago.

These projections are based on conifer cut levels of approximately 13,000 $m^3$ for 1982 and 23,000 $m^3$ over the last four years of the plan period with the resulting conifer clearcut harvest of approximately 40 and 75 hectares respectively taken from several locations. Costs are given in 1982 dollars and are representative of current industrial rates (many of the projects will actually be undertaken by work experience crews, so actual costs should be much less). The criteria which were utilized in developing these projections are:

1. All planting will take place immediately following harvesting or site preparation and will utilize exclusively plug +1 or plug +2 large stock. The former will be utilized to restock conifer logged areas having low brush potential while the latter will be utilized on deciduous logged areas and those high sites having high brush potential. The average costs of reforestation are estimated to be 45¢ per tree nursery production costs plus 40¢ per tree planting costs. Assuming that 700 trees/hectare will be established, at 85¢ per tree, the average reforestation cost will be approximately $600/hectare.

2. The 50 hectares of backlog N.S.R. will be planted in 1982 and all future clearcuts are to be restocked within six months of harvest.

3. Brush control will be a priority project especially on the higher site lands. All of the current backlog of brushed-in areas of 197 hectares will be treated over the next two years. In addition, approximately half of the clearcut areas will require brush control, as will all deciduous logging areas for each of three years following harvesting. Treatments will be a mix of both mechanical and chemical applications.

4. Alder logging of the 560 hectares of loggable backlog alder stands will commence in 1982 at a rate of 10 hectares rising slowly to approximately 50 hectares in 1986. Harvesting for firewood of small diameter alder stands will proceed at a rate of 10 hectares per year. Further firewood revenues will be generated through sale of permits for firewood removal from slash areas.

5. Deciduous stands considered to be too small to be loggable occupy approximately 300 hectares and generally occur in pockets of 3 hectares or less. 50% of this area will be treated individually over the next five years with the balance being treated along with the harvesting of adjacent stands. Treatment costs are expected to be $250/hectare for chemical means and $700/hectare for mechanical means, with subsequent re-treatments averaging $500/hectare over 30 hectares per year.

6. Site preparation will be required on 75% of all harvested areas commencing in 1983. Either landing burns at $100/hectare or broadcast burns at $200/hectare will be required.

7. Release of established conifers from competing weed species will commence in 1985 on all deciduous areas harvested in 1982 or earlier. Treatment costs for both chemical and mechanical projects will average $250/hectare.

8. Juvenile spacing projects will be scheduled on an even flow basis over 10 to 12 years with an average treatment rate of approximately 100 hectares per year. Average per manday productivity is estimated to be .35 hectares resulting in an average treatment cost of $750/hectare.

9. Aerial fertilization on selected sites will commence in 1985 at a rate of 200 hectares per year, costing approximately $225/hectare.

10. Commercial thinning will be a low priority project and will only be undertaken if it will result in a break-even or better operation. Startup is scheduled for 1984 at a rate of 50 hectares per year.

The treatments, size of treatments and expected costs are listed in Table 2.

## TABLE 2

## 5 YEAR SILVICULTURAL PLAN 1982 - 1986

| BASIC FORESTRY: | 1982 ha | 1982 $ | 1983 ha | 1983 $ | 1984 ha | 1984 $ | 1985 ha | 1985 $ | 1986 ha | 1986 $ |
|---|---|---|---|---|---|---|---|---|---|---|
| Broadcast Burns | | | 15 | 3,000 | 15 | 3,000 | 24 | 4,800 | 26 | 5,200 |
| Landing Burns | | | 20 | 2,000 | 20 | 2,000 | 25 | 2,500 | 30 | 3,000 |
| Brush Control | 100 | 50,000 | 97 | 48,500 | 45 | 22,500 | 45 | 22,500 | 65 | 32,500 |
| Alder Control | 30 | 15,000 | 30 | 15,000 | 30 | 15,000 | 30 | 15,000 | 30 | 15,000 |
| Planting of Clearcut Areas | 65 | 39,000 | 100 | 60,000 | 75 | 45,000 | 75 | 45,000 | 75 | 45,000 |
| Planting of Alder Log Areas | 10 | 6,000 | 10 | 6,000 | 30 | 18,000 | 40 | 24,000 | 50 | 30,000 |
| Planting of Brush Areas | | | 100 | 60,000 | 97 | 58,200 | | | | |
| Conifer Release | | | | | | | 10 | 2,500 | 10 | 2,500 |
| | 205 | 110,000 | 372 | 194,500 | 312 | 164,300 | 249 | 116,300 | 286 | 133,200 |
| INTENSIVE FORESTRY: | | | | | | | | | | |
| Juvenile Spacing | 100 | 75,000 | 100 | 75,000 | 100 | 75,000 | 100 | 75,000 | 100 | 75,000 |
| Fertilization | | | | | | | 200 | 45,000 | 200 | 45,000 |
| | 100 | 75,000 | 100 | 75,000 | 100 | 75,000 | 300 | 120,000 | 300 | 120,000 |
| TOTAL FORESTRY BUDGET:* | 305 | $185,000 | 472 | $269,500 | 412 | $239,300 | 549 | $236,300 | 586 | $253,200 |

| | 1982 | 1983 | 1984 | 1985 | 1986 |
|---|---|---|---|---|---|
| HARVEST VOLUME (CONFIFER & DECID) | 15,000m³ | 25,000m³ | 29,200m³ | 31,200m³ | 33,300m³ |
| COST/M³ OF HARVEST | $12.33/m³ | $10.78/m³ | $8.20/m³ | $7.57/m³ | $7.60/m³ |

*All costs given in 1982 dollars.

