ALBERTA NEWSPRINT COMPANY LTD.

EDMONTON ALBERTA

ENVIRONMENTAL IMPACT ASSESSMENT OF THE PROPOSED WHITECOURT NEWSPRINT MILL

Alberta Newsprint Company Ltd.
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16 May 1988

The Honourable K. Kowalski
Minister of the Environment
Government of Alberta
Room 132, Legislative Buildings
Edmonton, Alberta T5K 2B6

Dear Mr. Kowalski:

Reference: Environmental Impact Assessment for the Proposed Whitecourt Newsprint Mill

We are pleased to submit the Environmental Impact Assessment (EIA) report for the proposed Whitecourt Newsprint Mill.

The report was prepared by Nystrom, Lee, Kobayashi & Associates with assistance from several specialist consultants (Beak Associates Consulting Ltd., Cirrus Consultants, Environmental Management Associates and The DPA Group Inc.) whose reports are included as appendices. The report also summarizes the proceedings of public consultation meetings held with communities located on the Athabasca River downstream of the proposed millsite, from Whitecourt to Fort Chipewyan. Concerns identified by local officials and citizens are addressed in the EIA report.

The report has been prepared in accordance with established standards and with guidance of senior staff members in Alberta Environment. We would like to thank you and your department for the cooperation and assistance provided. You may be assured that Alberta Newsprint will provide any further data or information required to support your department's mandate - "to achieve the protection, improvement and wise use of our environment now and in the future".

Yours truly,

ALBERTA NEWSPRINT COMPANY LTD.

Ronald N. Stern

Ronald N. Stern
Managing Director

RNS/jec

PROJECT 1674
NEWSPRINT MILL

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DATE: 16 MAY 1988

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DATE: 16 MAY 1988

ENVIRONMENTAL IMPACT ASSESSMENT OF THE PROPOSED WHITECOURT NEWSPRINT MILL

SECTION 1 - EXECUTIVE SUMMARY

Introduction

Alberta Newsprint Company Ltd. plans to construct a world-scale newsprint paper manufacturing facility at Whitecourt, 180 km northwest of Edmonton. The facility will employ state-of-the-art technology to produce 220,000 tonnes of newsprint per annum for sale to publishers in Western Canada, the United States and off-shore. Raw material will be softwood and hardwood timber, obtained from extensive forests to the west of Whitecourt.

The Minister of Environment for Alberta has ordered the preparation of an Environmental Impact Assessment (EIA) for the project. This report, which summarizes the results of the EIA, presents comprehensive analysis on environmental impacts as well as analysis on socio-economic impacts, particularly on the Whitecourt area.

Completion of an EIA, which fulfills the requirements of the Minister and the staff of Alberta Environment, is a necessary condition before the issuance of Permits to Construct under the Clean Water and Clean Air Acts. Alberta Newsprint will not commence construction until the required environmental permits have been issued along with a Development Permit from the Improvement District 15 in which the site is located.

Raw Material Supply

The plant will require approximately 600,000 cubic meters of solid wood per annum, of which up to 20 percent will be aspen, with the balance a mix of white spruce and lodgepole pine. It is expected that about one-third of the required wood supply will be residual softwood chips, purchased from sawmills within a radius of approximately 150 kilometers of Whitecourt.

Roundwood will be harvested from presently underutilized crown forests. Alberta Newsprint is in the process of negotiating a Forest Management Agreement (FMA) with the Alberta Department of Forests, Lands and Wildlife to obtain an assured source of raw material. Under an FMA, Alberta Newsprint will be responsible for managing the defined forest lands on a sustained yield basis.

The Company will prepare detailed forest management plans for the review and approval by the Alberta Forest Service, which will be responsible for administering the FMA. In addition to delineating procedures and standards for forest management, the approved plans will establish high standards for environmental protection. Since environmental matters for the forests will be dealt with separately, this EIA report does not include evaluation of environmental impacts associated with wood harvesting and forest management.

As indicated, the forest lands will be managed on a sustained yield basis. Since the raw material is a renewable resource, the economic life of the project will be very long, unlike resource projects based on extraction of finite deposits. There are many instances in Canada where pulp and paper mills have operated continuously at the same site for over 100 years.

Project Site

Alberta Newsprint has selected a site 10 kilometers northwest of Whitecourt on Highway 43, near the junction of Highway 32 to Swan Hills. The 200 hectare wooded site is bounded by Highway 43 on the north and the Athabasca River on the south. Only 73 hectares of the site will be cleared, leaving a substantial forested buffer zone.

The site elevation is some 20 meters above the Athabasca River, well above the flood plain. The well-drained soil provides good conditions for site development and for foundations for the paper machine and other critical equipment.

Direct road access is available from Highway 43, the principal route from Edmonton to Grande Prairie and Peace River. Alberta Newsprint will construct a 10 kilometer long rail spur with a bridge across the Athabasca River to connect with the CN in Whitecourt.

TransAlta Utilities will construct a 26 kilometer long, 240 kV power- line to supply the site from the Sagitawah sub-station, located to the southeast of Whitecourt. The new power line will parallel existing power lines to the immediate vicinity of the site. Pipeline-quality natural gas will be delivered to the site via a new small-diameter pipeline.

For water supply, a pumphouse will be constructed on the Athabasca River adjacent to the site. With a water requirement of 17,000 cubic meters per day, withdrawal will be equivalent to one percent of extreme low and 0.08 percent of average Athabasca flow.

Processing and Manufacturing Facilities

The proposed Alberta Newsprint mill will be an integrated producer of newsprint paper - the first paper mill in Alberta. Wood chips, produced on site from roundwood and purchased from nearby sawmills, will be converted into newsprint grade pulp using a chemi-thermomechanical (cTMP) process. The pulp will be transferred in slurry form directly to the paper machine.

Prior to the 1980's, essentially all newsprint was produced from a blend of mechanical and chemical pulps. Now, developments in high-yield pulping technology allow quality newsprint to be produced from 100 percent mechanical pulp furnish. The Alberta Newsprint facility will use this new, but well-proven, technology to produce high-quality newsprint.

High-yield pulp is produced by mechanically developing the fibre properties of wood between rotating disks. The defibration is enhanced by moderate application of chemicals, sodium sulphite and caustic soda, under mild conditions of pressure and temperature. Depending on the process configuration, pulp with a range of properties suitable for tissue products, printing and writing papers and packaging papers, as well as newsprint, can be produced.

The pulping section of the Alberta Newsprint facility will be similar to the pulp mill now being constructed by Millar Western Pulp Ltd. in Whitecourt, near the confluence of the Athabasca and McLeod rivers. However, unlike Millar Western, where pulp with a range of properties for various market applications will be produced, the Alberta Newsprint pulp mill will produce a single pulp grade, specifically for newsprint furnish. The degree and conditions for chemical application at Alberta Newsprint will be milder than those required by Millar Western, hence the designation adopted by Alberta Newsprint, cTMP with a small c, as opposed to the more conventional nomenclature CTMP.

Potential environmental stress associated with a mechanical pulp mill is substantially less than that inherent with the chemical or kraft process. The very mild application of sulphur does not produce odourous reduced sulphur (hydrogen sulphide) emissions. Mild brightening or bleaching criteria do not require chlorine and chlorine derivatives, which are associated with potentially hazardous trace level discharges of dioxins. The Alberta Newsprint cTMP newsprint complex will be "chemically clean".

Slurried cTMP will be transferred directly from the pulp mill to the paper machine. A single paper machine of world-scale size and utilizing state-of-the-art technology will produce newsprint at an average rate of 623 tonnes per day, to provide the budgeted 220,000 tonnes per annum over some 353 scheduled operating days.

Parent rolls, 2.7 meters in diameter by 8.4 meters long, weighing 30 tonnes each, will be split and rewound into smaller rolls for direct shipment to publishers and printers. A finished products warehouse will provide storage for up to two weeks' production.

Utilities and Services

Utilities required to support the integrated cTMP-newsprint manufacturing process, include; water supply, steam and power supply and distribution and chemical receiving and preparation.

Water pumped directly from the Athabasca River will be treated with a conventional system to reduce hardness and turbidity. The treatment process will be similar to that employed by many municipalities in Alberta for potable water.

A major fraction of the process steam requirement will be realized from a heat-recovery system integrated with the cTMP mill. Average power demand from TransAlta Utilities will be about 90 mega-watts, of which about 75 percent will be attributable to the large-horsepower refiner motors. Some 80 percent of this energy input will be recovered in the form of useable steam.

Most chemicals will be received in bulk by rail and tank truck. Chemicals will be received, stored and prepared in an isolated area, where comprehensive measures will be taken for safe handling and to prevent spills. Any hazardous chemicals will be treated in strict accordance with the Province's regulations established under the Hazardous Chemicals Act.

Environmental Management

Environmental management encompasses design, construction and operation of process and associated utilities, services and abatement systems to meet the requirements of the Province of Alberta, including site specific requirements. A key issue is the quality of effluent discharged to the Athabasca River and its impact on water quality and acquatic life in the river.

Alberta Newsprint plans to design and construct an effluent treatment system, which will conform with Alberta Environment's requirements. Primary and secondary treatment are proposed to produce an effluent quality which will mitigate impact on the Athabasca River.

Primary treatment will comprise a reactor-clarifier for efficient removal of suspended solids. Secondary treatment will consist of an areated stabilization basin to reduce biochemical oxygen demand (BOD) by at least 90 percent, to limit oxygen depletion in the receiving waters. The proposed treatment concept will match that installed at any other newsprint mill in Canada and will provide adequate protection for aquatic life in the Athabasca River.

Air emissions will be generally limited to water vapour and products of combustion. There will be no offensive odourous emissions. Air emissions from similar pulping/paper-making complexes have not caused deleterious impact at other locations. Air emissions will not be noticeable except in the immediate vicinity of the millsite. In Whitecourt, the nearest community, the impact of air emissions will not be detectable.

The largest volume of solid waste arising from the project will be bark and other wood waste from wood preparation and chipping operations. This waste will be burned in an on-site incinerator, similar to the unit now operated by Millar Western Industries in Whitecourt. Other solid waste will be minimal and will be disposed of in an approved solid waste disposal site.

Environmental Impacts

The most significant environmental impact will be on the effluent receiving waters, the Athabasca River. Due to natural causes, the Athabasca River does not currently meet all Federal and Alberta criteria for drinking water standards. This does not limit its suitability for municipal drinking water supplies, but does define requirements for the level of treatment required. Effluent discharges from the Alberta Newsprint mill will not affect treatment requirements for drinking water use.

Computer modeling projections, completed in fulfillment of the EIA, indicate that under "worst case" conditions, dissolved oxygen just upstream of the confluence of the Athabasca River with the Lesser Slave River may approach the 5.0 ppm limit set to protect aquatic life. "Worst case" conditions are established as 7Q10 (seven-day low flow moving average with an expected frequency of one in 10 years) low water flow under an ice cover with the expanded Champion pulp mill at Hinton and the new Millar Western pulp mill at Whitecourt along with the Alberta Newsprint mill all discharging BOD at maximum discharge rates. This combination of events is, of course, unlikely to occur.

Nevertheless, the computer modeling does indicate that the organic discharges by the existing pulp mill at Hinton, the new pulp mill at Whitecourt, and the Alberta Newsprint operation will have some impact on the Athabasca River. It will be prudent for Alberta Environment to monitor the situation and compare actual river conditions with projections and objectives.

Other effluent discharge characteristics - total suspended solids, toxicity, colour, nutrient, temperature, and inorganic chemical loads - will not result in noticeable impacts on Athabasca River quality for aquatic life or other river uses.

As noted under Environmental Management, air emissions and solid waste disposal will not produce noticeable environmental impacts.

Community Impacts

The socio-economic impacts are very positive. The project will provide direct employment for 365 people in the Whitecourt area and 10 people in Edmonton. In Whitecourt, alone, it is anticipated that at least 450 additional new job will be created as a spin-off effect of the Alberta Newsprint project.

Without the impact of the Alberta Newsprint project, the population of Whitecourt and the surrounding Improvement District would grow to about 11,200 by 1993. The result of the Alberta Newsprint project will be to increase population by about 1000 or 9 percent. No problem is anticipated in expanding housing facilities to handle this population increase. Similarly, it is expected that community services will also be readily upgraded by the responsible agencies. As the quality of service will generally be improved with larger scale operations, existing Whitecourt and district residents will benefit from the increased population.

On-site construction will provide about 850 person-years of employment, with a peak construction labour force of about 600, including about 100 residents of the immediate area. Construction employment for the Millar Western project in Whitecourt peaked at just over 500. Existing lodging and food facilities in Whitecourt have been adequate for the construction labour influx and no problems are anticipated for the Alberta Newsprint project.

Economic Impacts

The proposed Alberta Newsprint project has an estimated cost of $335 million, of which it is expected that $154 million or 46 percent will be spent in Alberta. Expenditures for labour during construction will be about $57 million, including $40 million for wages and salaries, of which $20 million will be retained in the Whitecourt region. Including the multiplier effect, the total provincial income effect is estimated at $250 million.

Annual expenditures for mill operations are estimated at $90 million, of which $75 million or 83 percent will be spent in Alberta. Of the expenditures in Alberta, $24 million will be spent on wages and salaries, $15 million on transportation, and $23 million on electric power and natural gas.

Public Consultation Program

Alberta Newsprint held consultation meetings with communities along the Athabasca River, from Whitecourt to Fort Chipewyan on Lake Athabasca, over 1000 kilometers downstream from the proposed millsite. Naturally, concerns at these meetings focussed on water quality. In most cases, it was possible to provide direct answers to questions raised at the meetings. Otherwise, written responses were provided subsequent to the meetings. Minutes of the meetings are included in this report.

Summary of Impacts

In point form, principal environmental and socio-economic impacts arising from the proposed Alberta Newsprint project are summarized as follows:

1. Raw materials for newsprint production will be obtained from currently underutilized forests on a sustained yield basis. Since the raw material is a renewable resource, the economic life of the project will be very long, unlike resource projects based on extraction of finite deposits.

2. Water removals from the Athabasca River and discharges of effluent to the river will not have a deleterious or even a noticeable effect on downstream municipal and agricultural water users.

3. There are no potential health hazards associated with effluent and air discharges or solid waste disposal.

4. Discharge of organic wastes by Alberta Newsprint along with the expanded pulp mill at Hinton and the new pulp mill at Whitecourt will noticeably reduce dissolved oxygen in the Athabasca River under "worst case" conditions, specifically, low flow in winter under an ice cover. While computer projections do not indicate that oxygen levels will be reduced to a level detrimental to aquatic life, particularly fish, it will be appropriate for Alberta Environment to monitor the situation and compare actual river conditions with projections and objectives.

5. The socio-economic benefits are very positive. Direct employment will be provided for 375 people and indirect employment will be provided for an additional 450 people, in the Whitecourt area alone. The provincial income affect during construction is estimated at $250 million. Of annual operating expenditures of $90 million, 83 percent or $75 million will be spent in Alberta.

ENVIRONMENTAL IMPACT ASSESSMENT OF
THE PROPOSED WHITECOURT NEWSPRINT MILL

SECTION 2 - INTRODUCTION

1.00 PROJECT BACKGROUND

Alberta Newsprint Company Ltd. investigated the feasibility of constructing a mill to manufacture newsprint at various locations in Alberta and the processes that can be used. Studies indicated that a growing newsprint market could absorb the existing and known planned production and that high quality fibre is in short supply in the established and historic newsprint production areas of the world. Excellent hardwood and softwood timber resources exist in Alberta.

Based on feasibility studies completed by Nystrom, Lee, Kobayashi & Associates of Vancouver, B.C., in May 1987, a detailed plan was developed for the construction of a world-scale newsprint mill near the Town of Whitecourt in west-central Alberta. Basic agrements were reached with the Government of Alberta for an adequate supply of fibre in forest management units of the Province.

As planned, stage one of the development includes a chemi-thermomechanical (cTMP) pulp mill integrated with a single paper machine that will manufacture 220,000 finished metric tons of newsprint paper per annum. The furnish to the mill will be white spruce, lodgepole pine and up to 20 percent aspen. The phased development includes a second paper machine to be built after the successful start-up and operation of the first newsprint machine.

Only stage one of the project is proposed at this time. It includes log and chip handling facilities, cTMP pulping systems, a single newsprint machine, handling, storage and shipping facilities for the manufactured newsprint and associated utilities and ancillary operations.

Stage two of the project will be the subject of separate environmental applications in the future, when economic conditions favour such expansion.

2.00 THE PROJECT PROPONENT

Alberta Newsprint Company Ltd. (ANC) is an Alberta corporation with executive offices located in Edmonton. The firm was established specifically to undertake the Whitecourt newsprint project. The Board of Directors includes businessmen with experience in the forest industry and in the manufacture and marketing of pulp, paper and paper products, including newsprint.

Timber rights are being negotiated for about 3600 square kilometers of forest in the region west of Whitecourt, consisting of forest management units W1, W2, as well as parts of G5C, E7 and E6 for the stage one plant.

Financing is being finalized by ANC's advisor, Prudential Bache Capital Funding. This financing has been aided by a $200 million loan guarantee offered by the Province of Alberta and an $8.3 million grant for infrastructure costs.

Sales commitments have been established for about one-half of the mill's production.

Detailed design is now being initiated for the newsprint mill, and upon satisfactory completion of the environmental impact assessment, it is anticipated that the necessary permits will be issued to allow construction to start in the late summer of 1988. Operations would then be commenced in the third quarter of 1990.

3.00 ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

Under the legislative authority of Section 8 of the Land Surface Conservation and Reclamation Act (Government of Alberta, 1980), the Minister of the Environment ordered that an Environmental Impact Assessment (EIA) be prepared. The submission of an EIA satisfactory to the Minister would be a prior condition for the issuance of the permits to construct and license to operate the newsprint mill, under the Clean Air Act and the Clean Water Act.

3.01 Objectives

Consistent with the guidelines issued by Alberta Environment for the preparation of an environmental impact assessment, the objectives of this EIA report are as follows:

a. To describe the newsprint manufacturing process and the environmental management systems to be employed in the proposed mill.

b. To identify the important components of the environment that are likely to be affected by the construction and operation of the proposed mill.

c. To identify the environmental issues that are of concern to the public, municipal governments and provincial government agencies and/or departments.

d. To describe the measures to be adopted to reduce any possible negative aspects, or to enhance favourable environmental impacts related to the construction and operation of the newsprint mill.

3.02 EIA Focus

Based on preliminary discussions with the Ministry of the Environment on 20 January 1988, and subsequent meetings and correspondence, a consensus was developed on the important environmental elements on which effort was to be focused. It was decided that the key issue would be effluent quality and the impacts of the effluent on the water quality of the Athabasca River.

In addition, strong emphasis would be placed on the socio-economic assessment and a public consultation program, where Whitecourt and the downstream communities on the Athabasca River would be directly involved. Meetings, as reported in Section 7 of this report, were held at all significant downstream communities. Issues raised by local officials and concerned citizens are specifically addressed in this report.

With respect to services, including access roads, the railroad spur, power lines and gas and water line rights of way, only wildlife aspects were considered to require assessment.

3.03 The EIA Team

This EIA has been prepared by Nystrom, Lee, Kobayashi & Associates (NLK) with the assistance of the following sub-consultants:

a. Beak Associates Consulting Ltd.
Division of Stanley and Associates
Edmonton, Alberta - Biophysical aspects related to water quality and effluent impacts on the Athabasca River.

b. Cirrus Resource Consultants
Vancouver, B.C. - Biophysical aspects related to climate, meteorology and air quality.

c. Environmental Management Associates
Calgary, Alberta - Biophysical aspects related to soil, vegetation and wildlife.

d. DPA Group Inc., a subsidiary of Monenco Consultants Limited
Calgary, Alberta - Socio-economic assessment.