## AN EXAMINATION OF THE POTENTIAL ALLOWABLE CUT OF

## THE CROWN LANDS PROPOSED FOR INCLUSION IN

## A NORTH COWICHAN MUNICIPAL TFL

### LANDS EXAMINED:

| | |
|---|---|
| Banon Creek | 1,675 ha |
| Coronation Mountain | 3,564 |
| Mount Prevost | 1,937 |
| Sahtlam-Skutz | 2,051 |
| TOTAL | 9,227 ha |

### DATA SOURCES:

The basis for most of the information is the 1970 B.C.F.S. inventory maps. Stand data for the Banon and Sahtlam-Skutz areas was obtained from recent Management Plans of the B.C.F.S. Duncan District. Data from spaced areas was utilized for a large portion of Coronation Mountain. For the remainder of Coronation plus Mount Prevost, types on the inventory maps were grouped by site and age, and hectares for all of Coronation and Prevost were taken from the maps. The M.A.I. and volume figures for each age class were taken from the Ministry of Forests Variable Density Yield Projection Tables (October 1980).

It should be noted that in consideration of the limited data available, the annual cut volumes arrived at in this report must be viewed as estimates and not adhered to as exact figures for subsequent planning. The hectares are also rough and do not compare exactly to the legal values.

### STAND DESCRIPTION:

The predominant species is Douglas-fir throughout the entire area. Of the total area, 85% is covered by coniferous (fir) stands, 13% is deciduous and 2% is N.S.R. Of the fir stands, 16% is good site, 65% is medium and 19% is poor site. These site classes were grouped into 10 or 20 year age classes depending upon available information. Examination of the age class distribution by area shows 88% of the area covered by stands 25 to 70 years old (68% is between 25 and 50 years old). On Coronation Mountain, 1,650 ha of juvenile spacing has been carried out in stands mostly between 30 and 40 years old.

## DISCUSSION AND RESULTS:

As Douglas-fir is the main species, no other species was considered in the calculation of a commercial cut. To allow for increased growth from present stand treatments (spacing and fertilizing), some treated stands were rounded up in age from mid 30's to 40 years old and site class was increased from poor to medium in some cases. No other stand treatment was considered for the purposes of cut calculations with the exception of 400 hectares of good site rehabilitation, deciduous to conifer, over the next 20 years. (The area of good site was increased by 200 hectares at T-10 and 200 hectares at T-20.)

After grouping age classes by site class, the total M.A.I. arrived at is $46,000m^3$. The present volume (age 30+, 17.5cm dbh) is $2,227,000m^3$ of which 83% is between 35 and 70 years old. The three site classes were graphically projected by 10 year intervals over a period of 90 years. The sum of the three sites gives the total allowable annual cut. The projection indicates that the cut could rise as high as $78,000m^3$ per year from T-20 to T-30 and be as low as $43,900m^3$ per year from T-60 to T-70. (Assume T-0 = 1981.)

To arrive at an optimum annual cut it is apparent that fluctuations in the cut over time would be reduced by commercial thinning in good site at an earlier stage, T-0 to T-10, and possibly delaying cut to the medium site through thinnings in the T-20 to T-40 stages. The annual cut expressed as an overall average would be approximately $55,000m^3$. This cut represents an estimate based on no further spacing or fertilizing, however the cut could be increased substantially if silvicultural practices were maintained throughout the stand rotations.

SUMMARY OF AREA AND M.A.I. BY AGE CLASS AND SITE

| | AGE CLASS | CONIFER AREA | M.A.I. | VOL/HA | TOTAL M.A.I. | DECID. AREA | N.S.R. AREA |
|---|---|---|---|---|---|---|---|
| GOOD SITE | 10 | 50ha | | | | | |
| | 20 | 9 | $3.9m^3$/ha/yr | | $35.1m^3$ | | |
| | 30 | 24 | 7.2 | $215.5m^3$ | 172.8 | | |
| | 40 | 1,005 | 9.6 | 382.1 | 9,648.0 | 603ha | |
| | 60 | 144 | 11.2 | 669.4 | 1,612.8 | | |
| | 80 | 12 | 10.5 | 841.8 | 126.0 | | |
| | 100 | 31 | 9.3 | | 288.3 | | |
| | | 1,275ha | | | | | |
| MEDIUM SITE | 10 | 63 | | | | | |
| | 20 | 138 | .6 | | 82.8 | | |
| | 30 | 673 | 3.1 | 93.2 | 2,086.3 | | |
| | 40 | 2,657 | 6.0 | 240.1 | 15,942.0 | | |
| | 60 | 1,212 | 8.0 | 482.8 | 9,696.0 | 500 | |
| | 80 | 284 | 7.2 | 579.0 | 2,044.8 | | |
| | 100 | 3 | 6.1 | | 18.3 | | |
| | 120 | 6 | 5.1 | | 30.6 | | |
| | 140 | 23 | 4.3 | | 98.9 | | |
| | 250+ | 61 | 2.5 | | 152.5 | | |
| | | 5,120ha | | | | | |
| POOR SITE | 10 | 28 | | | | | |
| | 20 | 121 | .2 | | 24.2 | | |
| | 30 | 248 | 1.4 | 416.0 | 347.2 | | |
| | 40 | 756 | 3.0 | 118.5 | 2,268.0 | 68 | 163ha |
| | 60 | 216 | 4.2 | 251.8 | 907.0 | | |
| | 80 | 109 | 3.8 | 303.9 | 414.2 | | |
| | 100 | 17 | 3.2 | | 54.4 | | |
| | 150 | 3 | 2.2 | | 6.6 | | |
| | | 1,498ha | | | | | |
| | | 7,893ha | | | $46,057m^3$ | 1,171ha | 163ha |

TOTAL: 9,227ha

## AGE CLASS DISTRIBUTION BY AREA

| AGE CLASS | AREA | PERCENT | |
|---|---|---|---|
| 10 | 141 ha | 1.8% | } 5.2% |
| 20 | 268 | 3.4 | |
| 30 | 945 | 12.0 | } 88.0% |
| 40 | 4,148 | 56.0 | |
| 60 | 1,572 | 20.0 | |
| 80 | 405 | 5.0 | |
| 100 | 51 | .6 | |
| 120 | 6 | .1 | } 6.8% |
| 140 | 23 | .3 | |
| 150 | 3 | .05 | |
| 250+ | 61 | .15 | |
| | 7,893 ha | 100.0% | |

Deciduous Cover =                                    1,171 ha          13.0% of Total Area

NSR (Not Satisfactorily Restocked) =    163 ha            2.0% of Total Area
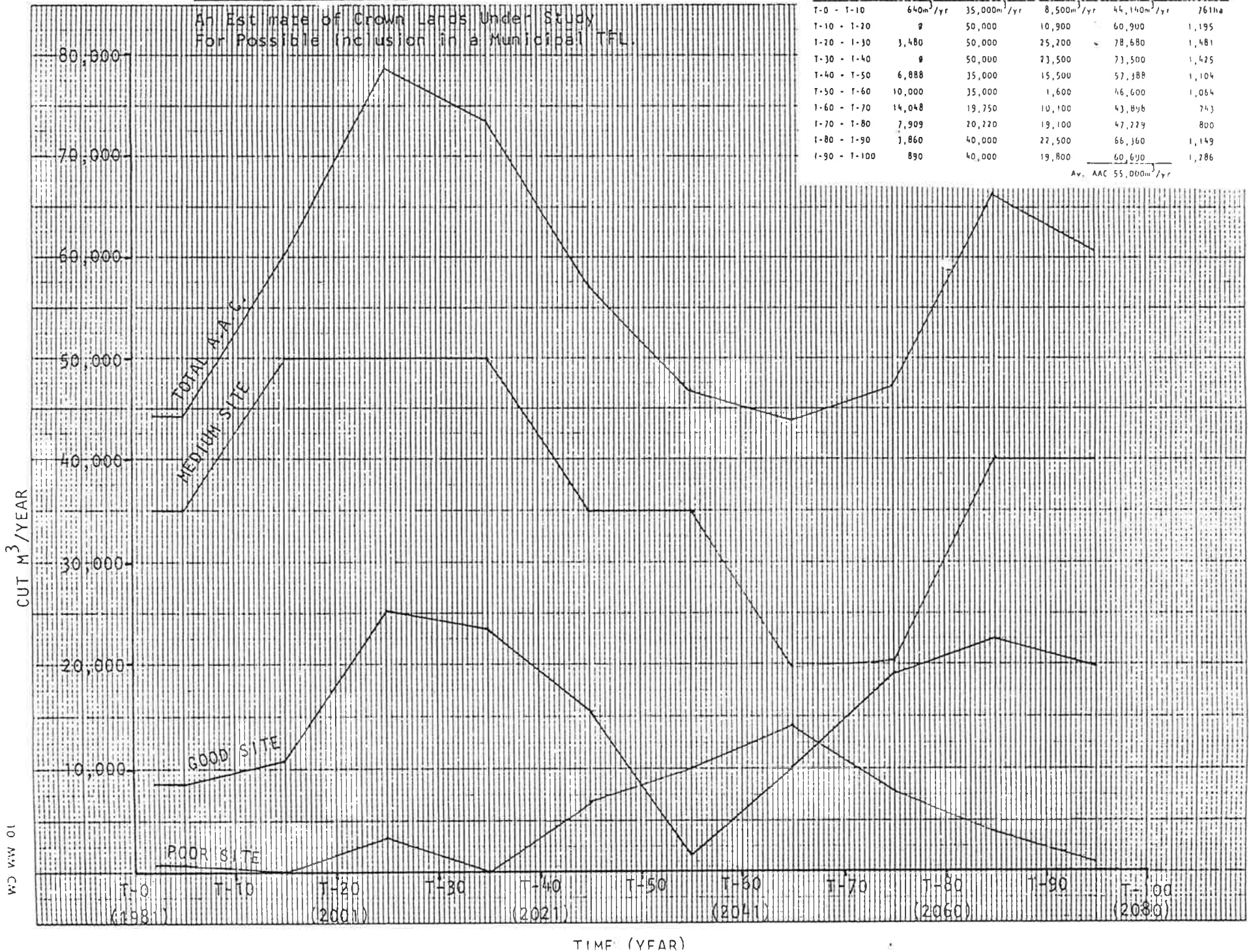
TOTAL AREA        9,227 ha