The text in relative sections in the main body of the EIA report is based on studies completed by these consultants. The complete texts of the sub-consultants' reports are included in Appendices.

4.00 THE EIA SCOPE

The EIA is introduced with a project description that includes technical information on the project site, wood supply, newsprint manufacture and the associated utilities and services. This is followed by an environmental management plan for process effluent, air emissions, solid waste disposal, noise control and millsite surface runoff.

Biophysical environmental impacts are presented for the Athabasca River, groundwater quality, air quality and terrestrial features. Community and economic impacts consider population, income and employment in the study region, as well as community services and infrastructure.

Finally, the public consultation program is summarized to present the concerns encountered in contacts with the Town of Whitecourt and the affected downstream communities. Details on the public consultation program are contained in Appendix 5.

Environmental impacts associated with forestry operations and the harvesting of wood covered by a Forest Management Agreement (FMA) to be held by ANC will be the subject of separate reports filed with the Alberta Forest Service.

5.00 REGULATORY REQUIREMENTS

5.01 Permits for Construction

The proposed millsite, located within Improvement District 15 (ID 15), is on lands zoned as Forestry District. While Forestry District use covers activities like a pulp and paper mill, the ID 15 Municipal Planning Commission considers that rezoning to Rural Industrial District is appropriate. On 12 May 1988, ANC submitted an Application for Amendment to the Land Use Order to ID 15 for rezoning to Rural Industrial District.

This application is expected to be considered by a Council meeting of ID 15 on 18 May 1988, with the Council holding a special meeting and public hearing on the application on 2 June 1988.

An Application for Development was filed with ID 15 on 6 May 1988. The Application was discussed by its Municipal Planning Commission on 10 May 1988. It is anticipated that this application will be dealt with by the Commission following resolution of the rezoning application.

Prior to issuance of required permits to allow construction to proceed, ANC plans to undertake certain pre-construction activities, such as site investigations and clearing. Prior to initiating such activities, in particular, felling of trees, ANC will obtain necessary clearance from the Alberta Forest Service.

5.02 Other Permits

a. Water Resources Act

Application will be made to the Water Resources Division of Alberta Environment for the following:

i. The right to utilize water from the Athabasca River for processing pulp and manufacturing newsprint and for other related uses on site.

ii. The right to install a water intake and an effluent diffuser in the Athabasca River.

b. Navigable Waters Protection Act

An application will be made to the Canadian Coast Guard in Vancouver, administrators for this Act, for the right to install a water intake and an effluent diffuser in the Athabasca River.

c. The Clean Air Act

An application will be made to the Standards and Approvals Division of Alberta Environment for a permit to construct. During construction, an application will be filed for a license to operate, so that start-up can proceed immediately upon completion of construction.

d. The Clean Water Act

Application will be made to the Standards and Approval Division of Alberta Environment for a permit to construct. Again, during construction, two other applications will be filed under this Act. An application will be filed for a license to operate so that start-up can proceed when construction is completed. Another application will be made for a permit to return treated effluent to the Athabasca River through a diffuser located within the river.

It is possible that another permit may be required for the discharge of water to the Athabasca River from the surface water drainage system. Alberta Environment will review the design of the system and will determine, having regard for its overall effectiveness in removing silt and other contaminants, whether or not a permit is required.

6.00 THE STUDY REGIONS

In general terms, the following areas were considered in carrying out the EIA.

a. Transportation, land use and wood supply - from a distance of approximately 150 km.

b. Site access - about 50 km.

c. Air quality - 3 km.

d. Water quality and Athabasca River study - generally to the confluence of the La Biche River. For public consultation - to Fort Chipewyn.

e. Socio-economic impacts - primarily limited to Whitecourt and ID 15. In some cases, the whole province was considered.

7.00 GLOSSARY OF TERMS

Throughout this report many terms and abbreviations are used that are commonly used in EIA reports and in the pulp and paper industry. These are presented below to assist readers who may not be familiar with them.

A	Annum
ADMT	Air dry metric ton
ADMTPD	Air dry metric tons per day
ADMTPA	Air dry metric tons per annum
Activated Sludge	An aerobic effluent treatment process using recycled biological sludge
Aerobic	Processes that depend on the presence of oxygen
Anaerobic	Processes that can occur without free oxygen
ANC	Alberta Newsprint Company Ltd.
ASB	Aerated Stabilization Basin used for aerobic effluent treatment
ASWQO	Alberta Surface Water Quality Objectives
BCFP	British Columbia Forest Products Ltd.
BD	Bone dry
BDMT	Bone dry metric ton

BDMTPD	Bone dry metric tons per day
BDMTPA	Bone dry metric tons per annum
BOD	Biochemical oxygen demand
C	Centigrade temperature
Champion	Weldwood of Canada, Hinton Division (formerly Champion Forest Products (Alberta) Ltd.)
CN	Canadian National Railway
Consistency	Percentage content of dry weight of fibre in a pulp stock solution
CTMP	Chemi-thermomechanical pulp
cTMP	Chemi-thermomechanical pulp Mild chemical treatment, as will be used by ANC
dbA	Sound level measurement
DO	Dissolved oxygen
DTPA	Diethylene triamine penta acetic acid, a chelating agent which sequesters metal ions and aids bleaching
EIA	Environmental Impact Assessment
FMA	Forest Management Agreement
FMT	Finished metric ton
FMTPD	Finished metric tons per day
FMTPA	Finished metric tons per annum
Freeness	Measure of the drainage rate of pulp stock solution
Furnish	Fibre supply for pulp production Pulp supply for paper production
hp	Horsepower

Hardwood	Deciduous trees such as aspen, birch, etc.
HRT	Hydraulic retention time, for effluent treatment
ID	Improvement District
kV	1000 volts
kWh	Killowatt - hours
Kraft	Chemical pulping process using cooking liquor, also known as sulphate process
LC_{50}	(Lethal concentration). That dilution of an effluent by volume in which 50% of the test fish survive for 96 hours
MC	Medium consistency
MCC	Motor control center
MVA	Mega volt amperes
MWPL	Millar Western Pulp Ltd.
NLK	Nystrom, Lee, Kobayashi & Associates
100 Year Flood	Flood level that would be equalled or exceeded on the average once in 100 years
O_2	Oxygen
pH	Measurement of hydrogen ion concentration giving degree of acidity or alkalinity
ppm	Parts per million
QRP	Quesnel River Pulp
Refiner	Device using rotating grooved disc and stationary disc to produce pulp from wood chips

Softwood	Generally coniferous trees such as spruce, pine, fir, etc.
Sulphonation	Sulphur treatment
TMP	Thermomechanical pulp
TSS	Total suspended solids
Toxicity	Expressed as percent LC_{50} which is percent concentration of effluent giving 50% survival of salmonid species over a 96 hour T.L.M. static bioassay
7Q10	Minimum 7-day moving average flow with anticipated frequency of once in 10 years
7Q2	As above, with anticipated frequency of once in two years

Abbreviations of Measurement Units

bar	100 kPa, approximately one atmospheric pressure
cm	centimeter
g	gram
g/m^2	grams per square meter (basis weight)
kg	Kilogram
kg/s	Kilograms per second
km^2	Square kilometers
kpa	Kilopascal
l	liter
l/m	liters per minute
m	Metre
mm	Millimetre

m^3	Cubic metres
m^3/D	Cubic metres per day
m^3/s	Cubic metres per second
mg/l	Milligrams per litre

ENVIRONMENT IMPACT ASSESSMENT OF
THE PROPOSED WHITECOURT NEWSPRINT MILL

SECTION 3 - PROJECT DESCRIPTION

1.00 PROJECT OVERVIEW

1.01 Fibre Supply

The proposed ANC mill, to be constructed near Whitecourt, will be designed to produce 220,000 finished metric tons per annum of newsprint paper from chemi-thermomechanical pulp (cTMP), produced from softwood chips and up to 20 percent hardwood chips. Softwood chips will consist of about equal parts of spruce and lodgepole pine. Hardwood chips will be derived from aspen species. Hardwood will be delivered to the mill by truck in roundwood form. Softwood will also be delivered to the mill by truck in both tree length logs and in chip form, the latter being residual chips from sawmills located throughout the region.

1.02 Pulping Process

The cTMP process produces a higher quality pulp than other mechanical pulp production processes. Its fibres are long, flexible and low in fine material. This pulp can be used to produce newsprint with superior strength and printability.

Prior to the 1980's, essentially all newsprint was produced from a blend of mechanical and chemical pulps. However, developments in high yield mechanical pulping technology now allow newsprint to be manufactured with 100 percent mechanical pulp furnish. The ANC mill will utilize state-of-the-art technology to produce high-strength, high-brightness mechanical pulp (cTMP), capitalizing on the most suitable fibre species for making newsprint. Only a few newsprint mills in the world have the advantage of the highest quality wood.

The process to be used has been proven at several recently completed installations, such as; Donohue Normick Ltd. at Amos, Quebec; Bear Island Paper Co. at Ashland, Virginia; at Shotton Paper in Wales; and Svenska Cellulosa in Ortviken and Braviken, Sweden. At these locations, newsprint is produced with 100% mechanical pulp and at production rates of 160,000 to 220,000 tonnes per year from a single paper machine.

The cTMP process is so effective because the lignin binding in the wood chips is softened thermally, and chemically treated prior to the mechanical defibration in the refiner. Through careful process control, up to 95% yield of high quality pulp can be achieved.

1.03 Paper Machine

Conditioned pulp stock from the refiners will be pumped to the twin-wire paper machine. First, a thin fibre mat will be produced by draining the stock between two wire cloths. This mat will then be fed to a press section to reduce the water content to about 60%. Next, the web will be dried by contact with steam heated, rotating dryer cylinders in the dryer section of the newsprint machine.

The paper will pass to the calender section where highly-polished rotating calender rolls will produce a smooth finish. The paper will then be wound into large 30 tonne parent rolls. These rolls will be slit and rewound into roll sizes specified by the customer.

The paper machine will have a continuous operating speed of more than 1400 m per minute, providing a maximum daily production rate of 750 tonnes.

1.04 Newsprint Product

This capability will enable the newsprint mill to achieve an average daily production of 623 finished metric tons (FMT), equivalent to the nominal production rate of 220,000 finished metric tons per annum (FMTPA) over 353 operating days.

Newsprint will be shipped by truck and rail to the Canadian Prairie market, the western United States and offshore.

1.05 Project Implementation

ANC will be responsible for the project execution. NLK has been engaged by ANC to provide project management, engineering and design, procurement, construction management, and start-up assistance services. NLK provided similar services to Millar Western Pulp Ltd. (MWPL) for the Whitecourt CTMP mill, currently under construction and scheduled for start-up in mid-1988.

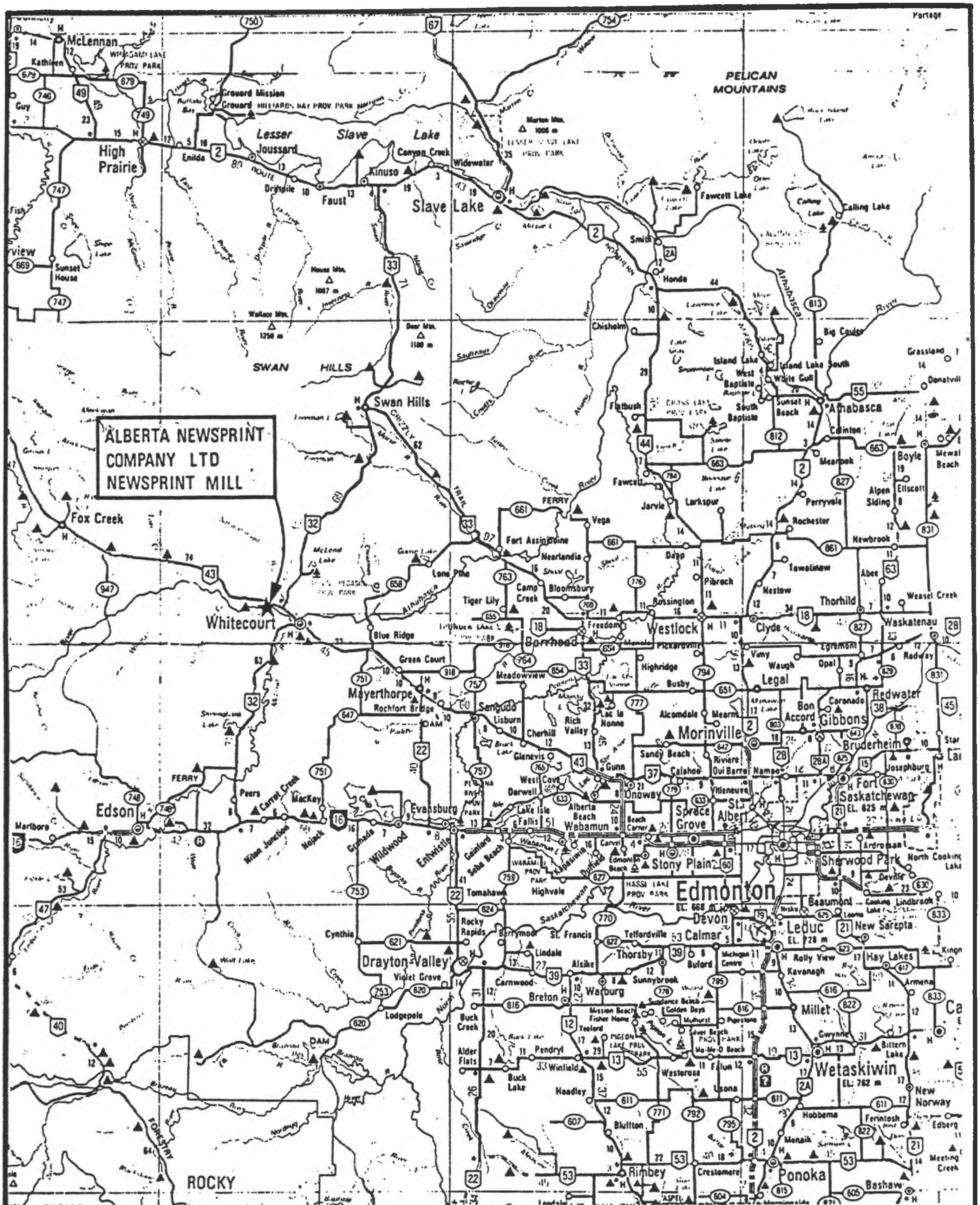
NLK established an office in Edmonton in May 1988. Equipment and construction procurement and certain detailed engineering activities will be undertaken from NLK's Edmonton office. Alberta-based consulting engineers will be used to provide detailed design and other engineering services for selected aspects of the project.

The project schedule provides for completion and start-up of the mill by the third quarter of 1990. To meet this schedule, it is planned to complete selected pre-construction activities in the fall of 1988 to allow start of building construction as early as weather conditions permit in the spring of 1989. It is essential to close-in major mill buildings by the fall of 1989, to allow intensive mechanical and electrical construction to proceed through the winter of 1989/1990.

Pre-construction activities include site preparation, placing of piles and partial construction of foundations for the paper machine and other critical equipment. A project schedule is included in Appendix 6.

ANC plans to establish the scope and schedule of site construction contracts to encourage bidding by a range of Alberta contractors, including those based in Whitecourt and nearby towns. It will be an ANC corporate policy to select local contractors and suppliers, subject to their meeting competitive price and quality levels.

The capacity of Whitecourt and the surrounding area to supply and accommodate construction workers will be taken into account in establishing detailed construction schedules. The socio-economic impact of construction activities is addressed in Section 6. It is believed that construction activities can be managed to enhance positive benefits to the local community and Alberta in general.



REV.	DATE	DESCRIPTION
01	16/05/88	ISSUED FOR EIA REPORT

REFERENCE DRAWINGS

NYSTROM, LEE, KOBAYASHI & ASSOCIATES
CONSULTING ENGINEERS
VANCOUVER CANADA

DRAWN A.A | CHECKED

APPROVED

DRAWING No. Figure 3-1

SITE & SITE SERVICE
SITE
REGIONAL SETTING

ALBERTA NEWSPRINT CO. LTD

APPROVED | DRAWING No. A-1674-211-0004 | REV. 01

2.00 PROJECT SITE

ANC has selected a 200 ha site located 10 km northwest of Whitecourt. As shown on Figure 3-1, the site is just south of Highway 43, just 1 km west of the junction of Highway 32 to Swan Hills and Kinuso.

This figure also illustrates the strategic location of the mill with respect to forest resources in west-central Alberta and the major highways that serve the region. And most importantly, the site is within easy driving distance from Whitecourt, where most employees are expected to live.

2.01 Site Selection

The site selected by ANC is the same site chosen by British Columbia Forest Products Limited (BCFP) in 1982 for a proposed kraft pulp and newsprint mill. At that time, sites on the Athabasca River, in the Knight/Hurdy/Whitecourt area, were evaluated in a thorough site selection process carried out by two Alberta consulting firms and BCFP staff. More than twelve possible sites were evaluated with respect to foundation, transportation, power and gas supply, development costs and general environmental conditions, before focusing the study in detail on three of the sites.

Associated Engineering Alberta Ltd. of Edmonton was engaged by ANC to review the characteristics of a number of sites, including several assessed by BCFP in 1982. The analysis confirmed that the site previously selected by BCFP provided the best combination of attributes for the proposed ANC newsprint mill.

2.02 Site Access

The advantages of access to the millsite are clearly shown on Figure 3-1. On a local scale, the site location and site services are shown on Dwg. AO-1674-211-0001, included in Appendix 6. Access to the mill from Whitecourt will be provided for vehicular traffic by Highway 43 that runs along the north boundary of the site. The access road will enter the site near the eastern property boundary and continue south and west to serve the log storage area and the mill proper.

To provide for the safe flow of traffic to the mill, especially for trucks hauling logs and chips, it has been proposed in discussions with Alberta Transportation that an improvement be made to Highway 43 at the point where the access road meets the highway. This would involve construction of a divided highway segment, centered on the junction of the access road, that provides safe turning lanes for overhanging loads and acceleration lanes for all vehicles entering onto the highway. Such a junction has been used successfully at the Cottonwood intersection leading to Blue Ridge, east of Whitecourt, for about four years and has eliminated accidents involving logging trucks.

Rail access to the site will be provided by a 10 km long spur line that will be constructed by ANC from the existing CN rail line in Whitecourt. This rail spur will require construction of a bridge across the Athabasca River. From that point, the line will extend north, then generally parallel Highway 43, before swinging in a westerly direction to enter the site at the southeast corner. When the right of way for the rail spur is cleared, commercial timber will be salvaged.

A gas supply line and the electric power supply will enter the millsite at the north-east corner and parallel the access road to the main mill block, as shown on drawing AO-1674-211-0002.

2.03 Site Plan

This drawing shows the general arrangement of the site and illustrates the location of key components of the mill, including the aerated stabilization basin, the water intake and the effluent return to the river.

The cleared area for the newsprint mill will total 73 ha. This will leave a significant forest buffer zone on the northern, western and southern boundaries. When the site is cleared, salvageable timber will be sold to local sawmills or stockpiled for use as wood supply to the mill.

This site is especially attractive for a newsprint mill, since it is well drained and there is an extensive deep gravel bed that will provide an excellent foundation for the paper machine, which must be vibration free and maintain perfect alignment.

3.00 WOOD SUPPLY

Supply of fibre for the newsprint mill will be derived from an assured reserve of softwood and hardwood, under FMA and quota agreements, and from softwood chips available from sawmill operations in the region. The forest areas are shown on Figure 3-2.

Softwood will be obtained from W1, W8, E7 and E6 management units. Hardwood will come from these units and from W2 and part of G5C.

3.01 Chip Supply

Of the total 480,000 m^3 (solid wood equivalent) of softwood fibre requirement, it is estimated that about 200,000 m^3 will be in the form of chips purchased from sawmills within a 150 km radius of Whitecourt. Based on 253 haul days per year, an average of about 16 trucks per day will deliver chips to the mill.

Since chips will be stock piled at the site plant, truck movement will be independent of mill operation. Chip hauling will proceed throughout the day with no set schedule.

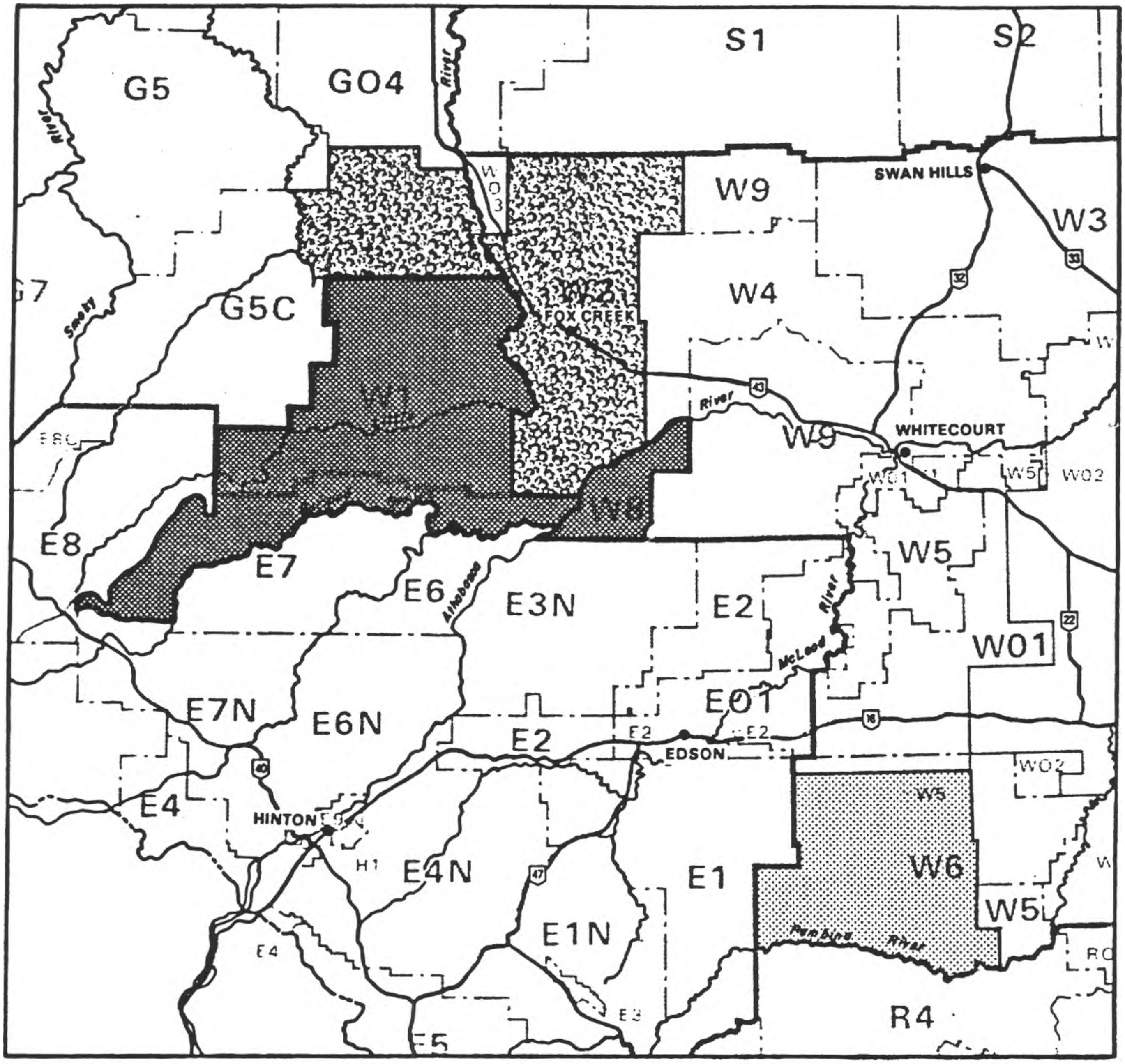
3.02 Softwood Roundwood

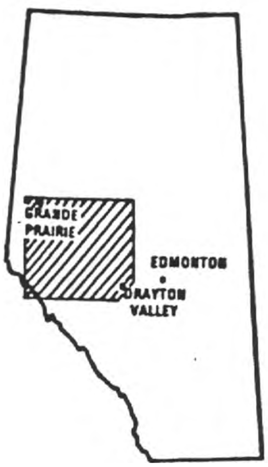
The remaining 280,000 m^3 of softwood will be in the form of tree length logs harvested in the FMA. These logs will be mainly trucked over off-highway haul roads to the millsite. This will require about 3460 loads per year, and, based on a minimum of 110 haul days per year, a maximum of 31 truck loads per day. However, it is expected that some summer logging will be undertaken, thus reducing the peak number of loads per day in winter.

Construction of a government forest access road has been started. The road will extend from Muskeg River on Highway 40 to Knight on Highway 947. It is anticipated, that in future, this road will be extended eastward from Knight, south of the river to Windfall, then north to Hurdy, and after crossing the river, eastward to the millsite.

3.03 Hardwood Roundwood

Hardwood roundwood will be mostly trucked on Highway 43 from W2 and G5C management units. The hardwood furnish of 120,000 m^3 will require 3260 loads per year, based on 110 haul days, an average of 30 loads per day.





PROPOSED FOREST TENURES

ALBERTA NEWSPRINT COMPANY LTD.

- FOREST MANAGEMENT AGREEMENT AREA
- DECIDUOUS TIMBER SUPPLY AREAS FOR FIRST AND SECOND MILL
- CONIFEROUS TIMBER QUOTA SUPPLY AREA FOR SECOND MILL

Figure 3-2

3.04 Transportation

The traffic loads generated by the supply of raw material are summarized as follows:

Type	Typical Load Weight (kg)	Maximum Loads/Day	Minimum Days/Yr
Chips	35,000	16	253
Softwood Roundwood	60,000	31	110
Hardwood Roundwood	45,000	30	110

Product shipments will be the only other significant contributor to commercial highway traffic. Assuming a third of the production is shipped by truck, there would be an additional 8 truck loads per day based on 253 haul days per year.

It is difficult to accurately analyze the total traffic pattern because source of supply of some raw material is uncertain at this time. In the following analysis, possible routings and impacts are discussed.

a. Softwood Roundwood

It is expected that most log haul traffic will be on forest haul roads. A small quantity of select saw logs may be exchanged for pulp logs or chips. This traffic could be required to traverse regular highways.

b. Hardwood Roundwood

Most traffic will be on Highway 43 to the millsite.

c. Softwood Chips

Maximum traffic density scenarios would have the total traffic on Highways 34 and 43 between High Prairie and the millsite, between Kinuso and the site on Highways 32 and 33, or all on Highway 43 from the east through Whitecourt.

i. High Prairie to the Millsite

The greatest impact of the first scenario would be approximately 46 trucks per day (16 with chips and 30 with hardwood) between Fox Creek and the mill. An increase of this magnitude would not create significant traffic congestion on this stretch of highway.

ii. Kinuso to the Millsite

The second scenario would add 16 truck loads per day on the Swan Hills road. Again, this is not considered a significant increase. The most serious traffic congestion could be created at the junction with Highway 43 near the mill site. However, a divided highway section will provide a safe and effective entrance to the mill.

iii. Whitecourt Traffic

If total chip supply were to come from the east, it is estimated that daily truck traffic on the highway could be increased by 8 product trucks, 16 chip trucks, 1 saw log exchange truck, and 1 chemical supply truck, for a total of 26 units per day. If most of the units passed through the town between 6:00 a.m. to 6:00 p.m., it would add about two units per hour in that period. This increase should not have any impact on traffic flow. A reduced Whitecourt scenario would be 4 chip trucks per day, with a daily total of 14 units.

e. Rail Traffic

With two-thirds of the product shipped by rail, shipments will amount to about 150,000 metric tons (2500 carloads) per year or 12 carloads per day. This traffic will be handled by at least four switches per week. No adverse impacts should arise in Whitecourt due to this increased level of rail traffic. Related switching will take place in the yards west of the MacLeod River, so tie-ups on 51st Avenue in the town will not be increased by ANC traffic.

3.05 Forest Management Agreement

ANC will enter into a Forest Management Agreement (FMA) with the Government of Alberta, providing a wood supply for the newsprint mill. Softwood timber resources to supply the mill will be obtained from W1, W8, E7 and E6 management units. Deciduous timber will be supplied from areas W2 and part of G5C. A further reserve for a second paper machine is to be established in the west part of the

W6 management unit. These areas were shown earlier on Figure 3-2.

a. Licensee Responsibilities

An FMA gives the operator the right to harvest a specified quantity of timber, consistent with sustained yield plans. An FMA also carries forest management responsibilities over a defined area of forest land for the full term of the agreement.

These responsibilities for forest management include:

i. restocking of logged forest areas at the companies expenses.

ii. adherence to specified standards of recovery and utilization.

iii. co-operation with the government in protecting against fire, insects and disease; although the government bears most fire protection and suppression costs.

The Alberta Forest Service has the responsibility for administration of forest management agreements on behalf of the government. All issues of environmental impact dealing with the forests, including multiple use concepts for recreation and wildlife, are handling in conjunction with the FMA. Given this allocation of responsibility, it is not appropriate to consider environmental impact related to the FMA in this EIA report. These aspects will be covered in the forest management plan, which will be reviewed and approved by the Forest Service.

b. Forest Management Plan

Operations in the FMA will not be commenced until a Preliminary Management Plan (PMP) has been filed with, and approved by the Alberta Forest Service. The basis for preparation of the PMP will be forest development requirements established in consultation with the staff of the Whitecourt Forest Headquarters. These requirements will take into consideration all aspects of forest management and the environment, including wildlife and such uses as recreation and oil and gas exploration and production. Subsequent to acceptance of the PMP, a Detailed Management Plan will be submitted and finally approved by the Alberta Forest Service.

c. Other Management Requirements

It will be a requirement for ANC to file an annual operating plan for approval by the Forest Service. Periodically, the ANC overall management plan will be revised in complete detail for review and approval by the Forest Service.

The plan will include a detailed forest inventory, calculation of the allowable cut, and proposed long-term program of development, harvesting and silviculture consistent with sustained yield management. The total cost of the surveys required to draw up or revise the development plans will be borne by the company. In supervising woodlands operations, the Forest Service strictly enforces environmental protection and silviculture regulations.

4.00 NEWSPRINT MANUFACTURE

4.01 Chip Supply and Handling

Softwood chips purchased from area sawmills will consist of approximately 50% lodgepole pine and 50% white spruce. Trucks will be weighed at the millsite prior to unloading on a truck dumper and chips will be belt-conveyed to a storage pile with approximately ten days' capacity.

Roundwood, both softwood and aspen, will be trucked to the site, weighed and unloaded with a portal crane to a log storage area with approximately three months' capacity.

Roundwood will be debarked by a mechanical ring barker prior to chipping. Chips will then be screened, with accepts directed to either the softwood or aspen chip piles. The aspen pile will typically contain three days of storage. The bark removed in the debarker, fines (sawdust) and oversize (large pieces of wood) will be incinerated in a smokeless burner.

Both softwood and aspen chips will be metered from the storage piles, blended together and coarse screened for removal of oversize debris such as rocks, pieces of tramp wood and frozen chip lumps. A typical chip blend will consist of 80% softwood and 20% aspen. A three-stage chip screening system will then remove fines and oversize/overthick chips. Accepted chips will go to the cTMP plant.

The overthick/oversize chips will be diverted to a chip slicer, preceeded by a rock trap, prior to joining the accept flow to the cTMP plant. Fines, at a maximum level of 0.5% of chip feed, will be incinerated.

It is estimated that daily chip requirements will average 685 BDMT with a maximum of 760 BDMT.

4.02 cTMP MILL

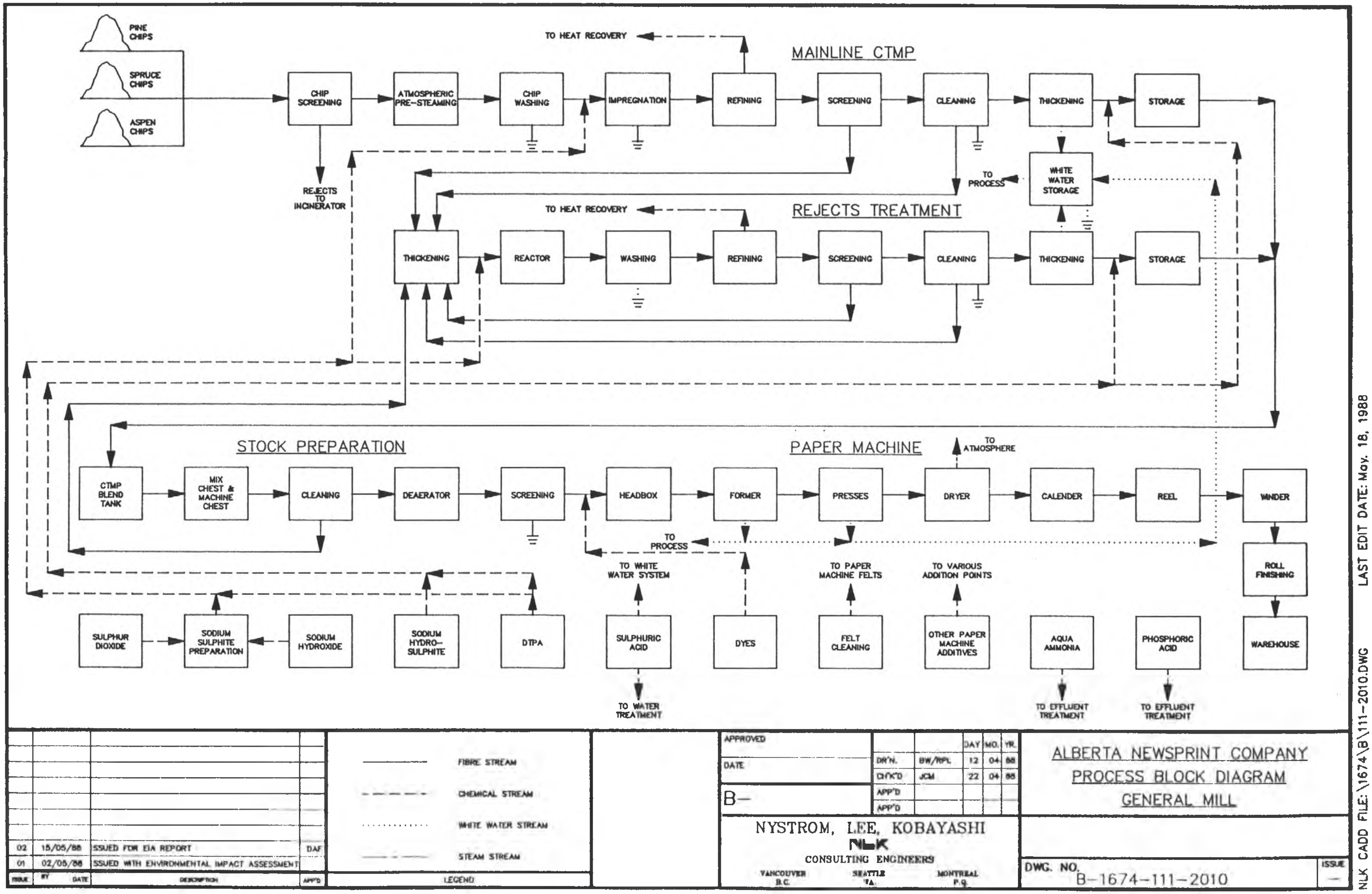
The mill process configuration, including the cTMP mill, is shown on drawing B-1674-111-2010.

Screened chips will be conveyed to a 60-minute atmospheric presteaming bin. Presteaming serves the function of deicing the chips in winter, removing air pockets within the chips and raising and equalizing chip temperature.

The chips will then be washed in a chip washer to remove sand, grit, metal and other foreign material, followed by a dewatering twin screw drainer, which will reduce the water content of the chips from 65% to 45%.

This will be followed by a chip impregnation system consisting of a 20-minute atmospheric presteaming bin and a 5-minute impregnator. Presteaming will again be used to raise and equalize temperature within the chips and to remove any remaining air. This step is important to improve the efficiency of impregnation which follows. Chemical treatment with small amounts of sodium sulphite and DTPA prior to the impregnator assists in proper conditioning of the chips before refining and is a factor in determining the properties of the mechanical pulp produced.

Refining will be accomplished in two parallel lines, each consisting of two 12,000 hp primary and one 12,000 hp secondary refiners. Refining, which reduces the chips into individual pulp fibres, will be performed under conditions of moderate temperature and pressure. The waste steam generated will be removed from the pulp stream in cyclones which follow each refiner and directed to a heat recovery system.


PINE CHIPS
SPRUCE CHIPS
ASPEN CHIPS
MAINLINE CTMP
TO HEAT RECOVERY
CHIP SCREENING
ATMOSPHERIC PRE-STEAMING
CHIP WASHING
IMPREGNATION
REFINING
SCREENING
CLEANING
THICKENING
STORAGE
REJECTS TO INCINERATOR
WHITE WATER STORAGE
TO PROCESS
REJECTS TREATMENT
TO HEAT RECOVERY
THICKENING
REACTOR
WASHING
REFINING
SCREENING
CLEANING
THICKENING
STORAGE
STOCK PREPARATION
PAPER MACHINE
TO ATMOSPHERE
CTMP BLEND TANK
MIX CHEST & MACHINE CHEST
CLEANING
DEAERATOR
SCREENING
HEADBOX
FORMER
PRESSES
DRYER
CALENDER
REEL
WINDER
TO PROCESS
TO WHITE WATER SYSTEM
TO PAPER MACHINE FELTS
TO VARIOUS ADDITION POINTS
ROLL FINISHING
SULPHUR DIOXIDE
SODIUM SULPHITE PREPARATION
SODIUM HYDROXIDE
SODIUM HYDRO-SULPHITE
DTPA
SULPHURIC ACID
DYES
FELT CLEANING
OTHER PAPER MACHINE ADDITIVES
AQUA AMMONIA
PHOSPHORIC ACID
WAREHOUSE
TO WATER TREATMENT
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NYSTROM, LEE, KOBAYASHI
NLK
CONSULTING ENGINEERS
VANCOUVER B.C.
SEATTLE WA.
MONTREAL P.Q.
ALBERTA NEWSPRINT COMPANY
PROCESS BLOCK DIAGRAM
GENERAL MILL
DWG. NO. B–1674–111–2010
ISSUE
LAST EDIT DATE: May. 18, 1988
NLK CADD FILE: \1674\B\111-2010.DWG

The refined pulp will contain some slivers of wood which are not fully defibred. These slivers and other debris will be removed in a two-stage pressurized screening system, with the accepts then handled by a four-stage centrifugal pulp cleaning system. Accepts from the cleaners will be dewatered on two disc thickeners prior to high density pulp storage.

The reject streams from the screening and cleaning systems will be combined with the paper machine cleaner rejects and thickened by two screw presses prior to a sulphonated rejects reactor. As in the impregnator, small amounts of sodium sulphite and DTPA will be added at the reactor to condition the rejects prior to refining. This will enhance the development of desired pulp properties from the reject fractions.

Single stage rejects refining will be used, with waste steam directed to the heat recovery system. The refined rejects will then be screened, cleaned and thickened prior to storage in a separate high density tank. The reject streams from the screens and cleaners will be recycled through the sulphonated rejects reactor.