SITE CLASS

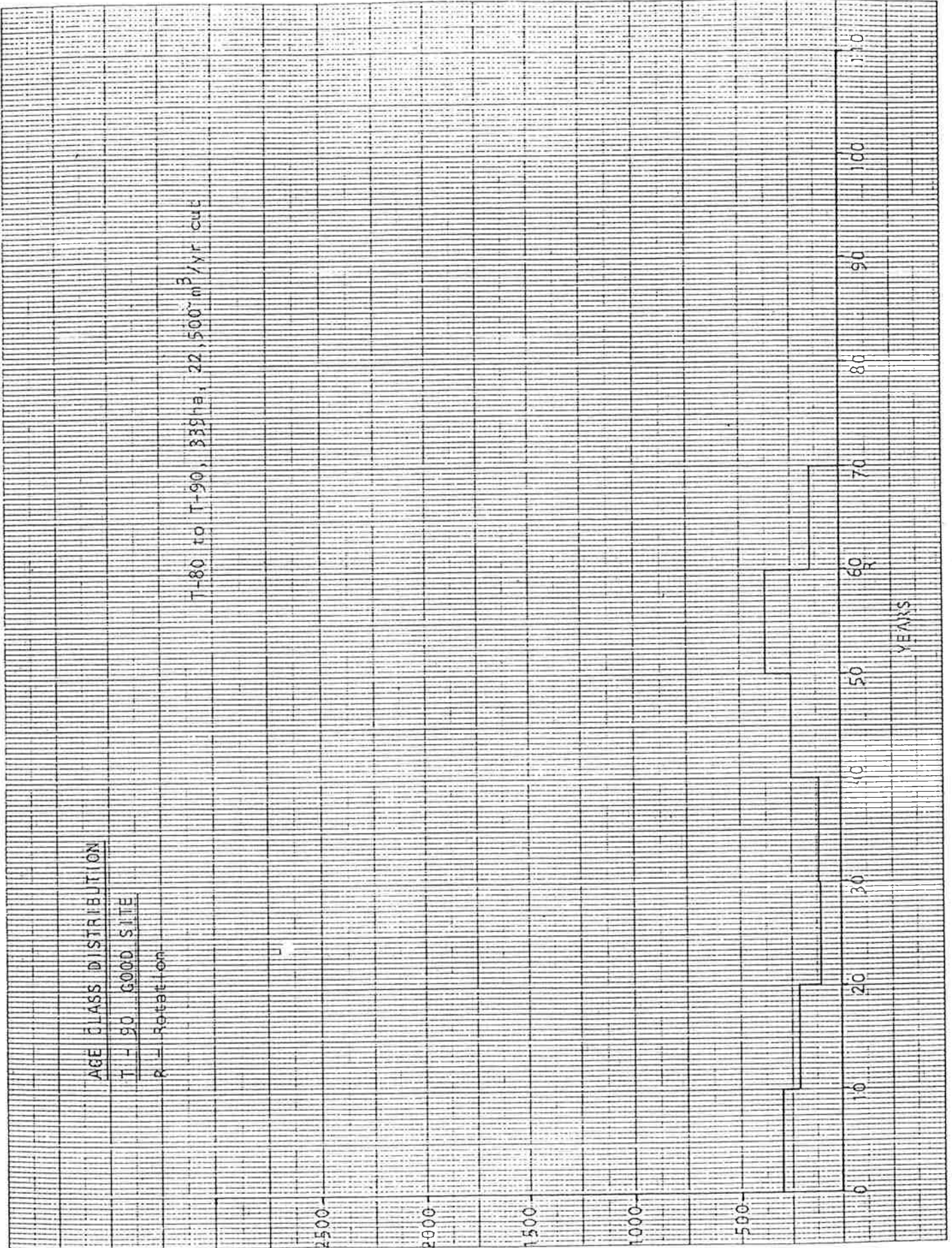| PERIOD | POOR | MEDIUM | GOOD | TOTAL | AREA LOGGED |
|--------|------|--------|------|-------|-------------|
| T-0 - T-10 | $640m^3$/yr | $35,000m^3$/yr | $8,500m^3$/yr | $44,140m^3$/yr | 761ha |
| T-10 - T-20 | Ø | 50,000 | 10,900 | 60,900 | 1,195 |
| T-20 - T-30 | 3,480 | 50,000 | 25,200 | 78,680 | 1,481 |
| T-30 - T-40 | Ø | 50,000 | 23,500 | 73,500 | 1,425 |
| T-40 - T-50 | 6,888 | 35,000 | 15,500 | 57,388 | 1,104 |
| T-50 - T-60 | 10,000 | 35,000 | 1,600 | 46,600 | 1,064 |
| T-60 - T-70 | 14,048 | 19,750 | 10,100 | 43,898 | 743 |
| T-70 - T-80 | 7,909 | 20,220 | 19,100 | 47,229 | 800 |
| T-80 - T-90 | 3,860 | 40,000 | 22,500 | 66,360 | 1,149 |
| T-90 - T-100 | 890 | 40,000 | 19,800 | 60,690 | 1,286 |

Av. AAC $55,000m^3$/yr

# ALLOWABLE ANNUAL CUT

An Estimate of Crown Lands Under Study
For Possible Inclusion in a Municipal TFL.

| | SITE CLASS | | | | |
|---|---|---|---|---|---|
| PERIOD | POOR | MEDIUM | GOOD | TOTAL | AREA LOGGED |
| T-0 - T-10 | 640 m³/yr | 35,000 m³/yr | 8,500 m³/yr | 44,140 m³/yr | 761 ha |
| T-10 - T-20 | 0 | 50,000 | 10,900 | 60,900 | 1,195 |
| T-20 - T-30 | 3,480 | 50,000 | 25,200 | 78,680 | 1,481 |
| T-30 - T-40 | 0 | 50,000 | 23,500 | 73,500 | 1,425 |
| T-40 - T-50 | 6,888 | 35,000 | 15,500 | 57,388 | 1,104 |
| T-50 - T-60 | 10,000 | 35,000 | 1,600 | 46,600 | 1,064 |
| T-60 - T-70 | 14,048 | 19,750 | 10,100 | 43,898 | 743 |
| T-70 - T-80 | 7,909 | 20,220 | 19,100 | 47,229 | 800 |
| T-80 - T-90 | 3,860 | 40,000 | 22,500 | 66,360 | 1,149 |
| T-90 - T-100 | 890 | 40,000 | 19,800 | 60,690 | 1,286 |

Av. AAC 55,000 m³/yr

CUT M³/YEAR

TOTAL A.A.C.

MEDIUM SITE

GOOD SITE

POOR SITE

80,000

70,000

60,000

50,000

40,000

30,000

20,000

10,000

T-0 (1981)  T-10  T-20 (2001)  T-30  T-40 (2021)  T-50  T-60 (2041)  T-70  T-80 (2060)  T-90  T-100 (2080)

TIME (YEAR)

10 X W CM

AGE CLASS DISTRIBUTION

T - 90   GOOD SITE

R = Rotation

T-80 to T-90, 33Ctha, 22,500 m³/yr cut

HECTARES

YEARS

10 MM CM

AGE CLASS DISTRIBUTION

T - 0 GOOD SITE

R = Rotation.