Mild brightening of the pulp will be accomplished by the addition of sodium hydrosulphite ($Na_2S_2O_4$) and DTPA to the pulp streams prior to both high density pulp storages. The DTPA will be added to enhance brightness development in the pulp.

The water removed from the pulp on the disc thickeners (termed "white water") will be recycled for use in various parts of the mill.

The waste steam from the primary, secondary and reject refiner cyclones will be directed to a heat recovery system. The clean steam generated will be used in the paper machine dryer, minimizing need for fossil fuel generated steam. Other potential uses of this steam include atmospheric presteaming of chips and building heating.

The chemical treatment requirements for producing mechanical pulp for newsprint are rather mild in comparison to treatment required for market mechanical pulp. Hence, the adoption of the designation cTMP for ANC, rather than the more usual designation CTMP.

The cTMP building will be equipped with an air conditioned control room complete with laboratory facilities, washrooms and a lunch room. Offices and a conference room will be located above the control room. Motor control centers will be air conditioned and the building itself equipped with roof exhaust fans.

4.03 Newsprint Machine

To assist in the initial operation of the paper machine, allowance will be made for the addition of up to 15% kraft pulp to the machine furnish. This start-up phase is estimated to last less than one year, following which newsprint will be manufactured using 100% cTMP.

Semi-bleached kraft pulp will be purchased in bale form and directed to warehouse storage, with capacity for 1000 ADMT. The kraft bales will be repulped and pumped to storage.

Pulp from the two cTMP high density pulp storages will be pumped to a blend chest to ensure homogeneous pulp characteristics, and then to a mix chest, where it will be combined with the other fibre streams.

Kraft pulp from storage will be refined prior to the mix tank, where it will be combined with cTMP, machine room broke (repulped paper) and saveall stock (fibre recovered from machine room process water streams). Stock flows to the mix tank will be ratio controlled to ensure a proper pulp blend to the paper machine.

The blended stock from the mix tank will be pumped via the machine chest to a four-stage paper machine cleaning system. The cleaners, and the screening system which follows, are intended to remove dirt and other debris from the pulp in order to provide a clean paper sheet. The cleaner rejects will be directed to the cTMP reject handling system, while the accepts proceed to a deaerator, to remove entrained air. Removal of air will result in better sheet formation on the paper machine

A two-stage screening system will follow, with secondary rejects diverted to a vibratory flat screen. The flat screen accepts will be recovered, while the rejects are sewered. Primary screen accepts will proceed to the pressurized headbox of the paper machine.

The machine will be balanced for a maximum speed of 1500 m/min and designed for a continuous operating speed of 1310 m/min at a sheet width of 861 cm. Assuming 100% efficiency and a sheet basis weight (measure of the amount of fibre per unit area) of 48.8 g/m^2 the theoretical production will be 750 FMTPD. Budget tonnage will be 220,000 FMTPA over a 353 day operating year, for an average daily tonnage of 623 FMT.

Key components of the paper machine will include: a 9.3 m wide twin-wire former (used to form a wet paper sheet), a four-nip press section (used to press water from the sheet), a seven-stage pulp dryer (used to further reduce water content by evaporation), a six-roll, five-nip calender stack to provide proper sheet surface preparation, take up reels, a winder, plus other ancillary equipment. The final paper sheet will retain 8% moisture.

A computer system will be installed to control the sheet basis weight, moisture content and caliper (thickness).

Provision will be made for installation of a second winder. Two 90-tonne machine cranes will be available for maintenance purposes and a reel crane will be provided for transferring rolls from the reel to the winder.

The paper machine building will be equipped with roof exhaust fans and make up air units. A ventilated false ceiling will be installed over the wet end of the machine to prevent condensation. The paper testing laboratory, motor control centers, control room and offices will be air conditioned.

4.04 Finishing and Shipping

Newsprint rolls will be conveyed from the winder to the finishing area where they will be automatically weighed, wrapped, labelled and then lowered to the warehouse by an elevator.

Clamp trucks will stack rolls four high in the warehouse which is designed for 9000 tonnes, equivalent to about two weeks' production. Loading facilities for both rail and truck will be provided.

Ground floor storage will be provided for cores and wrappers along with associated equipment.

The entire system will be designed to facilitate future production from a second paper machine.

5.00 UTILITIES AND SERVICES

5.01 Chemical Receiving and Preparation

Most chemicals used at the mill will be received in bulk (rail and tank truck) and stored in one section of the plant, equipped for safe handling of corrosive and potentially dangerous chemicals. Due to the potential for extreme winter temperatures, those chemicals susceptible to freezing will be stored inside.

Sulphur Dioxide

a. Sulphur Dioxide

Liquified sulphur dioxide gas (used in the manufacture of sodium sulphite) will be received in 90-tonne rail cars and stored outside in a pressure vessel equipped with a compressed air unloading system and all necessary safety features.

Consumption of sulphur dioxide will be about 3500 tonnes per annum, with shipments received at 10 day intervals.

b. Caustic Soda

Caustic Soda (50% solution) will be received in 30 tonne tank trucks and unloaded to a heat traced carbon steel tank located inside the building.

For distribution within the plant, 50% caustic will be diluted to a 10% solution on a continual basis using mill water and stored in a stainless steel or fibreglass reinforced plastic (FRP) tank.

Caustic soda will be used in the mill for the manufacture of sodium sulphite, as an ingredient in the felt cleaning solution and for periodic paper machine cleaning.

Consumption of caustic soda will be about 8600 tonnes per year (50% solution). Six truckloads will be received each week.

c. Sulphuric Acid

Sulphuric acid (93% solution) will be received by 30 tonne tank truck and unloaded into a carbon steel tank located outside the chemical preparation area. The tank will be suitably diked to contain any spills.

For process use, the concentrated acid will be diluted to 6% on a continual basis using mill water and stored in a fibreglass reinforced plastic (FRP) tank.

Sulphuric acid will be used for pH control and adjustment in the white water system, machine silo, felt cleaning solution and mill effluent.

Annual acid consumption will be approximately 660 tonnes, with deliveries at two week intervals.

d. Diethylene Triamine Penta Acetic Acid (DTPA)

DTPA will be supplied as a 40% solution, which is strongly alkaline. Shipment will be by tank truck, with each load carrying about 15 tonnes of solution. Storage will be in a stainless steel tank located in the building.

DTPA will be added to the chips in the impregnator and to rejects in the rejects reactor to enhance brightness gain from the use of sodium sulphite.

Annual consumption will be about 660 tonnes of 40% solution, with shipments unloaded on a weekly basis.

e. Sodium Sulphite (Na_2SO_3)

Sodium sulphite will be manufactured on site by reacting sulphur dioxide with dilute (10%) caustic soda in an inline mixer. The resultant solution will be stored in stainless steel tanks.

Sodium sulphite is the active chemical in the cTMP process being used to treat chips in the impregnator and reject pulp in the sulphonated rejects reactor. Annual consumption will be about 6800 tonnes.

f. Sodium Hydrosulphite ($Na_2S_2O_4$)

A package system will be installed to supply $Na_2S_2O_4$ on a continual basis for pulp brightening. The chemical will be added to the suction of the medium consistency pumps supplying the two cTMP high density pulp storages. Annual consumption will be about 1650 tonnes.

g. Effluent Treatment Chemicals

Aqueous ammonia and phosphoric acid will be purchased and stored on site as nutrient sources for nitrogen and phosphorous, respectively. These chemicals will be used to support biological treatment of mill effluent. Annual consumption will be in the order of 1250 tonnes NH_4OH (60% solution) and 300 tonnes H_3PO_4 (58% solution).

Polymeric coagulant aids may be required to assist effluent clarification in the primary effluent clarifier and retention aids may be required to enhance effluent sludge dewatering prior to incineration or landfill. Possible use for these chemicals will be better defined at a later date.

The following chemicals will be used in smaller, as yet undefined, quantities when compared to those discussed earlier.

h. Dye System

Methylene blue and methyl violet dyes are normally added to standard newsprint to produce the required blue-white hue. A multicolored batch liquid dye system will be installed, with two stainless steel mix tanks for each dye to ensure an uninterrupted supply. The system will be capable of tinting newsprint to the specifications of individual customers.

i. Wire and Felt Cleaning System

This system will consist of a fibreglass reinforced plastic (FRP) storage tank containing a concentrated liquid detergent, with two pumps to supply the detergent to a mix tank (polypropylene lined FRP). This tank will be used to mix caustic soda, detergent, water and sulphuric acid in the required proportions to formulate the cleaning solution, which will then be transported to a storage tank of similar construction. The solution will then be used as required on the wire and felt cleaning showers.

j. Kerosene

Kerosene will be received at the millsite by tank truck and stored in an underground carbon steel tank. Surface mounted pumps will supply the chemical to the calendar stack on the paper machine, where it will be used on an intermittent basis for roll cleaning.

k. Defoamer

Defoamer will be supplied to the mill in drums. Top mounted pumps will supply the chemical to required points of use in the mill. Defoamers are used to minimize foam generation both in the pulping, machine room, and at times, effluent systems.

l. Slimicide

Slimicide will be supplied in drum form and top mounted metering pumps will supply the chemical to specified application points. Slimicide is used to impede slime growth on some process equipment, primarily in the paper machine area.

It is anticipated that other small-volume chemicals may be required and these will be better defined at a later date. They include; boiler feed water chemicals, raw water treatment chemicals and talc for pitch control.

The use and application of all chemicals will conform with provincial Hazardous Chemicals Act and associated Regulation (Alberta Regulation 49/85).

5.02 Power Supply

Electrical power to the mill will be provided by a new 240 kV transmission line, which along with a new 112.5 MVA primary substation facility, will be designed and constructed by TransAlta Utilities Corporation. The substation will be located at the millsite and will consist of:

a. Deadend structure for termination of the line.

b. An incoming line disconnect switch and circuit breaker.

c. A 240 kV bus system complete with all necessary insulators, arrestors, supports, yard steel, grounding and foundations.

d. A fenced yard area, stone filled.

e. Three 37.5 MVA primary substation transformers complete with primary disconnect switches and breakers, protection and primary on-load tap changers.

Power from the 37.5 MVA transformer secondaries will be connected to a 13.8 kV switchboard, located in the cTMP area, for distribution to the 13.8 kV refiner motors and to the 13.8 kV area sub stations. Motor control centers will be supplied at 2400 V for motors over 225 kW and at 600 V for smaller motors. The 2400 V and 600 V distribution systems will be high-resistance grounded. High-speed ground fault relaying will be provided for equipment protection and safety.

The new 240 kV transmission line will be 26 km in length, and parallel existing lines from the Sagitawah substation southeast of Whitecourt, to the northeast corner of the millsite. The line will then parallel the main access road to the substation. Mill power requirements will average 90 MW, with about 75% of this total used in the refiners. Approximately 80% of this electrical energy will be recovered useable steam.

5.03 Water Supply

The raw water supply system for the mill, designed for a flow of 12,000 l/min, is shown on drawing AO-1674-351-2001. With extensive water recycle and reuse, within the mill, raw water requirements will be kept to a minimum.

The system will include a pumphouse on the Athabasca River, with intake pipes running to a submerged intake structure in the river channel. Intake structure design will comply with all applicable regulations. A hot water line may be incorporated into the intake to prevent frazzle ice problems during winter operation.

The pumphouse will consist of a travelling screen to remove coarse debris such as leaves and twigs and three vertical pumps, one unit on standby, to transport raw water to the reactor-clarifier in the water treatment plant. The water line will be sized to accommodate a second paper machine.

Chemicals added at the clarifier will include milk of lime for hardness reduction, and sodium aluminate or alum and a polymeric coagulant for removal of turbidity and colour. Facilities will also be provided for pH control.

Clarified water will be filtered in multiple self-contained gravity filter units and flow to a clearwell for use in the mill. Filter backwash water will be collected in a holding tank and recycled to the clarifier feedwell. Clarifier sludge will be dewatered for landfill disposal.

A potable water system will be provided for mill personnel and will comply with Alberta Environment regulations.

5.04 Steam and Air Utilities

Utilities will include a packaged boiler and a compressed air supply system.

a. Utility Boiler

A natural gas-fired boiler will be installed with all necessary auxiliaries. The boiler will have a maximum continuous rating of approximately 100,000 kg of steam per hour at a pressure of 14 bar. Auxiliary equipment installed as part of the steam plant will include:

i. Condensate return system and storage tank, with condensate pumped to the deaerator

ii. A semi-automatic sodium zeolite softening system, prepackaged with a brine saturator for zeolite regeneration

iii. An internal boiler water treatment system. Boiler chemicals addition equipment will be provided, including dosage meters, pumps and automatic controls

iv. A softened water storage tank

v. A combined deaerator and boiler feedwater storage tank, complete with two boiler feed pumps

vi. A continuous blowdown system with heat recovery

vii. Complete testing facilities for water quality control

Steam from the refiner heat recovery system will be used in the paper machine dryer along with other applications such as chip prestreaming and building heating. Boiler steam will supplement recovered steam as needed, to ensure all process and non-process steam requirements are met.

b. Air compressors

Two air compressors, each with a capacity of 60 Nm^3 per minute at 10 bar pressure will supply compressed air for mill use. An air dryer will be installed for instrument air. A separate, small compressed air system will be provided in the woodroom.

c. Natural Gas Supply

Natural gas supply to the mill has yet to be finalized. However, it will include a small diameter, high pressure pipeline from a main line in the vicinity, a new heater/regulator station and a section of low pressure pipeline to the millsite.

5.05 Maintenance Facilities

The mechanical, electrical and instrument maintenance and repair shops will be located on the ground floor of the cTMP building. This area will include major shop equipment, a sheet metal shop, pipe shop, woodworking area, a paint storage area and booth, tool crib and mill stores.

On the mezzanine above the shops, the following operations will be located; MCC room, HVAC room, maintenance offices, locker and washroom facilities, instrument and electrical test shops and a general storage area.

An enclosed roll grinding area, a two-wheel roll grinder and a winder slitter grinder will be located on the ground floor at the dry end of the machine room. Roll balancing equipment will be sited in the same area.

5.06 Mill Offices and Laboratory

The office and administration building will be a three-storey building located at the front of the main mill block. The ground floor will be devoted to safety and security personnel, employment and personnel management staff, first aid, a mill conference room, locker rooms and rest room facilities for men and women. The outside office entrance will be located on this level at the front of the building

The second floor will be occupied by engineering and technical personnel, as well as laboratory facilities. Mill management and support staff will be located on the third floor, together with accounting, purchasing and sales personnel. Access to the mill will be provided from the ground and third floors. The office building will be served by a centrally located elevator.

6.00 FIRE PROTECTION, EMERGENCY AND SAFETY SYSTEMS

6.01 Fire Protection

Storage will be provided on site for 3000 m^3 of dedicated fire water. In the event that this primary source is exhausted, a diesel pump located at the river pumphouse will provide a back-up source of fire protection water. Three fire pumps will be provided; one electric, one diesel in the event of a power failure, and a jockey pump.

Training in fire fighting techniques will be provided for pertinent mill personnel. Portable fire protection equipment will be provided as required to supplement permanent hydrant, hose and sprinkler systems.

A detailed fire protection plan will be developed and designed to meet the requirements of the National Fire Protection Association and subject to approval by ANC's insurance underwriters.

a. Outside Fire Protection

An underground yard main will be an integral part of the system, complete with section valves, post indicators, hydrants and risers for sprinkler systems.

Hydrants will be provided around all buildings and at appropriate locations in the yard, including the log and chip storage areas and in the vicinity of the smokeless burner.

For frost protection, all piping will be buried below the frost line.

b. Inside Fire Protection

Automatic sprinkler systems and hose stations will be installed in all buildings with potential fire hazards and designed to meet appropriate fire protection codes. As most buildings will be continuously heated, wet pipe systems will be used, while in unheated areas such as chip reclaim conveyors, dry pipe systems will prevail.

A multiplex fire alarm and detection system will be installed with an annunciator panel located in the central control room and appropriate alarms in the guard house. This panel will monitor status of all critical items of the fire protection system, including pull box alarm stations in all buildings, smoke detectors in all motor control centers and other electrical installations and halon systems in control and rack rooms.

6.02 Emergency and Safety Systems

In line with standard industrial practice, the presence of moving equipment and chemical use will dictate the application of safe work practices. All employees will be trained in safe work practices consistent with their job duties and in accordance with Alberta Occupational Health and Safety regulations.

Employees will be provided with all appropriate personal safety equipment and its use will be mandatory where dictated by local conditions; for example, hearing protection in the vicinity of the chipper, special safety gear for unloading truck and rail chemical shipments, and dust protection in certain enclosed wood handling areas.

Employee safety will be addressed through regular training, safety meetings and committees, first aid personnel and installed protection devices; for example, safety showers, and eye wash fountains. Specialized training will be provided for specific personnel where required. All employees will be advised of plant evacuation routes and muster stations in the event of an emergency.

Visitors to the mill, in accordance with normal industrial practice, will be instructed on mill safety procedures, provided with any personal safety gear required, and their access restricted to certain areas.

One security house will be located near the mill entrance, with both truck and employee traffic being monitored from this location. Weigh scales will be located nearby.

A detailed mill safety and emergency program will be developed and reviewed with personnel from the Alberta Occupational Health and Safety branch.

ENVIRONMENTAL IMPACT ASSESSMENT OF
THE PROPOSED WHITECOURT NEWSPRINT MILL

SECTION 4 - ENVIRONMENTAL MANAGEMENT

1.00 BASIS OF DESIGN

Environmental management encompasses design, construction and operation of process and associated services, utilities and abatement systems, where required, to meet the regulations of the Province of Alberta, including site specific requirements. The mill will be designed and operated to mitigate impacts on the Athabasca River, the groundwater quality, ambient air quality, and land resources.

A key issue is the quality of effluent discharged to the Athabasca River and its impacts on water quality and aquatic life in the river. The Province of Alberta has not established specific standards for pulp and paper mill effluent discharges. Rather, Alberta Environment, the responsible department, requires that industry adopt the "best achievable technology" to protect the quality of Alberta's rivers (Alberta Environment News Release No. 126).

Concepts and designs developed by NLK for water recycle, treatment and discharge, will conform with Alberta Environment's requirement. Similarly, design concepts will be adopted for control and abatement of gaseous emissions and for management and disposal of solid waste which are consistent with Alberta Environment's mission statement - "to achieve the protection, improvement and wise use of Alberta's environment, now and in the future" (Speech from the Throne, March 1987).

The nature of mill effluent, gaseous emissions, and solid waste disposal requirements, along with proposed control and environmental management strategies are discussed in this section. Also summarized are proposed measures for noise control and for compliance with occupational health and safety requirements.

The impact of emissions on the receiving environment is discussed in Section 5.

2.00 EFFLUENT

As indicated in Section 3, 5.03, Water Supply, water recycle will be employed to a high degree to minimize water use. The design water consumption of 24 m^3 per tonne of newsprint is a minimum practical objective. This specific water rate compares with 22 m^3 per tonne for the Millar Western pulp mill at Whitecourt, 75 m^3 per tonne for the kraft mill proposed by Daishowa Canada for Peace River, and well over 100 m^3 per tonne for many older pulp and paper mills.

Over 90 percent of the raw water used by the mill will be discharged as effluent. The balance will be released as water vapour from process vents, as described in Section 4, 3.00 Air Emissions. The characteristics of the raw and treated effluent are described as follows.

2.01 Effluent Sources

A major fraction of fresh process water will be supplied to the paper machine. From the paper machine, water will be cascaded backwards to the cTMP mill. The counter-current process configuration minimizes water consumption and facilitates taking process purges at the most effective locations.

Principal effluent discharge points are listed as follows:

a. Discharge from screen on chip washer circulation system.

b. Pressates from plug screw feeders.

c. Condensate from cTMP heat recovery system.

d. Clear white water from cTMP mill disk filters.

e. Dilution with rejects from cleaners and screens.

f. Effluent from sludge press.

Clear white water from the cTMP mill disk filters at 60^{o} to 70^{o}C will be pumped to the primary effluent treatment system via heat exchangers which will heat incoming raw water.

All other process effluents along with miscellaneous cooling and seal water discharges will be collected with a floor trench system. All floor trenches will terminate in a single mill effluent sump provided with a bar screen at the inlet. From the sump, effluent will be pumped to primary treatment.

All tanks will be equipped with controls and alarms to prevent overflows except under upset conditions. Critical tanks will be provided with back-up or redundant controls. Storage tanks for potentially hazardous chemicals will only overflow under emergency conditions, into containment areas. All overflows will discharge into floor trenches leading to the effluent sump.

Sanitary sewer discharges from washroom and kitchen facilities will be collected separately for treatment in a packaged domestic waste treatment plant.

2.02 Effluent Characterization

Projected characteristics of the raw and treated effluent are summarized in Table 4-1.

TABLE 4-1: EFFLUENT CHARACTERIZATION

Parameter	Unit	Untreated	Treated
Flowrate	m^3/FMT	24	24
Flowrate	m^3/day	15,000	15,000
Biochemical Oxygen Demand (BOD_5)	kg/FMT	50	7.0*
	kg/day	31,500	4,400*
Suspended Solids after Primary Clarification	kg/FMT	30	10*
	kg/day	19,000	6,300*
Suspended Solids after Treatment	kg/FMT		30*
	kg/day		19,000*
Resin Acids	mg/liter		2.0
	kg/day		3.0
pH	-		6.5-9.5
Fish Toxicity (96 hour LC_{50})	-		100%
Dissolved Oxygen	mg/liter		2
Colour	kg/FMT		45*
	kg/day		28,400*
Threshold Odour Number (TON)	-		100
Sulphate	mg/liter		350
	kg/day		5,250
Sodium	mg/liter		550
	kg/day		8,250
DTPA	mg/liter		5
	kg/day		75
Nitrogen	mg/liter		60
	kg/day		900
Phosphorous	mg/liter		10
	kg/day		150

* Based on a 30-day average.

2.03 Effluent Treatment

a. Primary Treatment

Primary treatment will be provided by a reactor-type gravity clarifier to remove suspended solids. The reactor-type design is especially well suited for high-fines newsprint mill effluent. This configuration is utilized at a number of similar newsprint operations in Canada. Sludge from the clarifier, consisting of dirt and grit from pulp cleaning along with a small amount of pulp fibre, will be withdrawn from the bottom of the clarifier and pumped to a dewatering system.

A screw press or a twin-wire press will dewater the sludge to 20 to 30 percent solids, adequate to allow combustion in an on-site incinerator. If the inorganic content is too high, the sludge will be directed to landfill. Polyelectrolyte coagulant aids will be employed as required to achieve adequate dewatering efficiency.

Biochemical oxygen demand (BOD) will also be reduced in the primary clarifier. ANC will evaluate the effects of polyelectrolytes to enhance this reduction.

From the primary clarifier, effluent will flow by gravity to secondary treatment, as shown on the Flow Diagram for Effluent Treatment, drawing AO-1674-251-2001.

b. Secondary Treatment

Aerobic biological secondary treatment will be used to reduce biochemical oxygen demand (BOD_5) and render the effluent non-toxic to aquatic life. Several alternative treatment systems were considered, as discussed in Section 4, 2.04. An aerated stabilization basin (ASB) with a very conservative hydraulic retention time (HRT) of 10-days was selected as the system which provided the best combination of technical performance and reliability.

A subsurface aeration system will be used to provide oxygen for biological respiration. For the projected BOD loadings, the aeration system will require about 2500 horsepower, based on a specific energy requirement of approximately 1.1 kWh per kg of BOD removed. A subsurface system has been selected to provide efficient operation at the relatively high unit energy application required and to ensure high reliability, particularly under winter conditions. Adequate oxygen will be provided to ensure that there will be no significant odour producing anaerobic activity and to meet the discharge oxygen concentration limit of at least 2 mg of O_2 per liter.

The outlet structure will be designed to prevent floating solids or foam from entering the discharge pipe and to facilitate control of the ASB level. Effluent will be discharged to the Athabasca River through a submerged diffuser section.

Biological activity in the ASB will be frequently monitored and controlled to provide adequate reduction of BOD and degradation of toxic compounds. The toxic constituents consist of volatile wood components, such as resin and fatty acids, extracted in the production of cTMP pulp. These extractives are readily biodegradable (Mueller et al., 1976; McLeay 1986; and many others) and will be rendered non-toxic in the ASB.

Nutrients, nitrogen as aqueous ammonia and phosphorus as phosphoric acid, will be metered into the ASB to support biological activity. The effluent discharge to the river will be monitored for residual nitrogen and phosphorus content so that excess nutrients are not discharged to the river.

The 10-day hydraulic retention time is equal to the retention provided for effluent from the Millar Western operation, which is anticipated to have a raw effluent BOD concentration 30 to 60 percent higher than that which will prevail at ANC. Retention time for similar systems provided for kraft mill effluent, which is potentially more toxic, is frequently in the range of 5 to 8 days. The 10-day ASB represents a very conservative approach for effluent treatment from a newsprint mill.

A computer model will be employed to optimize the design of the ASB. This model facilitates arrangement of the retention area into a well-mixed section followed by a plug-flow section; to achieve maximum BOD and toxicity removal efficiency and to control discharge of biosolids.

c. Effluent Diffuser

A submerged effluent diffuser will be strategically located in the Athabasca river for dispersal to the receiving waters. It is anticipated that the diffuser will cover about 50% of the width of the river channel, leaving a substantial width free for fish migration.

The diffuser will be provided with multiple discharge ports to enhance dispersion of the effluent and establish complete mixing in the minimum possible distance downstream of the discharge point. A computer model will be used to predict dispersion, which will be confirmed with dye studies after physical installation prior to start-up.

2.04 Alternative Treatment Processes

The ASB was selected for biological secondary treatment after comparison with other available systems, specifically:

a. Activated sludge

b. Anaerobic treatment

c. Physical/chemical treatment

The ASB, with a conservative hydraulic retention time of 10 days and adequate air supply, will provide over 90% BOD_5 reduction (Servizi and Gordon, 1986). Further, resin and fatty acid concentrations will be reduced to non-toxic levels of less than 2 mg per liter. (Servizi and Gordon, 1986).

There are limited examples at other locations in Canada for high-efficiency treatment of effluents similar to that which will arise from the ANC operation. A recent survey provides the following summary (Hamilton, et al., 1987).

TABLE 4-2: WASTEWATER TREATMENT PRACTICES AT SELECTED CANADIAN CTMP AND SIMILAR TYPE MILLS

Location	Effluent Treatment Facilities
Amos, Quebec	primary clarification
Bathurst, N.B. [a]	screening
Quesnel, B.C.[a]	primary clarification, aerated lagoon [5-days HRT]
Crofton, B.C.	extended aeration activated sludge (on part of wastewater stream) [1-day HRT]
Stephenville, Newfoundland	primary clarification
Temcell, Quebec	dissolved air flotation
Taylor, B.C. [b]	primary clarification, aerated lagoon [10-day HRT]
Baie Comeau, Quebec	primary clarification
Beaupre, Quebec	primary clarification
Jonquierre, Quebec	primary clarification

a Anaerobic treatment investigated at pilot scale and to be implemented at full-scale.
b Under construction.

The only significant addition to this list, and, which is of special interest, is the Millar Western Pulp Ltd. (MWPL) mill at Whitecourt. Treatment at this plant, scheduled to commence operation in mid-1988, will consist of primary clarification and an aerated stabilization basin with a hydraulic retention time of 10 days. The CTMP plant currently under construction at Taylor, B.C. will also be provided with an aerated stabilization basin with a 10-day hydraulic retention time.

It is noteworthy that at the Amos, Quebec location effluent treatment is limited to primary clarification and that no treatment is provided specifically to reduce BOD and toxicity. The mill at Amos is a single machine newsprint mill with integrated TMP production. This mill, with a rated capacity of 165,000 tonnes per annum, is essentially similar in process design to the proposed ANC operation.

Six other installations in the above list also do not have a secondary treatment system to reduce BOD and effluent toxicity.

The most extensive and applicable experience from the above list for biological treatment is available from the Quesnel River Pulp (QRP) operation at Quesnel, B.C. This mill was constructed in 1981 as a thermomechanical pulp (TMP) mill. It was subsequently converted to chemi-thermomechanical pulp (CTMP) and now produces both grades on an intermittent basis. Effluent characteristics and treatment for this mill have been extensively studied and reported upon (Servizi and Gordon, 1986 and several unpublished reports).

The QRP aerated stabilization basin has a nominal hydraulic retention time of five days. Aeration capacity has been increased from the initially installed 500 horsepower to over 1600 horsepower. Plant capacity is currently approximately 200,000 tonnes per annum. Effluents discharged by QRP have not consistently met Federal regulations and Provincial effluent quality criteria for detoxification (Servizi and Gordon, 1986). However, benthic surveys of the receiving waters downstream of the discharge have not indicated any detrimental effects (unpublished studies).

The performance limitations of the QRP system are considered to arise from the frequent periodic product grade charges and limited hydraulic retention time and aeration capacity. Pilot plant testing at Quesnel with QRP effluent from both TMP and CTMP production indicated near 90% BOD removal with five days of treatment and over 90% removal with seven days of treatment (Servizi and Gordon, 1986).

Selection of an aerated stabilization basin reflects conservative and good engineering practice. A 10-day hydraulic retention time is proposed, equal to the retention chosen for the two similar mills under construction in Western Canada, Millar Western Pulp at Whitecourt and Fibreco at Taylor, B.C., where BOD concentrations in the raw effluent will be substantially higher than for ANC.

The characteristics of the alternatives considered are discussed below:

a. Activated Sludge

Like aerated stabilization basins, activated sludge systems can be used to achieve high efficiency removal of BOD from CTMP effluents. However, aerated lagoons can achieve more consistent detoxification than activated sludge systems. This applies even where the degree of BOD removal for an activated sludge system is equal or greater than with an ASB. Tests conducted at an NSSC/CTMP mill in New Brunswick indicated that two and one-half days of activated sludge treatment could not completely detoxify the effluent, whereas a seven to nine day aerated lagoon could do so. (Hamilton et al., 1987; Mueller et al., 1976; Wilson et al., 1985.)

The only operating activated sludge system on CTMP effluent in Canada is at the British Columbia Forest Products (BCFP) newsprint and kraft pulp mill at Crofton on Vancouver Island. This plant is currently being expanded and the treatment system is being upgraded with the installation of a jet-aeration system similar to the aeration system provided for the Millar Western pulp mill. Following the expansion and upgrading, hydraulic retention time for the system will be less than one day.

Treatability tests have indicated that the modified BCFP system will meet toxicity requirements. However, only a portion of the effluent is treated in the system and the mill water balances are such that certain toxic components are likely transferred to other effluent streams and discharged with more dilute effluents. Further, there is very little resin acid content in coastal woods compared to interior species. Resin acid will be the principal component potentially toxic to aquatic life in the ANC effluent.

In addition to less effective toxicity removal, activated sludge systems compare unfavourably with aerated stabilization basins with respect to resistance to process upsets and consistent performance. Biological sludge concentration and condition must be carefully controlled to achieve consistent performance with an activated sludge system, whereas an aerated stabilization basin tends to be self regulating. The first cell of the ASB will have a retention time of 4 to 6 days and be very well mixed. This compares to two days or less for an activated sludge system. Thus, with the ASB, upset conditions can be much more readily absorbed and smoothed out before the final effluent outfall.

On a technical performance basis, it is considered that an activated sludge system has no important advantage over an aerated stabilization basin, but, rather, has several disadvantages; namely - inferior toxicity reduction and less tolerance to normal upset process variations.

The impetus to select activated sludge in preference to an aerated stabilization basin is, in most cases, land space availability. The area required for an activated sludge system is typically only 20% of that required for an ASB. The activated sludge system at Crofton was installed because of space limitations. The ANC site has adequate land available for the proposed ASB.

A perceived advantage of activated sludge is the reduction of biosolids in the final effluent. With activated sludge, biosolids are separated from the effluent following biological treatment. A portion of the solids is returned to the retention vessel or pond and the balance is extracted for landfill or incineration. This can reduce the discharge of biosolids in the final effluent to about 20% of that which prevails for an ASB.

Biosolids consist of non-settleable suspended solids, predominantly micro-organisms less than 5 microns in size (Costa, et al., 1979). These authors report - "In the authors' experience, these nonsettleable suspended solids were never known to directly or indirectly create a deleterious environmental impact in receiving waters". Further, the authors say - "At the levels they occur in receiving waters, residual biosolids do not generate detectable benthic deposits, do not cause harm to fish raised in their presence, do not deleteriously affect aquatic insect communities, and do not significantly impact algal productivity. These biosolids do enter the food chain of aquatic insects and fish through ingestion and incorporation into cellular material .... Food chain studies suggest the biosolids can have an important productivity role in receiving waters". (Costa, et al., 1979).

In summary, technical factors related to BOD removal efficiency, elimination of aquatic toxicity and system reliability clearly favour an ASB system. Adequate space for a very conservatively sized ASB with 10 days' hydraulic retention is available. Discharge of biosolids associated with an ASB will not have a detrimental impact on the receiving waters.

b. Anaerobic Treatment

Aerobic treatment, aerated stabilization basins and activated sludge, all require high volume air supply with associated high power costs. Anaerobic treatment, on the other hand, is carried out in the absence of air, and power costs are minimal. Moreover, the anaerobic process produces methane gas which can be used as fuel for boilers and dryers.

Anaerobic treatment is a developing and promising technology for the pulp and paper industry. An anaerobic treatment system will be installed by Quesnel River Pulp to provide incremental treatment for a 50% increase in production capacity currently under construction. A similar system will be installed at Bathurst, New Brunswick, to treat effluent from a CTMP mill started-up in 1983. The design and performance standards for both of these systems were based on extensive, relatively large-scale, on-site pilot testing. As yet, the technology for anaerobic treatment for pulp and paper effluents is not sufficiently advanced to allow design and construction of treatment systems without considerable site-specific data. The technical risk associated with use of an anaerobic system for a new facility, like ANC, is not acceptable.

In any case, the principal impetus for use of anaerobic treatment is economic not technical performance. Anaerobic treatment has the potential to provide significant operating cost savings (Fromson et al, 1986). However, to achieve 90% BOD removal and compliance with toxicity standards, a tertiary level of treatment would be required at ANC.

It is anticipated that ANC will construct a second paper machine in the future. At that time, an anaerobic treatment system could be a technically attractive process if integrated with the existing 10-day ASB. The availability of actual effluent characteristics and the ability to undertake on-site pilot plant development would enable the control and evaluation of technical risk. The anaerobic system now being installed at Quesnel River Pulp follows this concept.

c. Physical/Chemical Treatment

Some recent research has indicated that massive lime treatment can be used to reduce BOD and raw effluent toxicity (Bennett, et al., 1988) However, application of physical/chemical methods would be limited to pretreatment prior to conventional biological treatment. The principal benefit would be reduction in power costs for subsequent aerobic treatment. Since the technology is unproven, it is not considered appropriate for ANC.

2.05 Effluent Monitoring

Effluent discharges will be monitored in accordance with requirements established by Alberta Environment. In addition, instrumentation will be installed and testing procedures implemented to optimize the performance of the biological treatment system. Parameters which can be measured with on-line sensors, such as flow, temperature, pH and dissolved oxygen, will be continuously monitored and recorded. Abnormal conditions will be alarmed.

Sampling and testing procedures will be in accordance with Alberta Environment standards where specified or recognized industrial standards, where Alberta Environment does not impose specific regulations.

A downstream chemical and benthic monitoring program will be developed in association with Alberta Environment.

3.00 AIR EMISSIONS

NLK retained Cirrus Consultants of Vancouver, B.C. to conduct a meteorological and air quality evaluation for the proposed mill. The Cirrus report is attached as Appendix 2.

3.01 Air Emission Sources

Process Emission

Primary emissions from the mill will be:

a. Wood volatiles from the pulping process.

b. Water vapour from the pulping and paper machine areas.

c. Products of combustion from the natural gas fired power boiler and the glycol/water heater.

d. Water vapour from the surface of the aerated stabilization basin.

e. Products of combustion from the smokeless burner.

Fugitive Dust Emissions

Fugitive dust emissions will occur from chip and roundwood handling and storage and from vehicular movement (primarily heavy equipment) on the millsite.

3.02 Air Emission Characterization

Projected air emissions for water vapour, particulates, NO_x and SO_x are summarized in Table 4-3.

TABLE 4-3

PROJECTED MILL EMISSION LEVELS

Source	No. of Discharges	kg/hr	Total Flow Nm3/min	Am3/min	deg C	Water Vapour %v/v	Humidity	Ht. m	Stack Diam. mm	Vel. m/sec	Contaminates Partic. g/s	NOX g/s	SOX g/s	Remarks
PULPING AREAS														
Heat Recovery Vent	1	3,700	75	97	95	83	Sat.	34	400	12.9	-	-	-	Normal Operation, all refiner steam condensed
*Refiner Steam Vent	1	90,000	2,000	2,600	100	99	Sat.	34	2100	12.5	-	-	-	Abnormal operating conditions
Pulp Thickener Hoods	3	21,000	300	320	40	7		34	550	7.5	-	-	-	Continuous
Pulping Area Ventilation	2	349,000	5,000	5,300	35	7		34	1800	17.4	-	-	-	Continuous
PAPER MACHINE														
Paper Machine Dryer Hood	3	261,000	3,800	4,200	50	11	Sat.	32	1400	15.2	-	-	-	Continuous
** PM Dryer Hood	3	273,000	4,100	4,700	60	19		32	1400	17.0	-	-	-	Abnormal operating condition
Saveall Hoods	2	14,000	200	220	40	7		32	550	7.7	-	-	-	Continuous
Paper Machine Ventilation	6	977,000	14,000	14,800	35	7		32	1800	16.2	-	-	-	Continuous
UTILITIES														
Packaged Boiler	1	100,000	1,500	2,700	230	18		34	2100	13.0	Neg	67.8	0.23	Intermittent
Glycol/Water Heater	1	14,000	210	410	260	17		34	850	12.0	Neg.	6.4	0.03	Intermittent for space heating
WOOD PREPARATION AREA														
Wood Waste Incinerator	1	297,000	4,300	13,200	550	10		26	8500	3.9	3.2	3.2	0.32	Operation in /association with wood preparation

* When Heat Recovery System not Operating
** When Economizer not Operating

4.00 SOLID WASTE MANAGEMENT

4.01 Solid Waste Sources

a. Wood Handling

While effort will be expended to ensure efficient utilization of wood resources, waste will be generated in several areas of wood handling. These areas include debarking of roundwood, chip screening and solid wood handling.

b. Raw Water Treatment Plant

In order to produce water of a quality suitable for mill use, raw water from the Athabasca River will be treated with chemicals to reduce total hardness and turbidity. Milk of lime will be used for hardness reduction, while a polymer and either sodium aluminate or alum will be used for clarification. The sludge from the water treatment clarifier will thus contain silt settled from the river water plus small quantities of treatment chemicals. The sludge will be dewatered prior to disposal.

c. Effluent Clarifier

Mill effluent streams will flow to a primary effluent clarifier prior to the aerated stabilization basin. A polymer will be used to assist in the removal of settleable solids, (predominantly dirt and grit from pulp cleaning with small amounts of fibre), in the waste water. The clarifier sludge will be dewatered to about 30% BD consistency prior to disposal.

d. Burner Ash

A smokeless burner will be used for some solid waste disposal. The ash generated will require disposal on a regular basis.

e. Construction Materials

During the construction period, wastes will be generated in the form of building materials and rubble. This material will be burned on-site or trucked to the regional sanitary landfill.