T-0 to T-10, 1,275/a = 8,500 l3/yr cut

YEARS

HECTARES

10 MM. CM.

AGE CLASS DISTRIBUTION

T - 90 MEDIUM SITE

T-80 to T-90, 782ha, 40,000 m³/yr cut

YEARS

HECTARES

10 MM CM

AGE CLASS DISTRIBUTION

T = 0   MEDIUM SITE

R = Rotation

T=0 to T-10, 5,120ha, 35,000 m³/yr cut

YEARS

HECTARES

10 MM/CM

AGE CLASS DISTRIBUTION

T-90 POOR SITE

R = Rotation

T-90 HQ T-100, 1,437ha, 890 m³/yr cut

HECTARES

YEARS

R
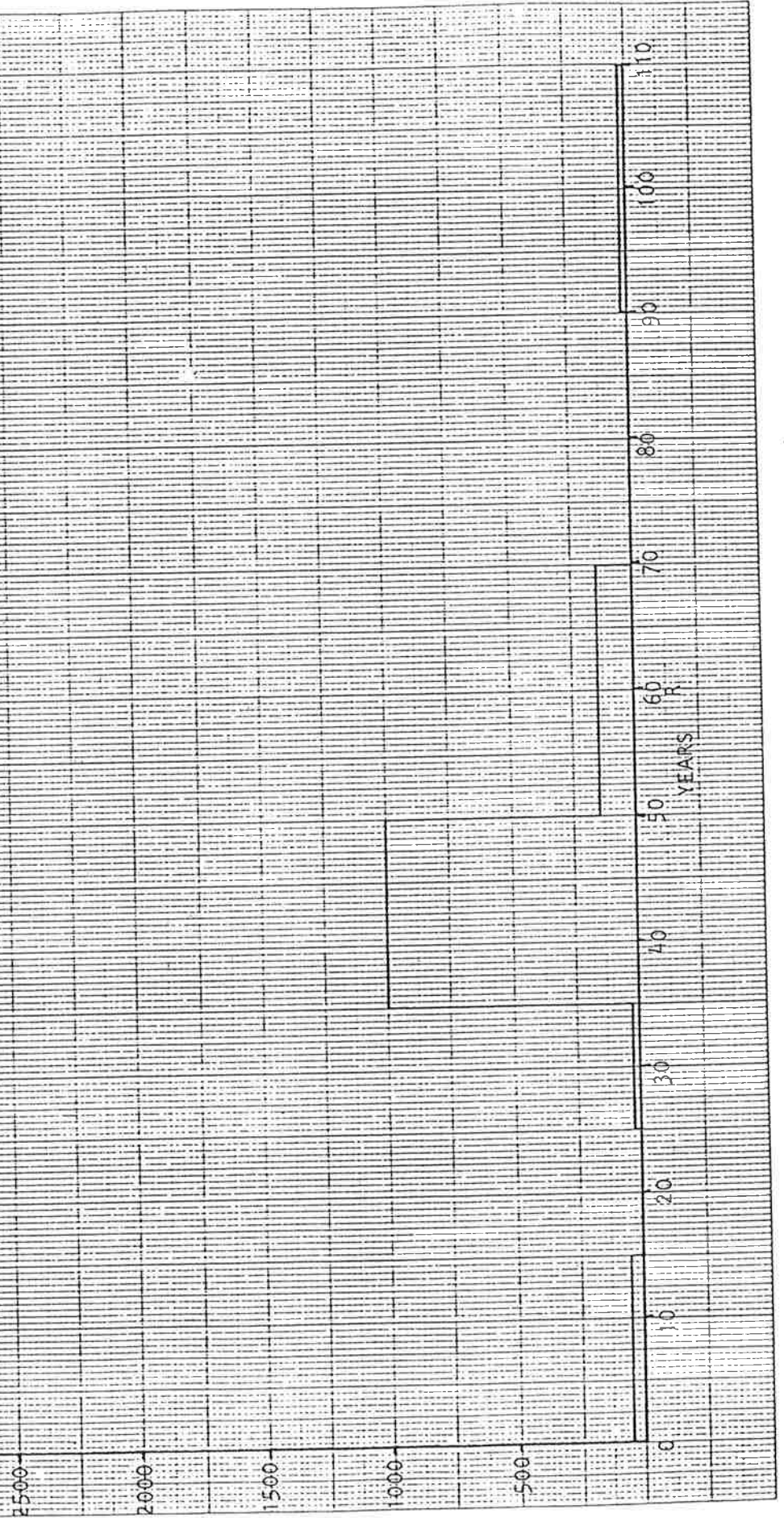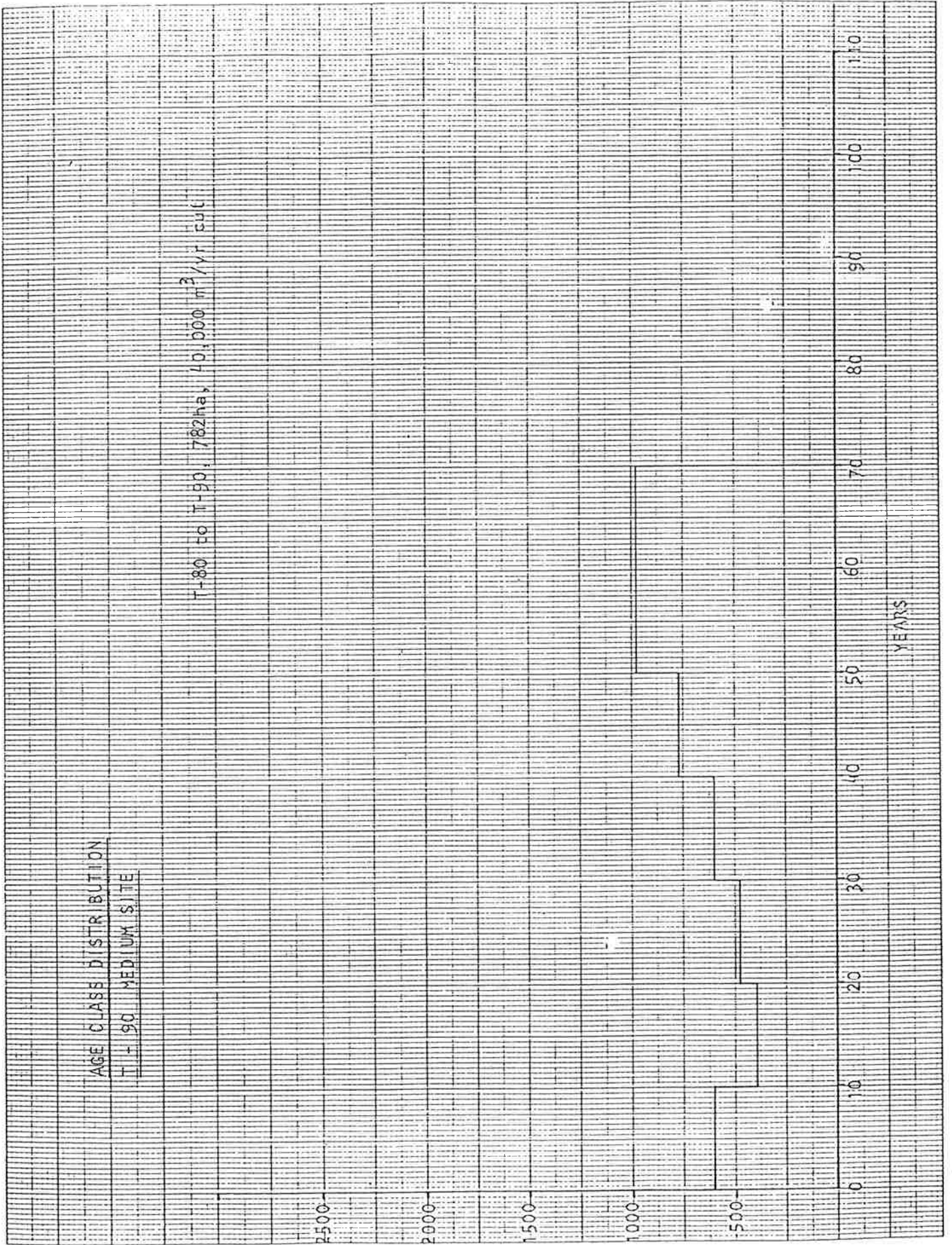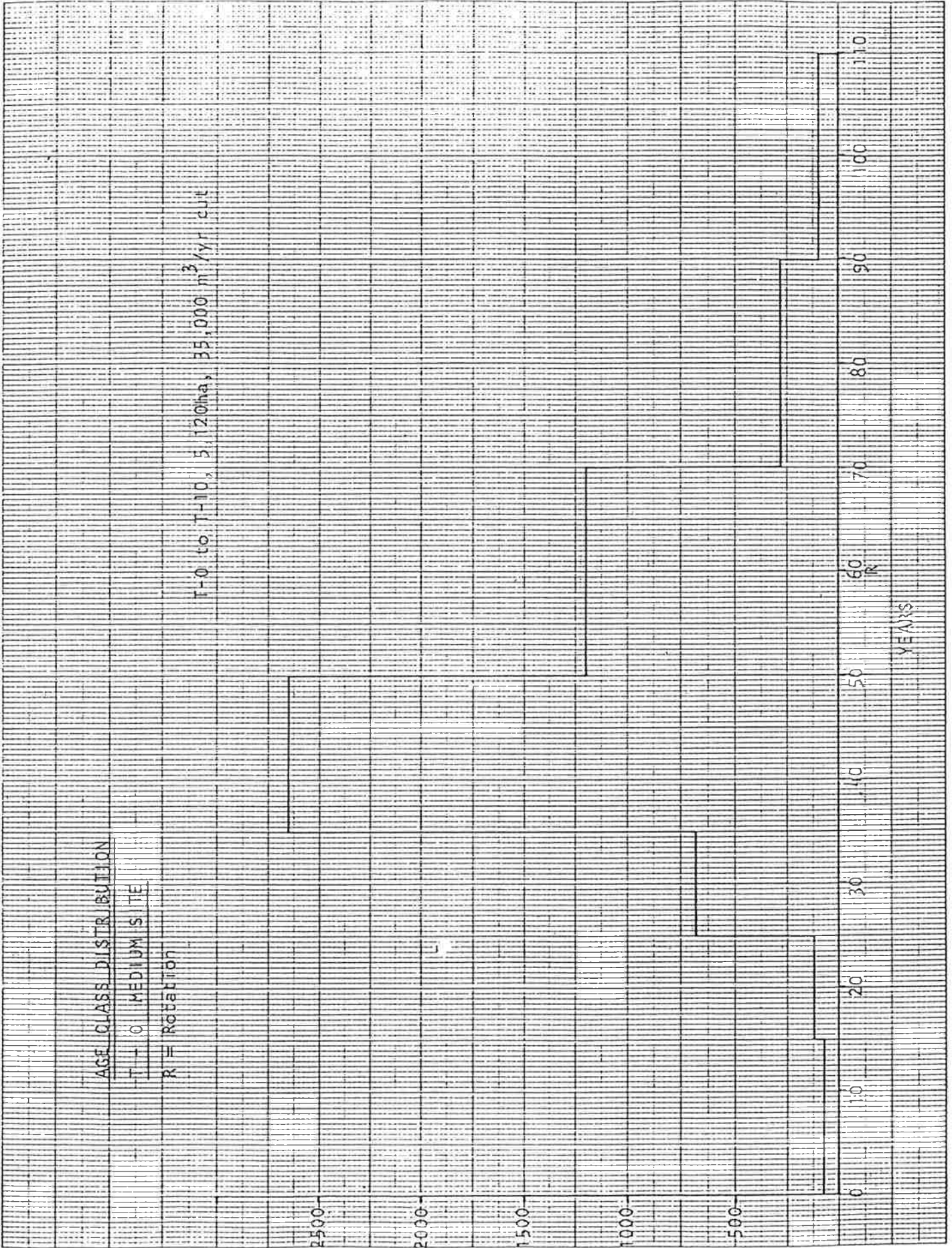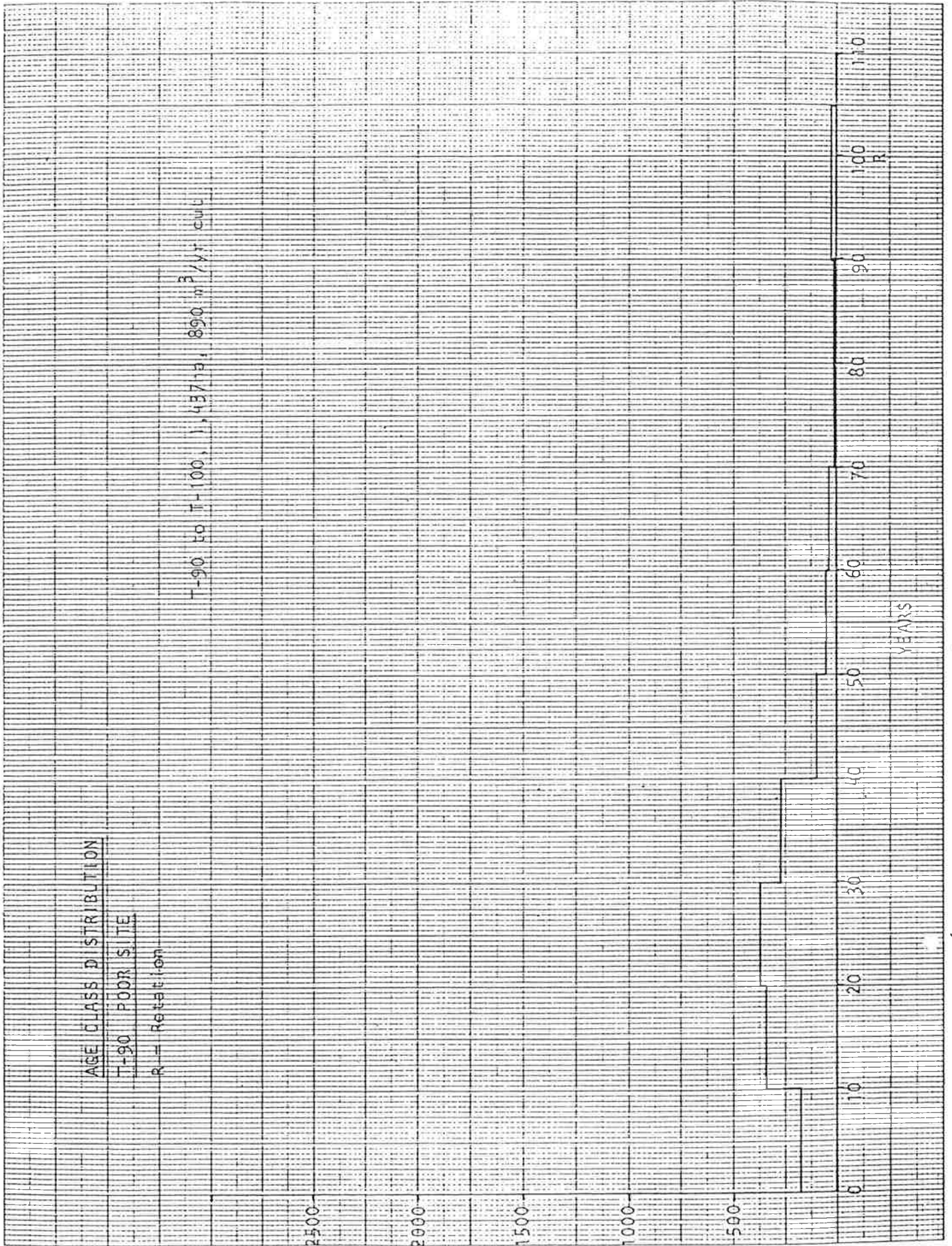
10 MM·CM