4.02 Solid Waste Characterization

At design production capacity, solid waste disposal requirements are tabulated as follows:

TABLE 4-4: SOLID WASTE GENERATION

Source	Estimated Quantities (BDMT) Per Annum	Per Day
Bark	19,000	54
Solid Wood	25,000	71
Chip Handling	4,000	11
Total Wood Handling	48,000	136
Water Treatment Sludge	2,200	6
Effluent Clarifier Sludge	3,200	9
Burner Ash	1,000	3

4.03 Solid Waste Disposal Practices

Government regulations will be observed in the handling and disposal of all solid wastes.

Wood waste and effluent clarifier sludge will be incinerated in a smokeless burner to be constructed at the mill site. The quantity of waste incinerated per day will be in the order of 145 BDMT and will generate about 3 BDMTPD of ash. The ash will be disposed of in a government approved landfill facility.

Water treatment sludge will be dewatered to about 20% BD consistency and disposed of in a government approved landfill facility.

Where possible, construction wastes will be recycled. Remaining material will be burned or landfilled in an approved manner.

In the event that wastes are generated, either during the construction phase or operation of the proposed plant, which are unsuitable for incineration in the smokeless burner or disposal in an approved landfill, due to their potentially hazardous nature, discussions will be initiated with the appropriate authorities to ensure handling and disposal in an approved manner.

5.00 NOISE CONTROL

Noise abatement construction techniques will be utilized where necessary to ensure that noise levels within the mill are in accordance with occupational health and safety guidelines.

The proposed mill site will be 8 km away from the town of Whitecourt and thus noise generated by mill operation will not be detected in town. The issue of noise management is discussed in Appendix 2.

6.00 SURFACE RUN-OFF

A detailed surface run-off storm drainage plan will be developed for the overall site and submitted to Alberta Environment for review.

The plan will address drainage along all roadways and track beds within the mill site, as well as paved areas such as parking lots and chip storage pads. Also included will be building roof drains and general yard drainage. All surface runoff collection channels will be graded to drain to a storm pond for gravity settling of solids, prior to discharge to the Athabasca River.

Care will also be taken to address proper drainage during the site cleaning and construction phase of the project.

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ENVIRONMENTAL IMPACT ASSESSMENT OF
THE PROPOSED WHITECOURT NEWSPRINT MILL

SECTION 5 - ENVIRONMENTAL IMPACT

1.00 ATHABASCA RIVER WATER QUALITY

1.01 Introduction

NLK retained Beak Associates Consulting Ltd. of Edmonton to prepare a study on water quality in the Athabasca River, both under current conditions, and for those that would prevail following start-up of the proposed ANC mill. The Beak report is attached including Millar Western as Appendix 1, with pertinent findings discussed in this section.

1.02 Existing Water Quality

Water for use in the mill will be drawn from the Athabasca River. River flow varies with time of year, the low flow regime typically occurring under ice cover in the December-March period, with peak river flows attained in June or July. The ANC mill will be located near the Windfall gauging station (07AE001) maintained by Environment Canada, with historical flow data available for the period 1960-1984. Table 5-1 presents pertinent flow data at Windfall, with Fort McMurray and Athabasca Town included for comparison.

TABLE 5-1: ATHABASCA RIVER FLOWS

	Station No.	Drainage Area (km^2)	Minimum Recorded Flow (m^3/s)	Mean Flow (m^3/s)
Windfall	07AE001	19,900	19.3	253
Town of Athabasca	07BE001	74,600	42.2	438
Fort McMurray	07DA001	133,000	92.0	689

The 7Q2 and 7Q10 flows at Windfall were calculated by Beak as 38.6 m^3/s and 30.4 m^3/s respectively.*

Maximum mill water requirements will be about 0.20 m^3/s (12,000 l/min), which represents 1% of the minimum recorded flow and 0.08% of the mean flow recorded at Windfall. These numbers indicate that mill water withdrawal from the river will have minimal impact on the flow regime.

Existing water quality along the Athabasca River basin was studied by Alberta Environment in the 1984/1985 period (Hamilton, et al, 1985). Water quality parameters at Windfall were extracted from the report and are presented as Table 5-2.

This study concluded that the Athabasca River could be divided into three water quality zones. Whitecourt is included in the first zone (Foothills reach) which extends from the headwaters through to Fort Assiniboine.

This section of the river is generally characterized by high alkalinity and hardness and low suspended solids. Hardness reflects the calcium and magnesium content, while elevated bicarbonate levels result in high alkalinity. The Athabasca River basin is of sedimentary origin. Many elements such as calcium and magnesium, and most of the metals are readily dissolved from sedimentary rock, explaining their presence, at times elevated, in the river water.

River pH levels along the basin ranged from 8.0 to 8.2 and in this alkaline environment, bicarbonate (HCO_3) is the major form of inorganic carbon.

Water entering this reach from the mountain regions also contains higher levels of sulphate and nitrate + nitrite when compared to the downstream levels. This, again, is due to the sedimentary nature of the basin. Nutrients (organic carbon, nitrogen and phosphorous) are also lower in this reach when compared to downstream levels.

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* 7Q2 is the minimum 7-day moving average flow occurring with an expected frequency of once in two years. 7Q10 is the same flow with an expected frequency of once in ten years.

TABLE 5-2: WATER QUALITY: ATHABASCA RIVER AT WINDFALL

Item	Unit	Amount *
Total Dissolved Solids	mg/l	160
Conductivity	us/cm	299
Filterable Residue	mg/l	220
Non-Filterable Residue	mg/l	30.5
Turbidity	NTU	73
Calcium	mg/l	38
Hardness	mg/l	139
Alkalinity	mg/l	120
pH	pH Units	8.1
Sodium	mg/l	5
Magnesium	mg/l	10
Oil	mg/l	0.39
Potassium	mg/l	0.6
Chloride	mg/l	3.5
Sulphate	mg/l	30
Bicarbonate	mg/l	145
Biochemical Oxygen Demand	mg/l	1.0
Colour relative	units	26.6
Chemical Oxygen Demand	mg/l	14.7
Particulate Carbon	mg/l	2.9
Dissolved Organic Carbon	mg/l	3.6
Dissolved Inorganic Carbon	mg/l	27.3
Phenol	mg/l	0.004
Tannins and Lignins	mg/l	0.49
Planktonic Chlorophyll	mg/m^3	1.5
Epilithic Chlorophyll	mg/m^2	20.9
Total Coliform counts	100ml	290
Fecal Coliform counts	100ml	8
Silica	mg/l	3.6
Floride	mg/l	0.10
Total Phosphorous	mg/l	0.021
Total Dissolved Phosphorous	mg/l	0.004
Total Kjeldahl Nitrogen	mg/l	0.15
Particulate Nitrogen	mg/l	0.16
Nitrate + Nitrite	mg/l	0.045
Nitrite	mg/l	0.0012
Ammonia	mg/l	0.009
Aluminum (extracted)	mg/l	0.121
Beryllium (extracted)	mg/l	0.0010
Cadium (total)	mg/l	0.0010
Cabalt (total)	mg/l	0.0010

TABLE 5-2 CONT'D
WATER QUALITY: ATHABASCA RIVER AT WINDFALL*

Item	Unit	Amount *
Copper (total)	mg/l	0.0040
Chromium (total)	mg/l	0.0037
Iron (extracted)	mg/l	0.26
Lead (extracted)	mg/l	0.003
Manganese (dissolved)	mg/l	0.24
Mercury (total)	mg/l	0.00009
Molybdenum (total)	mg/l	0.0010
Nickel (total)	mg/l	0.004
Selenium (total)	mg/l	0.0002
Vanadium (total)	mg/l	0.003
Zinc (total)	mg/l	0.006
Arsenic (total)	mg/l	0.0007

* Concentrations represent the average of six test data

Hamilton, et al., (1985) concluded that point source discharges from industrial and municipal facilities in the basin had no broad based influence on the river. Localized effects may be apparent immediately downstream of point discharges, however the impact is limited in distance. The hydrologic regime was deemed the primary controlling variable in Athabasca River water quality.

The Alberta Surface Water Quality Objectives (ASWQO) are exceeded for some parameters along the basin (eg. iron, total phosphorous, manganese); however, this is attributed to natural causes and not human activity.

Athabasca River water exceeds some Federal guidelines for municipal supply along the entire length of the river, again, due to natural causes. This does not determine its suitability for municipal water supplies, but does dictate the level of treatment required. Alberta Environment recommends that no one drink water from a surface water body in the Province prior to treatment.

Contact recreation is limited along the river due to low water temperatures and high turbidity much of the year.

Many of the trace metal guidelines for wildlife and aquatic life are exceeded, particularly in the lower reaches of the river, again due to natural causes.

1.03 Impact on Water Quality

Effluent flow to the Athabasca River will be about 15,000 m^3 per day. This will represent approximately 90% of the raw water intake to the mill, the remaining 5% being distributed between the newsprint and vented as waste steam.

Mill design will incorporate extensive water recycle, minimizing raw water requirements. Design will also emphasize efficient utilization of all raw materials, particularly chemicals, thereby minimizing effluent loading.

Table 5-3 summarizes projected effluent loadings for key parameters and their resultant concentrations in the Athabasca River, assuming complete mixing. The effluent will be discharged to the river through a multiport diffuser pipe which will distribute effluent flow across the main river channel, thus establishing an effective mixing zone of minimum length. The mixing zone is that distance required downstream of the effluent discharge, before the effluent is fully mixed in the river water. A properly designed diffuser will reduce the mixing zone to a few kilometers.

The impact of the effluent on the river can be assessed by examining key wastewater parameters as listed in Table 53. and the ability to meet the Alberta Surface Water Quality Objectives (ASWQO).

The biochemical oxygen demand or BOD is a measure of the quantity of organic material in water that can be readily consumed by aquatic microorganisms. In digesting organic material, the microorganisms will consume oxygen dissolved in the water. The higher the BOD loading to a receiving water, the greater will be the reduction in dissolved oxygen (DO). The ASWQO place a minimum on DO of 5.0 ppm. This level of oxygen is a conservatively established objective to protect fish and other forms of aquatic life.

Background BOD levels in the Athabasca River at Windfall were measured at 1.0 mg/l (Hamilton, et al, 1985). The ANC effluent is projected to add 1.7 mg/l BOD under conditions of 7Q10 river flows and 0.2 mg/l BOD during mean or average flows.

TABLE 5-3: EFFLUENT PARAMETER LEVELS IN ATHABASCA RIVER

Parameter	Concentration in Treated Effluent mg/l*	Alberta Environment Levels at Windfall mg/l**	Contribution from Effluent mg/l 7Q10+	Mean++	ASWQO
BOD_5	300	1.0	+ 1.7	+0.2	-
TSS	1250	30.5	+ 7.1	+0.9	+10 unit increase above background
pH	6.5-9.5	8.1	-	-	6.5 - 8.5
Temperature	40^{o}C (Max.)	-	+ 0.2	+0.03	$+3^{o}$ increase above background
Colour	1900	26.6	+11	+1.3	+30 unit increase above background
Sodium	550	5	+ 3	+0.43	-
DTPA	5	-	+ 0.03	+0.003	-
Resin Acids	2	-	+ 0.01	+0.001	-
Sulphate	350	30	+ 2.0	+0.24	-
Total Nitrogen	60	0.15	+ 0.3	+0.04	1.0
Total Phosphorous	10	0.021	+ 0.06	+0.007	0.050
Threshold Odor No.	100	-	-	-	8
Toxicity	96hourLC_{50}=100%	-	-	-	-

* - based on 630 FMT/day, 15,000 m^3/day effluent flow
** - Hamilton et al, 1985
\+ - 7Q10 river flow of 30.4 m^3/s. Dilution factor 175
++ - mean river flow of 253 m^3/s. Dilution factor 1450

(1674, EIA Study)

Beak conducted a river modelling study, which is included in Appendix 1. Figures 5-4 and 5-5 illustrate projected river DO profiles without the ANC mill and following start-up of the proposed ANC mill under 7Q10 flow regimes. Figure 5-4 indicates that a minimum river DO level of 6.0 mg/l will be reached just upstream of the Lesser Slave confluence under current conditions and this will be reduced to 5.0 mg/l DO with both Whitecourt area mills operational. The river dissolved oxygen level is not projected to drop below the Alberta guideline.

It should be noted that this modelling assesses "worst case" conditions of all three mills (Champion, ANC and Millar Western) discharging at peak BOD levels at the same time under a 7Q10 flow regime under an ice cover. This combination of events is very unlikely to occur. Thus, there is a margin of safety, further ensuring maintenance of adequate dissolved oxygen in the river.

Nevertheless, the computer modelling does indicate that the organic load discharged by the two existing pulp mills and the ANC paper mill will have some impact on the assimilative capacity of the Athabasca River. It is expected that Alberta Environment will monitor the situation and compare actual river conditions with projections and objectives.

Total suspended solids (TSS) added to the river will increase the TSS background level (30.5 mg/l) by 7.1 mg/l and 0.9 mg/l under conditions of 7Q10 and mean river flows respectively. The ASWQO for suspended solids is a maximum increase above background of 10 mg/l. Projected increases are within the objective for ANC alone and exceed it slightly when included with MWPL.

The suspended solids discharged will be predominantly biological solids from the aerated stabilization basin (ASB). These solids are deemed non-settleable and will gradually decrease downstream of the effluent diffuser as they further oxidize and enter the aquatic food chain. The rate of decrease is a function of water temperature and other conditions in the river. These biological solids are similar to those created during natural vegetative decay and as such are not harmful to aquatic life. The oxygen demand associated with the TSS is included in the effluent BOD measurement.

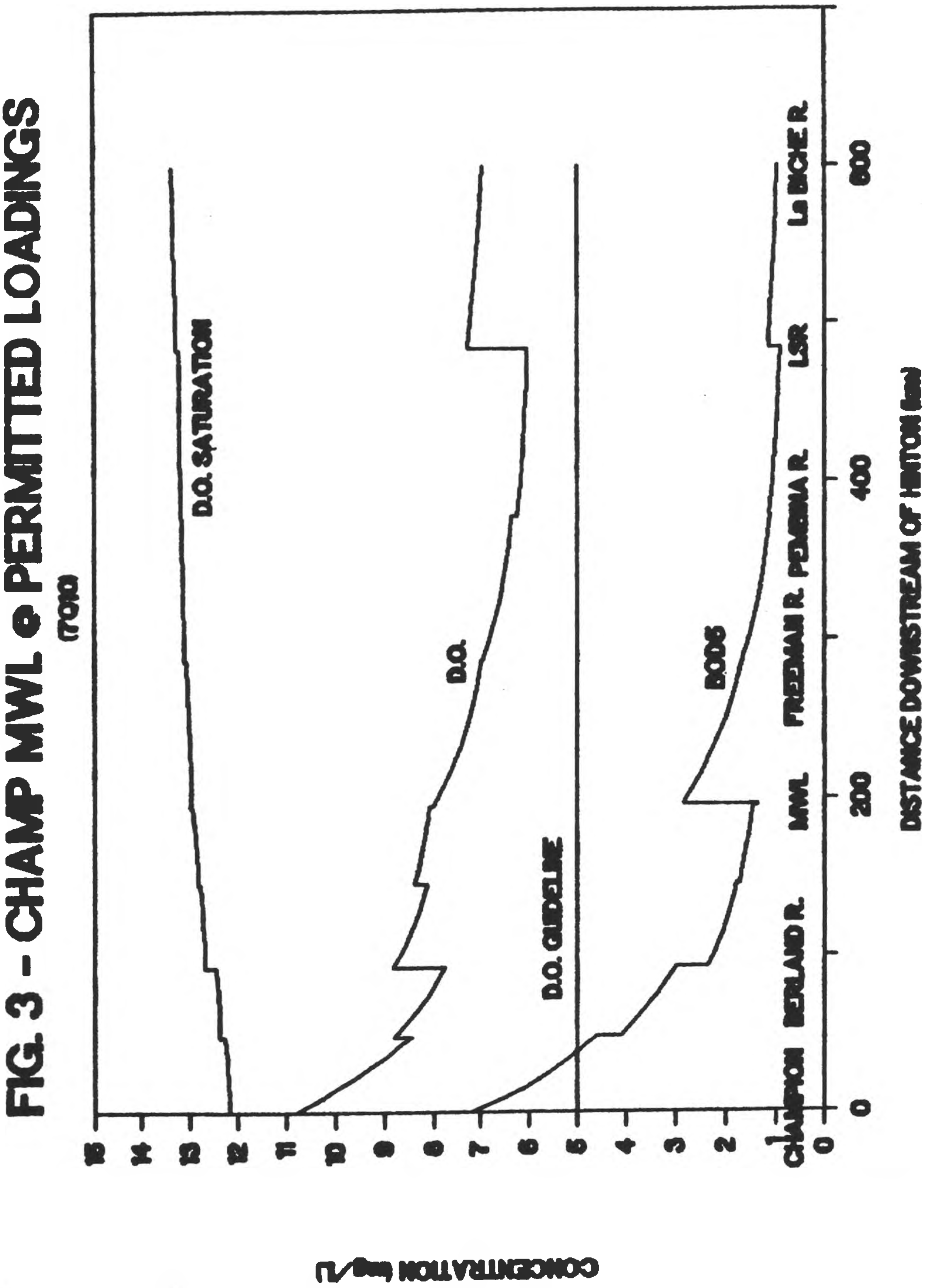

Figure 5-4

(1674, EIA Study)

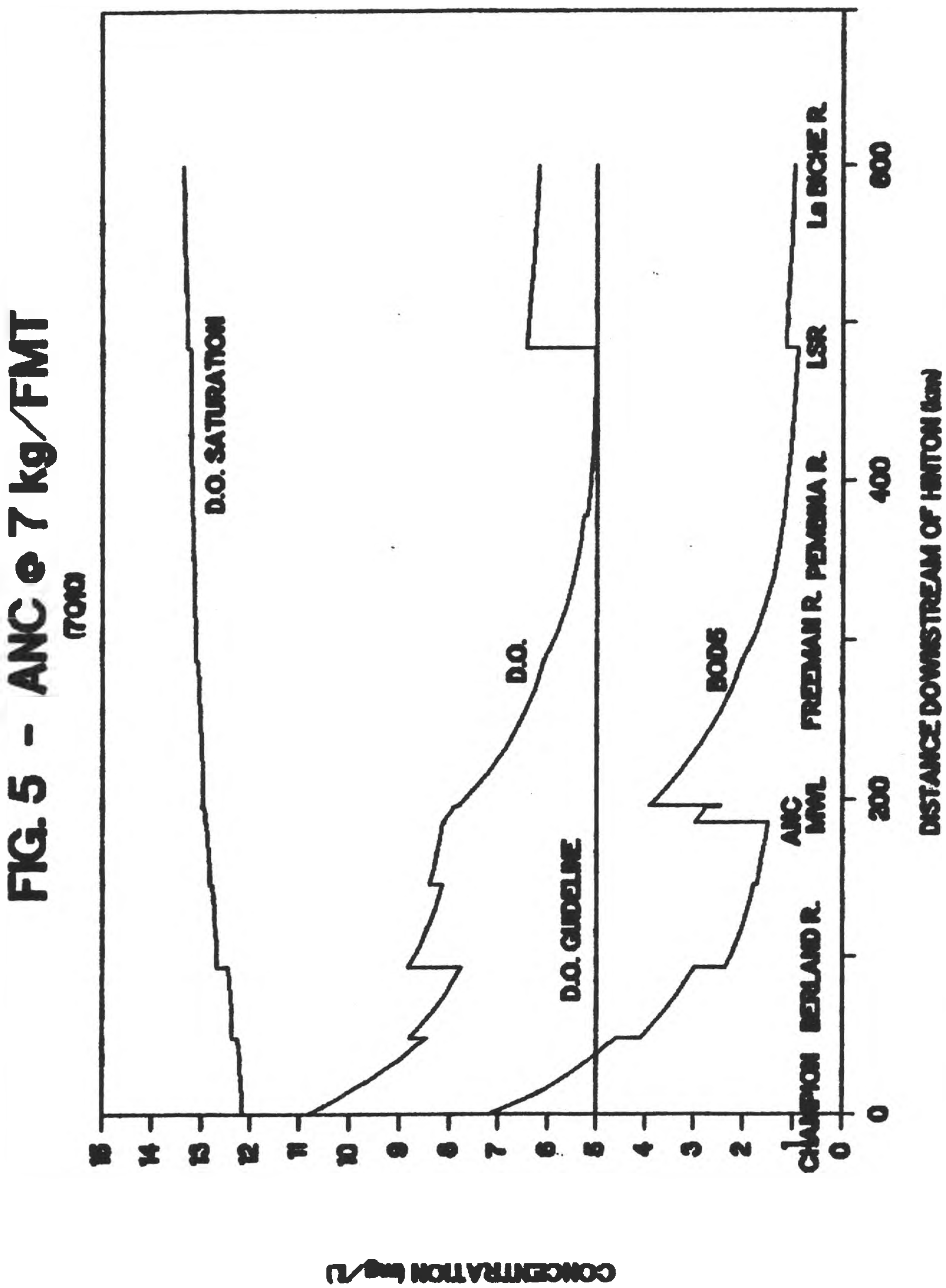

Figure 5-5

(1674, EIA Study)

The ASWQO state that river pH must be in the range of 6.5 to 8.5. The effluent biological treatment system must operate within this range for maximum BOD removal fficiency and raw effluent pH adjustment within the mill will be practiced as needed to maintain the desired range. With river dilution factors of 175 to 1450, effluent discharge will have minimal effect on river water pH.

For a maximum effluent temperature of 40°C, increases in river temperature of 0.2°C and 0.03°C will occur under 7Q10 and mean flow regimes respectively. This is well within the ASWQO of 3°C increase above background.

Colour levels in the river, according to ASWQO, should not increase by more than 30 colour units above background. For a treated effluent colour level of 1900 colour units, the increase in the river will be 11 units at 7Q10 flows, well within the objective. This objective is also met when the MWPL discharge is included with ANC. Effluent colour is due primarily to high molecular weight colour bodies (usually lignin) released during the processing of wood. Proper diffuser design will ensure rapid mixing of the effluent in the river, thereby minimizing any aesthetic effects of the increase in colour.

The treated effluent discharged to the river will be non-toxic as determined by a 96 hour static bioassay test, using procedures established by Alberta Environment. Much of the toxicity in raw effluent is contributed by resin acids released during wood processing. The 10 day retention ASB will decrease resin acid content to a maximum of 2 mg/l, which on dilution in the river will be reduced to levels less than 0.01 mg/l. The proven effectiveness of an ASB in detoxifying a pulp mill effluent was an important reason in the selection of this type of waste treatment technology.

Nutrients (nitrogen and phosphorous) will be added to the ASB to support BOD removal efficiency. Some of these nutrients will be discharged with the treated effluent, primarily bound in the biological solids. The predicted level of nitrogen in the effluent will be 60 mg/l, which will result in levels above the river background of 0.3 mg/l at 7Q10 flows and 0.04 mg/l at mean river flows. These emissions will keep the river nitrogen level under the ASWQO guideline of 1.0 mg/l.

Phosphorous levels in the treated effluent are predicted to be about 10 mg/l, which will result in an increase in river levels of 0.06 mg/l at 7Q10 flows and 0.007 mg/l at mean flows. When combined with background phosphorous levels, the river content will likely be in excess of the ASWQO guideline of 0.050 mg/l at minimum flows. However, total phosphorous levels are well below the objective in the lower reaches of the river (beyond the town of Athabasca) and should cause no adverse affects. (Hamilton et al, 1985).

DTPA release in the treated effluent will be about 5 mg/l. About 90% of this chemical will be degraded in the process or retained with the final product. While little is known about potential effects of this additive in receiving waters, its low concentration (less than 0.03 mg/l) after dilution is unlikely to have any adverse effects.

In conclusion, the effluent impact on the Athabasca River from ANC alone and ANC plus Millar Western on water quality.

a. Dissolved oxygen levels in the river will remain above the Alberta water quality guideline of 5.0 mg/l.

b. Suspended solids levels will be within the guideline for ANC alone and exceed the guideline by a small amount under a 7Q10 flow regime for ANC plus Millar Western. As much of the suspended solid load will be biological solids, they will undergo further oxidation in the river and enter the food chain. This type of solid is deemed non-settleable and should have a minimal impact.

c. Colour levels will be within the Alberta water quality guideline for the combined discharge of ANC plus Millar Western.

d. With proper ASB design and operation, a non-toxic effluent will be discharged with low levels of resin acids and DTPA. These should have minimal impact on downstream use.

1.04 Effect of Discharge on Downstream Users

The Athabasca River is a source of water for municipal, agricultural and industrial applications. The river is used as a source of municipal water by the towns of Athabasca and Fort McMurray and by the Slave Lake Improvement District. Under current conditions, the Federal guidelines for a municipal water source are exceeded in the Athabasca River for colour, hardness, manganese, turbidity and ammonia, along its entire length (Hamilton, R.H. et al., 1985). These elevated levels are all due to natural causes. The fact that some guideline levels are exceeded in the river does not detract from its suitability a municipal source, but dictates the level of treatment required.

The addition of ANC effluent to the river should have no impact on river use for municipal purposes.

The key health concern in water use is the presence of coliform bacteria, which are an indication of human and animal wastes. Neither MWPL or ANC will discharge domestic waste to the effluent system.

Klebsiella pneumoniae is a common bacteria in pulp mill wastes. The bacteria is widely spread in nature and is commonly found in bark and wood. There is no question that under certain conditions this bacteria is pathogenic, i.e. capable of causing disease. However, no evidence has been presented which even suggests that waterborne Klebsiella pneumoniae contributes to these diseases. Rather infection appears to occur primarily in people already hospitalized with other diseases. More information on this topic is available in Appendix 1. It may be concluded that any elevated levels of Klebsiella pneumoniae in the Athabasca River will have no impact on human health.

Contact recreational use of the river will remain unchanged. Low water temperatures and elevated turbidity levels already limit such activity for much of the year and discharge of the ANC effluent will not impact the current situation.

River use by wildlife and for agriculture should not be impacted as a result of effluent discharge. Federal water guidelines for livestock use are already exceeded for aluminum along the entire length of the river, due to natural causes. Mill effluent discharge will not have a meaningful impact on other parameters for agricultural use.

Due to the sedimentary nature of the Athabasca River basin, most trace metal levels in the river water exceed the recommended Federal guidelines for wildlife. Mill operation will not have a meaningful impact on the present water quality.

1.05 Impact on Fish and Aquatic Life

The existing sport fishery and aquatic fauna in the Athabasca River should not be harmed through discharge of the ANC effluent.

The dissolved oxygen level in the river will remain above the Alberta water quality guideline of 5.0 mg/l, allowing for the combined effluent discharge of ANC plus Millar Western. The treated effluent will be non-toxic and the biological solids discharged may actually prove beneficial in increasing receiving water productivity via the food chain (Costa et al., 1979). With a low resin acid concentration and the absence of chlorinated organics, fish tainting should not be a problem.

The toxicity of the mill effluent will be routinely monitored by the acute lethal bioassay test and regular benthic macroinvertebrate surveys of the river will document any chronic (long-term) effluent impact on the aquatic microorganisms.

1.06 Special Concerns

A topic of special interest at the present time is the issue of dioxins in the pulp and paper industry. As a result of studies conducted over the past several years, primarily in the United States, trace levels of dioxin (in the parts per trillion and parts per quadrillion range) have been detected in chemical pulp mill effluents and numerous paper products. The mechanism of formation of dioxins is still under investigation; however, existing research suggests that chlorine appears to be a necessary condition for the presence of dioxins in pulp and paper effluents or products.

The ANC mill will not use chlorine in any part of the pulping or brightening processes, so dioxin formation is not considered to be a pertinent issue with respect to this EIA.

2.00 GROUNDWATER QUALITY

The biophysical study conducted by Environmental Management Associates of Calgary, included in Appendix 5, provides an overview of the surficial geology at the proposed millsite. The area is located on a broad alluvial terrace within the Athabasca River valley and is characterized by a level to gently undulating surface comprised of coarse gravel extending to a depth in excess of 20 m. The coarse gravel features of the deposit allow for rapid drainage, resulting in a depression of the water table to a depth of 10 m.

NLK has retained Klohn Leonoff Ltd. of Calgary to conduct a geotechnical study of the proposed millsite, including hydrogeological characteristics. A report of their findings is not yet available. When this work is complete, an appropriate submission will be made to Alberta Environment.

3.00 AIR QUALITY

3.01 Introduction

Due to the use of different pulping technology and chemicals, air emissions from a cTMP/newsprint complex are very different than those from a kraft pulp mill. There will be no formation and release of odorous total reduced sulphur gases. As well, there will be no emissions of chlorine or chlorine dioxide, since these chemicals are not used in pulp brightening.

3.02 Existing Ambient Air Quality

Existing air quality in the vicinity of the proposed millsite is discussed in Section 2 of Appendix 2. Records from a weather station in the Whitecourt area were examined and pertinent data, summarized for temperature precipitation, wind speed and direction, visibility/ fogging and inversions.

3.03 Impact on Ambient Air Quality

Process Emissions

Waste steam from the cTMP refiners can contain small quantities of turpentine and other odorous gases. To minimize their release to the atmosphere, a waste heat recovery system will be an integral part of the mill design. This system will both condense odorous gases and reduce the mill's fossil fuel requirements by recovery of waste heat.

The odorous components will be condensed and handled as part of the mill effluent in the aerated stabilization basin. Levels released to the atmosphere will be extremely small. On occasion (process upset, maintenance), the waste heat recovery system may be offline and the gaseous steam would be vented to atmosphere. Tests conducted at the CTMP mill in Quesnel, B.C. in 1986 indicated that there was no detection of odour in the community due to venting waste steam. The only odour from the plant site was that of fresh wood chips. Thus, occasional venting of these gases should not result in detectable odour on the millsite.

Particulate emissions from the mill will be negligible, with the exception of the smokeless burner. This unit will burn waste from the wood handling system, as well as dewatered sludge from the primary effluent clarifier. The installation will be similar to the unit currently installed at the Millar Western sawmill in Whitecourt. The burner will be designed to comply with Alberta Environment air quality standards. Particulate emission is predicted to be comparable to a burner on Vancouver Island, which tested at 0.1 grains per standard cubic foot (equals 0.23 g/dsm^3). Using the STACKS model, the maximum predicted ambient particulate level will be 3.66 ug/m^3 for one hour. The 24 hour Alberta guideline is 100 ug/m^3. As the 24 hour ambient level would be lower than a predicted one hour level, compliance with the provincial guideline should readily be achieved.

The presence of trace levels of sulphur in wood waste and pipeline-quality natural gas will result in very small quantities of SO_2 released to the atmosphere. These levels are predicted to be minimal and no significant ambient air level or adverse effect is anticipated. Predicted ambient concentration, as a one hour average, is 0.88 ug/m^3.

Oxides of nitrogen will be generated by the smokeless burner, power boiler and a glycol/water heater. Using the STACKS model, the maximum predicted one hour NO_x concentration, as NO_2 is 217 ug/m^3, about two thirds of the Alberta air quality standard of 300 ug/m^3.

Fugitive Dust Emissions

The major fugitive dust sources will be chip and roundwood handling in storage areas and vehicular traffic. The chip storage pad will be paved and the portal crane will reduce dusting in the woodyard. Major vehicular thoroughfares will also be paved. Watering as needed on other parts of the site will keep fugitive dust release to a minimum.

3.04 Visibility/Fogging

The release of water vapour from the mill was investigated as regards to the potential for fog generation during certain meteorological conditions.

Water vapour emissions from the mill would parallel the river valley and are not expected to cause any problems at the Whitecourt airport or to Highway 43. In the event of a light wind from the proposed ANC site towards Whitecourt, any incremental fog would disappear well before the plume reached the town.

Regional fog and climatic conditions should not be a consequence in mill development at the proposed site.

4.00 TERRESTRIAL IMPACTS

4.01 Introduction

Environmental Management Associates of Calgary was retained by NLK to conduct a biophysical assessment of the proposed 200 ha mill site, as well as access (roads, rail) and utility (power, gas and water) corridors. The study addressed terrain, soil, vegetation and wildlife on the proposed site. The detailed report is presented in Appendix 3. Key findings of the report, including suggested mitigative measures are summarized below.

4.02 Terrain

The proposed mill site is located on a broad alluvial terrace within the Athabasca River valley. It is characterized by a level to gently undulating surface comprised of coarse gravel bound in a sandy clay matrix extending to a depth in excess of 20 m. The terrace is overlain by up to 2 m of fine grained sand. The coarse nature of the deposit allows for rapid drainage, resulting in a depression of the water table to a depth of 10 m.

In the vicinity of the mill site, the north bank of the Athabasca River is characterized by a steep slope. The top of the bank is approximately 20 m above low river water levels.

Terrain disturbances will be confined to grading operations during site preparation, and access corridor development, which will be minimized by project design and layout. Approximately 75 ha of the 200 ha site will be disturbed in this manner. The well drained surfaces ensure stability of terrain and existing gravel pits will provide a ready source of fill material for construction purposes.

The proposed railway bridge crosses the Athabasca River southeast of the millsite, 1300 m upstream of the Highway 43 bridge. The proposed routing for the rail spur provides an adequate forest buffer on either side for a wildlife corridor.

The land on the north side of the river at the proposed crossing site is an undulating lower alluvial floodplain, with white spruce, aspen and willow vegetation and imperfect to moderately well drained soils. The north side of the river is an undulating lower alluvial terrace, characterized by jackpine and white spruce cover and well drained soils.

The proposed rail crossing will be a five-span continuous steel box girder bridge of 188 m overall length, with a composite concrete deck. Interior spans will be 40 m length, with end spans 34 m. The five-span configuration was chosen to provide appropriately sized openings for navigation, ice and flood borne debris.

4.03 Soils

Soils within the study area are comprised of three distinctive types.

The dominant soil has developed from a wind-blown veneer overlying the main gravel terrace on the north bank of the Athabasca River. It is well to rapidly drained.

The second soil type is characterized by a thin mineral layer overlying clay rich regions and is more predominant in the northwest margins of the study area.

The third soil type occupies the low-lying river flats and benches adjacent to the Athabasca River in the southeast portion of the study area. These soils are of a sandy to silt loam texture and in general, moderately well drained.

Soil impacts will be inherently physical in nature resulting from excavation, filling and burial of soil profiles. Given the limited depth of topsoil material over much of the site, its salvage and storage for eventual reuse is likely impractical.

The potential for surface erosion will be minimized by proper design of a surface drainage system on the site and the inherently well-drained nature of the soils.

4.04 Vegetation

The study area is characterized by deciduous aspen and balsam poplar forests intermixed with extensive tracts of white and black spruce coniferous forests. Within the immediate river valley, three broad vegetation associations can be recognized.

The rolling topography occupying the northwestern corner of the site is populated by a mix of mature aspen and white spruce. The understory is dominated by willow, red-osier dogwood and other species and where canopy cover is particularly dense, by bunchberry and wintergreen species.

The gravel terrace which dominates the site is comprised of a neat uniform stand of jack pine, interspersed with white spruce. Blueberry, bearberry and crowberry shrubs dominate the understory.

A third vegetative type occurs under conditions of restricted drainage where an elevated water table favours the growth of white spruce. This type occurs at locations within the gravel terrace where minor topographic depressions are recognized by gradual transition of lodgepole pine to white spruce.

Site cleaning and access corridor construction will result in the removal of vegetative cover. The forestry potential of the immediate area is considered low, and thus removal of existing timber will have no impact on annual allowable cuts. Where good timber is encountered, the trees will be felled and salvaged.

A review of existing literature indicates no rare or endangered plant species occur within the proposed plant site or access corridors.

4.05 Wildlife

The proposed mill site and vicinity are populated by numerous wildlife species. Ungulates which currently use the study site include moose, elk, mule deer and white-tailed deer. The nearest woodland caribou herd is located about 60 km west of Whitecourt in the Grande Cache/Willmore Wilderness area.

A number of aquatic and terrestrial furbearing species reside in the area. Beaver are plentiful along the Athabasca River and its tributaries, with lower populations of mink, muskrat and the rare otter.

Red squirrel, coyote, short-tailed weasel, least weasel, marten and black bear are the most common terrestrial furbearers in the area, with infrequent appearances from the fisher, cougar, grizzly bear, red fox and wolverine. Wolves are quite common around Whitecourt, however, the strip of land between Highway 43 and the Athabasca River appears rarely used by this animal.

The study area could potentially harbour representatives of 16 species of birds. Of these, the most likely to occur on site are the Northern Goshawk, Red-tailed Hawk, Osprey, Great Horned Owl and Rough-legged hawk.

There are five rare and endangered species that could reside in west central Alberta. These are the peregrine falcon, western woodland cariboo, wolverine, trumpeter swan and northern leopard frog. The proposed use of the site is not expected to present a danger to any of these species.

Hunting and trapping is also prevalent in the Whitecourt area, including the proposed mill site.

A number of mitigative measures are recommended to minimize impact on wildlife in the area. The most important is the provision for a forest buffer zone of suitable width between the developed portion of the site and the river. This will allow a travel corridor for animals and potential nesting sites for birds.

Restrictions on firearm use by personnel on the site will reduce wildlife losses, particularly for ungulates, and appropriate signs willl be erected to warn motorists of wildlife.

The proposed mill site is sufficiently small so that it will not represent a significant impact on habitat in the Whitecourt area.

References for Section E are included in Section D, 7.00.

ENVIRONMENTAL IMPACT ASSESSMENT OF
THE PROPOSED WHITECOURT NEWSPRINT MILL

SECTION 6 - COMMUNITY AND ECONOMIC IMPACT

1.00 OVERVIEW

The DPA Group Inc., a division of Monenco Consultants Limited of Calgary, was engaged to undertake a comprehensive socio-economic impact study of the project on the province, and on the community of Whitecourt in particular. The complete study is included in Appendix 4.

The socio-economic impacts are generally very positive. The project will provide substantial permanent employment opportunities in operations as well as temporary positions during construction. Since the raw material is a renewable resource, the economic life of the project will be very long, unlike resource projects based on extraction of minerals, which have a definite and limited life based on the magnitude of the initial deposits. There are many instances in Canada where pulp and paper mills and other forest industry operations have been carried on continuously at the same site for over 100 years. For example, the sawmill in Whitecourt has been operated continuously for 66 years, with the exception of one year during the severe depression of the 1930's.

Population, employment and income effects along with the impact of the project on community services are discussed in the following sections. For additional detail refer to Appendix 4.

2.00 POPULATION AND EMPLOYMENT

At full production, the newsprint mill will require a staff of approximately 190 people. A further 175 people will be provided direct employment by way of contract activities in the wood supply and transportation function. In addition, it is anticipated that 10 permanent staff will be employed in ANC's Edmonton head office.