Regeneration Delay of 60ha

AGE CLASS DISTRIBUTION

T-0 POOR SITE

T-0 to T-10, 1,4981a, 640 m³/yr cut

YEARS
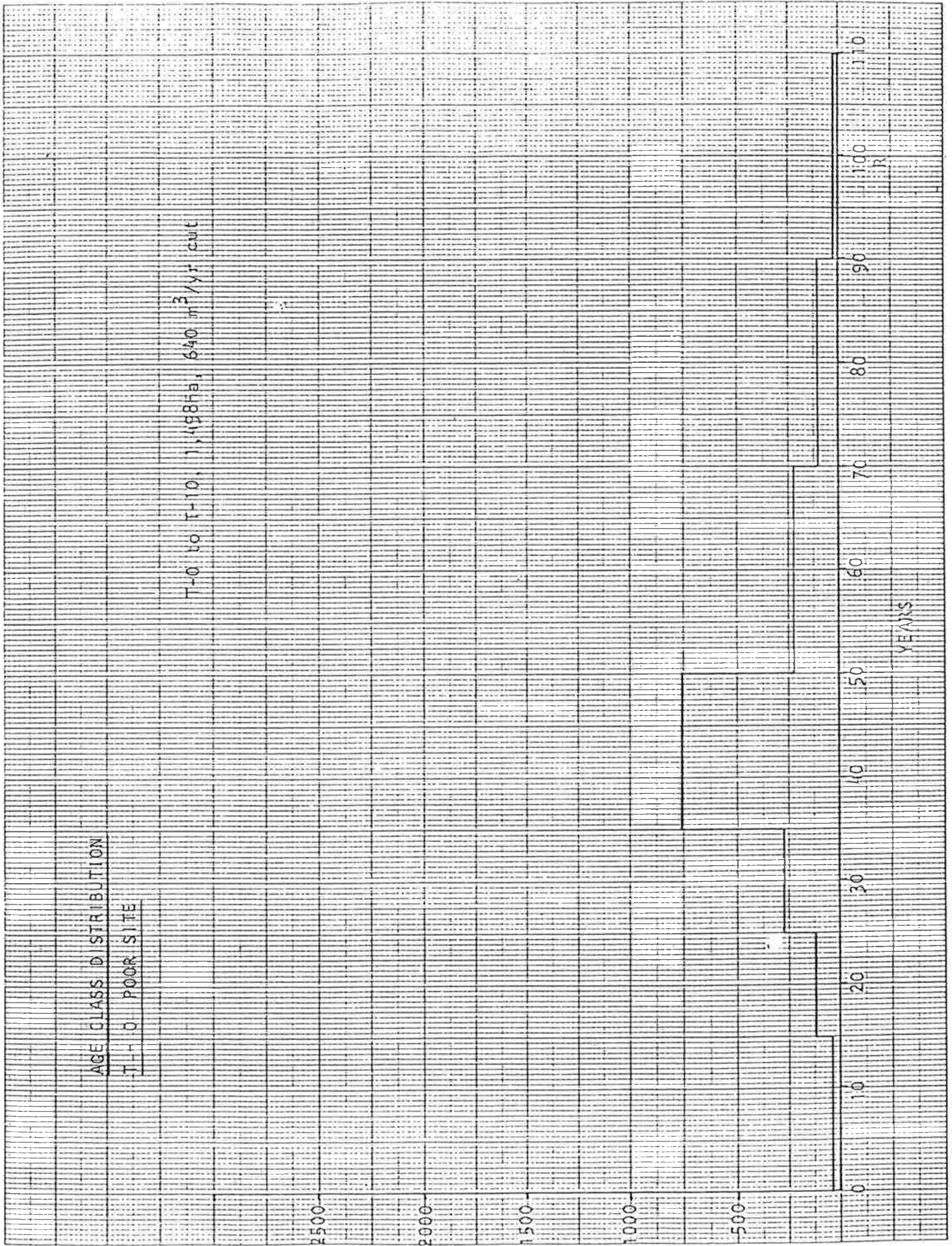
HECTARES

10 MM CM

APPENDIX V

SECURITY OF TENURE

Investment in forest land management should only be made where there is some guarantee that the crops will be grown through to at least one rotation. At present, considerable protection is afforded to the Forest Reserves pursuant to the "Municipal Act".

Forest Reserves are established by Council through by-law with the assent of the electors and involve lands owned by the Municipality that Council believes is suitable for reforestation purposes. Council shall not sell or lease land except under the following circumstances:

a) Initially they shall cause a notice to be published once each week for four consecutive weeks in a newspaper published or circulated in the Municipality stating their intention to withdraw the land from the Forest Reserve, the purpose for which it is to be withdrawn, and in the event of sale, the price that is being asked.

b) If 5% of the electors petition against the withdrawal of any or all of the land from the Forest Reserve, Council must then obtain the assent of the electors.

However, Council may, by by-law, without the assent of the electors undertake the following:

a) Employ Foresters and Forest Engineers to prepare and carry out management and working plans through the administration of the Forest Reserve

b) Enter into contracts for the protection, development, and utilization of a Forest Reserve with Canada or any Province or with the Minister of any Ministry and the government of that Province

c) Enter into agreements with the Minister of Forests, pursuant to the Forest Act for forest protection and fire suppression services and for the reforestation of these lands.

Council may also enter into agreements with the Minister of Forests under the Forest Act to combine their Forest Reserves with Crown land within or without the Municipality for the purpose of establishing a Tree Farm Licence.

Once a Forest Reserve has been established, Council may cut, sell, remove or otherwise dispose of any timber or other products from the Forest Reserve and may enter into a contract with any person or persons for the cutting and removal of timber, but the contract must have the following stipulations:

a) It shall provide that only selected trees may be cut and shall also provide for the protection of young growth and other trees and timber and have protection from fire

b) There may be a limitation placed on the use to which the cut timber may be put.

Finally, Council with the assent of the electors could enter into a lease for a term not exceeding 99 years for part or all of the Forest Reserve, and provision may be made for the protection of the forest on a sustained yield basis, together with the annual rental which shall be based on area and current values of the annual cutting.

Additional protection will be afforded through the municipal planning process, particularly for those stands where the municipality has made forest investments. A cost/benefit justification for extraction of these lands will necessarily have to be made and justified to Council as extractions are proposed. Discussions with municipal planners indicates that the following clauses should be included within any future municipal land management plan:

1. Except where specifically prohibited by other policies contained in this Plan or the policies of the Provincial Government, forestry related uses should be given priority in this forest reserve area.

2. The minimum parcel size in the forestry reserve designation should be 20 hectares (50 acres).

3. The Ministry of Forests and the large forest companies shall be encouraged to manage their timber resources on a sustained yield basis, however, it is recognized that at times, site conditions make this management alternative inappropriate. Due to the forest's high visual profile from throughout the District of North Cowichan and importance to the District's overall environmental quality, the District of North Cowichan should discourage the clearcutting of wooded areas which would:

   i) Pose a threat to the quality of water within the drainage systems of the Muncipality;
   ii) Severely alter the area's aesthetic appeal;
   iii) Disturb areas of unique vegetation or wildlife.

4. The potential for outdoor recreation that exists in the natural woodlands of this area should be protected for continuous use by future generations in conjunction with the management of the forests.

5. Controlled use of private logging roads and areas during non-operational periods for public recreational use should be permitted where possible, except during times of high or extreme forest fire hazard.

6. Wilderness outdoor recreational activities not requiring permanent structures should be promoted in a Forestry area provided such uses comply with Provincial and Regional District regulations.

7. Residential development should be discouraged from locating in this area and should instead be directed to locate in an area appropriately designated for such purposes.

8. Top soil should be perserved against purposeful removal in all areas of the Municipality.

9. Forestry practices which minimize erosion should be required in all operations on municipal land.

10. A rapid regeneration of commerical species should be encouraged by reforestation programs.

11. Consultation with fishing, recreation, wildlife, agricultural, and mining agencies should be pursued in order to ensure the best integration of uses of the Municipality's resources.