In addition to direct employment of some 375 people, the project will, of course, lead to indirect jobs in the industrial, personal services, and public sectors. In Whitecourt, alone, it is anticipated that approximately 450 new jobs will be created as a spin-off effect of the newsprint mill. Further indirect jobs will be created as a result of forestry operations.

Of the some 640 new jobs created in Whitecourt, it is expected that about 350 will be filled by local residents or the spouses of in-migrants. The remaining 290 jobs will require skill levels obtainable only from a larger labour pool. Total in-migration to Whitecourt due to the ANC project is anticipated to be about 290 families or 1000 people.

The current population of Whitecourt is about 6500, with a further 3200 resident in the surrounding ID 15. This includes the impact of the Millar Western project, which will provide direct permanent employment for approximately 90 people at the mill and a further 120 people in associated forest operations. Without the ANC project, it is estimated that the regional population of 9700 would grow to about 11,200 by 1993. As indicated, it is anticipated that the ANC project will lead to a regional population increase of about 1000 above normal growth. Thus, the regional population with the ANC project is predicted at about 12,200 by 1993. The Whitecourt population in 1993 is projected at 8400.

2.01 Construction Employment

On-site construction activities will provide approximately 850 person-years of employment, with a peak construction labour force of about 600. It is anticipated that about 100 local residents will be employed and that about 550 person-years will be supplied by in-migrants during the duration of the 24 month construction period.

The labour force on the Millar Western project peaked at just over 500. Existing town facilities have been adequate with respect to lodging and food at this peak, and, are anticipated to be adequate for the ANC project.

3.00 COMMUNITY SERVICES

As noted, the ANC project is expected to produce a population increase of about 1000 more people or 290 more household units than would be the case with normal growth. This impact is beyond that created by the Millar Western project. While some in-migrants will choose to live in ID 15, it is anticipated that the majority will establish in Whitecourt. The following discussion on community services focuses on Whitecourt.

3.01 Housing

The Town of Whitecourt has a substantial supply of serviced lots - an estimated 350 by the end of 1988, with a land reserve for a minimum of a further 800 lots. At present, residential construction is lagging somewhat behind demand, likely due to accelerated demand associated with the Millar Western project.

By the end of 1988, it is anticipated that some 250 of the 350 planned lots will have been taken. Thus, new areas in the land reserve will need to be opened up to provide the 300 to 350 units needed to support growth associated with the ANC project, plus additional units associated with normal growth.

Given the existence of an adequate land reserve in Whitecourt and adequate time for the private sector to respond and the municipal government to provide necessary approvals and infrastructure, no serious problems are anticipated in providing for the projected growth.

3.02 Schools

The Public School Board of the Town of Whitecourt operates two elementary schools and one high school, with a total enrollment of 945. The Catholic School Board of Whitecourt has two schools with a total enrollment of 635. A total increase of 135 students for both school boards is projected for next year.

The public high school and the Catholic elementary-high school both have surplus capacity at present. Both school boards have plans to accommodate the immediate growth and have long term plans for two new schools. It is anticipated that the school system will accommodate the growth of some 250 students associated with the ANC project without difficulty.

3.03 Municipal Infrastructure

The Town of Whitecourt has just completed construction of a new water intake and pumphouse on the McLeod River. The raw water supply and the water treatment plant, with some improvements, can readily service the projected Whitecourt population of 8400 in 1993. The sewage treatment facility, completed in 1979, was designed to serve 8000 people and can be upgraded to serve some 13,000.

Given the adequate lead time available, the town should have no difficulty in upgrading and expanding water supply and sewage facilities.

3.04 Community Services

Population increases associated with the ANC project, as well as the Millar Western project, will provide impetus for upgrading of community services. In particular, expansion of the following areas is anticipated and needed - library, fire protection service, police service, hospital, ambulance service and various social service programs.

Again, with ample time available, there is opportunity for the responsible agencies to plan and implement expansion to meet requirements. As the quality of service available in these areas is generally improved with larger scale operations, existing Whitecourt and district residents will benefit from the expansion.

4.00 REGIONAL ECONOMIC EFFECTS

The proposed ANC project has an estimated capital cost of $335 million, of which it is expected the $154 million or 46 percent will be spent in Alberta.

Expenditures for labour during construction will be about $57 million, including $40 million for wages and salaries, of which some $20 million will be retained in the study region as direct household income. It is expected that a further $10 million will be spent locally on construction goods and services.

The Alberta Bureau of Statistics estimates that the construction industry has an income multiplier of 1.636. Thus, the anticipated construction expenditure of $154 million in Alberta will produce a total income effect of about $250 million. Of this, approximately $50 million will be retained by the Town of Whitecourt and vicinity.

The mill will commence operation by the third quarater of 1990 and when full production capacity is achieved, annual operating expendi-tures will total about $90 million, broken down as follows:

TABLE 6-1: ANNUAL OPERATING EXPENDITURES

	$Millions per Annum		
	Total	Alberta	Canada
Direct Labour	14	14	-
Contract Labour	12	10	2
Transportation	16	15	1
Raw Materials	6	6	-
Energy	23	23	-
Chemicals	5	3	2
Supplies	14	4	10
Total	90	75	15

Some $75 million per annum or 83 percent will be spent in Alberta. Out of the province purchases will be limited to specialized supplies and services not available from Alberta sources.

Some $24 million per annum will be spent on direct and contract labour in the vicinity of Whitecourt. A further $15 million per annum will be spent on transportation services, a major portion of which will also accrue to the region. Energy, a major cost component of production, will be supplied by TransAlta Utilities and provincial natural gas producers.

ENVIRONMENTAL IMPACT ASSESSMENT OF
THE PROPOSED WHITECOURT NEWSPRINT MILL

SECTION 7 - PUBLIC CONSULTATION PROGRAM

1.00 OVERVIEW

As a part EIA process, ANC completed a public participation program to inform the Town of Whitecourt and other downstream communities about the nature, scope and timing of the proposed newsprint mill development on the Athabasca River. The activities and results of this program are detailed in Appendix 5, and summarized in the following sections.

2.00 CONTACTS

With the aid of a listing provided by Alberta Environment, contact was made with all communities, improvement districts and counties, Indian bands and Metis, health units and licenced water users downstream of the millsite.

3.00 ADVERTISEMENTS

An advertisement announcing a public meeting in Whitecourt on 21 April 1988 was run in the Whitecourt Star on 5 and 13 April 1988. Paid advertisements were also inserted in print media serving the downstream communities.

The advertisements announced ANC's intention to construct and operate a 220,000 tonne per annum newsprint mill near Whitecourt, and that an EIA was being prepared as a requirement before construction could commence. They also advised that public meetings would be held with the councils of the downstream communities and where information could be obtained, by mail or phone, in Whitecourt. Copies of these advertisements are presented in Appendix 5.

4.00 MEETINGS

a. Public Meetings

A total of ten community meetings of various types were held. In addition to the Whitecourt public meeting, nine other meetings, with public participation, took place with councils, administrators, and staff of communities, as listed below:

i. Whitecourt (Public)

ii. Fox Creek

iii. Smith

iv. Athabasca

v. Fort Asiniboine

vi. Fort McMurray

vii. Whitecourt (Council, Staff and Committee Chairmen)

viii Whitecourt Trade Fair (3 days)

ix. Fort McKay

x. Fort Chipewyan

Athabasca was a joint meeting of the Town Council, the County of Athabasca No 12 and the Athabasca Health Unit.

Fort Mcmurray was a joint meeting with representation from the City, I.D. 18 and Syncrude Canada Ltd.

Fort Chipewyan was a joint meeting sponsored by I.D. 18 at which the public were present along with representation from the Cree Band, The Fort Chipewyan Band, and Metis Local 124 of Fort Chipewyan.

b. Other Meetings

Meetings were held with the I.D. 15 Council and Advisory Board and with the Fort McMurray Medical Health Unit.

c. <u>Other Contacts</u>

The County of Barrhead No. 11 was contacted. The County declined a meeting The matter was discussed at a council meeting and a resolution was passed that they have no objections to the mill, provided all Provincial and Federal Environment Codes are complied with. A letter was received to that effect and is included in Appendix 5.

Three licenced downstream water users were contacted, but, they did not attend meetings to which they were invited.

d. <u>Meeting Format</u>

The objective of all meetings was to inform those in attendance about the project and to determine their concerns. Brief technical presentations were made at the start of each meeting, describing the scope of the proposed mill and the process to be used in the manufacture of newsprint paper.

The meeting was then opened to questions and to allow anyone present to state the concerns they had with respect to the project.

At all meetings, a broad range of issues on health and environmental matters was discussed. Mainly, the concerns were about maintaining acceptable quality of the river from a health, aquatic life and an aesthetic viewpoint.

In most cases the questions were completely answered at the meeting but, in one or two cases, a written response was required. These concerns have been addressed in the appropriate section of the EIA.

e. <u>Contact Schedule</u>

All contacts were made in the period 8th April to 20th May.

All meetings were held between 21st April and 20th May.

APPENDIX 1

ATHABASCA RIVER WATER QUALITY ASSESSMENT

ATHABASCA RIVER
WATER QUALITY ASSESSMENT

ALBERTA NEWSPRINT COMPANY LTD.

MAY, 1988

16 May 1988
File: 10-200-02-01

LETTER OF TRANSMITTAL

Mr. Wayne Nystrom
Nystrom, Lee Kobayashi & Associates
2130 West - 12th Avenue
VANCOUVER, B.C.
V6K 2N3

Dear Mr. Nystrom:

Reference: Alberta Newsprint Company Ltd.
Athabasca River Water Quality Assessment

Beak Associates Consulting Ltd. is pleased to submit our assessment of the potential aquatic environmental impacts associated with the Alberta Newsprint Company Ltd. project. Our assessment has been based upon effluent quantity and quality projections made by your firm, plus the use of water quality models developed by Beak Associates.

Our report is intended to assess the significant water quality issues associated with the proposed newsprint mill, and to provide your firm with adequate information to prepare an Environmental Impact Assessment. I trust you will find our report satisfactory.

I remain,

Sincerely yours,

BEAK ASSOCIATES CONSULTING LTD.

B. F. Bietz, Ph.D.
Manager, Environmental Sciences

BFB/tlz

Attachment

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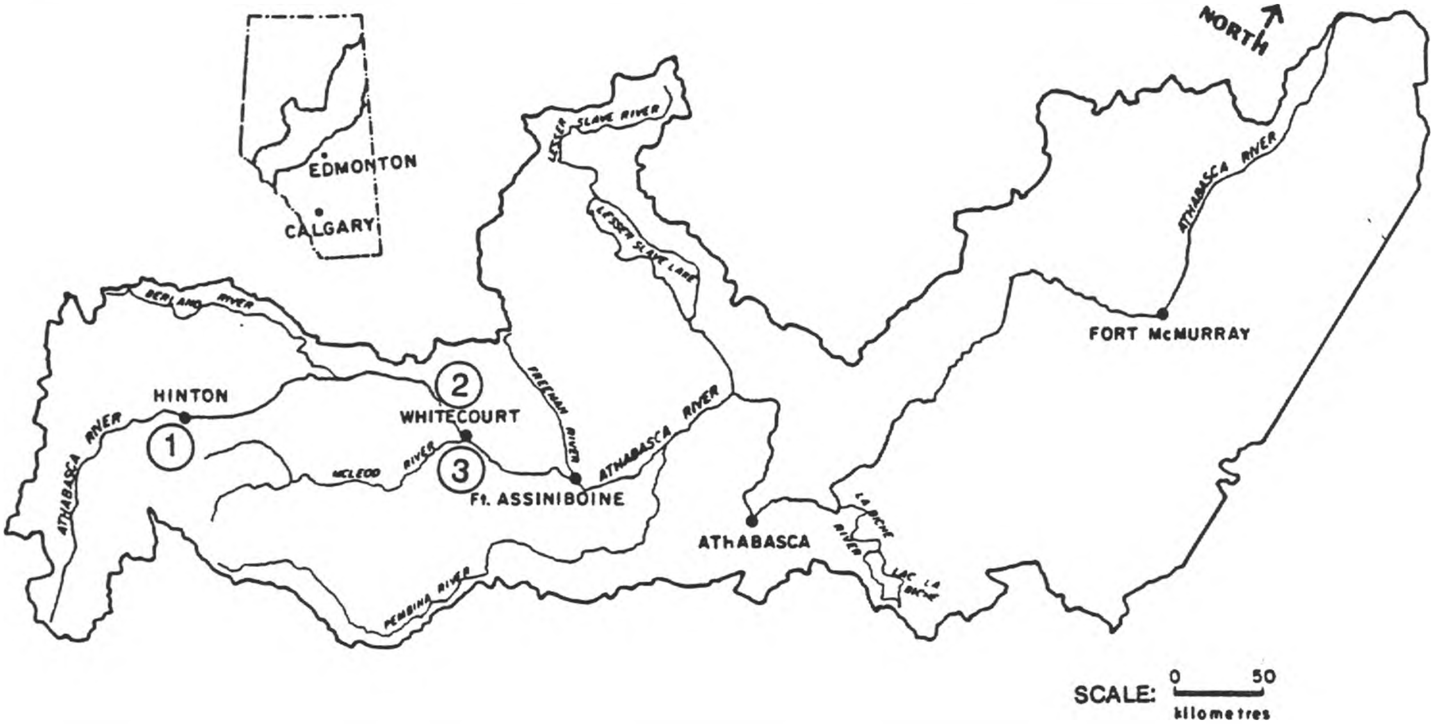
1.0 INTRODUCTION

Alberta Newsprint Company Ltd. (ANC) is currently planning the construction of a 220,000 finished metric tonne per year (FMT/yr) newsprint mill near the Town of Whitecourt (Figure 1). ANC requested that Beak Associates Consulting Ltd. provide an initial evaluation of the likely effect on the Athabasca River of the planned effluent discharge from the ANC mill (Beak, 1988).

Subsequent to that evaluation, ANC requested that Beak Associates prepare a more detailed assessment of the likely impacts of the proposed mills' effluent on the Athabasca River. This assessment is based on projected effluent volumes and characteristics provided by Nystrom Lee Kobayashi & Associates (NLK). The assessment also includes a number of refinements to the water quality models used by Beak (1988) in the initial evaluation. The models used have been calibrated using data collected by Alberta Environment in Feburary and March 1988. The report is intended to provide a background document for preparation by ANC of an Environmental Impact Assessment (EIA) for the proposed newsprint mill.



PULP MILLS

1. CHAMPION FOREST PRODUCTS (ALBERTA) LTD.
2. ALBERTA NEWSPRINT COMPANY LTD.
3. MILLAR WESTERN PULP LTD.

Figure 1

ATHABASCA RIVER BASIN
LOCATION PLAN

2.0 EXISTING ENVIRONMENT

2.1 HYDROLOGY

The proposed site for the ANC mill is near the Athabasca River Windfall gauging station (07AE001). The Athabasca River at Windfall has a drainage basin area of 19,891 km2 (Wallace and McCart, 1984). Historical streamflow data collected by Environment Canada are available for the period 1960 to date. The lowest flows normally occur under ice between December and March; mean monthly discharges during this period decrease from 65.1 m3/s in December to 48.2 m3/s in March. Mean monthly discharges increase sharply in April, rise to a peak of 660-670 m3/s in June and July, and then decrease gradually toward the low flow period. The mean annual discharge at Windfall is 253 m3/s and the minimum and maximum recorded flows are 19.3 m3/s and 2106 m3/s, respectively. The 7Q10 and 7Q2 flows have been estimated as 30.4 and 38.6 m3/s, respectively.

2.2 WATER QUALITY

Existing water quality conditions in the Athabasca River basin were reviewed in considerable detail by Alberta Environment (Hamilton et al., 1985). The survey was based on historical water quality data from three permanent stations (Jasper, Athabasca, and Fort McMurray), plus six surveys carried out at several locations within the watershed in 1984-85.

Based on their review of the data base, Hamilton et al. (1985) described three water quality zones in the Athabasca basin, with Whitecourt occurring within the upstream zone. Water quality in this region was characterized by high alkalinity and hardness, and generally low suspended solids, organic carbon and nutrient levels. The Champion mill is the only large source of man-made effluents, and was found to affect downstream river water quality for 50 to 75 km.

The report found that a number of Alberta Surface Water Quality Objectives (ASWQO) were exceeded on a regular basis, but that most of the exceedances were from natural sources and not attributable to anthropogenic pollution sources. The report also concluded that the upper Athabasca River generally met Environment Canada standards for all beneficial uses except for contact recreation which is limited much of the year by naturally low temperatures and high turbidities.

Seasonal variations in water quality at Whitecourt were discussed by Simons (1986). Colour and turbidity are low during most of the year but rise during spring thaw run-off periods. Dissolved oxygen appears to be at or near saturation in the cold months and somewhat less in the summer periods. Hardness is highest during the winter low flow periods and lower during the much larger discharges of the summer months.

2.3 FISHERIES

The river channel in the vicinity of Whitecourt is, in general, moderately sinuous and relatively wide and shallow, with frequent islands and mid-channel bars. Flow velocities are moderately high and riffle sections are frequent. The river bed is stony, with gravel and cobble sized fractions predominating.

Wallace and McCart (1984), in their review of the fisheries of the Athabasca River basin, characterize the section of the river in which Whitecourt lies as having a diverse and highly utilized cold water fish population. The sport species present include rainbow trout, Dolly Varden, arctic grayling, northern pike, walleye, and mountain whitefish; the common non-sport species are goldeye, flathead chub, brook stickleback, northern pearl dace, and white and long nose suckers. Within the mainstem, grayling and rainbow trout are the species most sought after by anglers. Wallace and McCart (1984) did not identify any spawning sites or migration routes in Athabasca River near Whitecourt, but noted that spawning sites in the area have been poorly surveyed.

3.0 DISSOLVED OXYGEN MODELLING

3.1 APPROACH

Modelling was carried out to simulate dissolved oxygen (DO) and biochemical oxygen demand (BOD) profiles along a 606 km length of the Athabasca River, from Hinton to the La Biche River confluence, under a number of effluent loading and river flow scenarios. The model considered the permitted BOD loadings from an expanded Champion Forest Products Ltd. (Champion) pulp mill and a new Millar Western Pulp Ltd. (MWPL) pulp mill, both of which are under construction, plus loadings from ANC. The loadings assumed in this analysis are as follows:

- Champion mill BOD_5 loading of 7.0 kg/ADT[a] (permit limit)
- MWPL mill BOD_5 loading of 7.5 kg/ADT (permit limit)
- ANC mill BOD_5 loading of 7.0 kg/FMT[b] (projected discharge level).

a. Air Dried Tonne
b. Finished Metric Tonne

The sources of information used in the models include various Alberta Environment reports (Hamilton et al. 1985, HydroQual 1987, HydroQual et al. in prep.), process data provided by NLK, and environmental impact assessments for the Champion expansion (Stanley, 1987) and the MWPL mill (Simons, 1986).

Modelling methods and parameters were reviewed in detail during the period February to April, 1988 and appropriate model inputs were determined (Table 1). These were based in part on a field program conducted by Alberta Environment during February and March, and the majority of the changes resulted from new data supplied to Beak Associates by Alberta Environment. The river flows used in the models (7Q10 and 7Q2) are the lowest average seven day flows occuring once every ten years and two years, repectively. As noted earlier, these flows generally occur in winter, under ice, when the rate of reaeration in the river is lowest. Therefore, the models are used to simulate worst case conditions.

TABLE 1: Modelling Assumptions for DO and BOD Simulations.

$7Q_{10}$		
Hinton	16.1	m^3/s
Windfall	30.4	
Athabasca	52.3	
$7Q_2$		
Hinton	23.7	m^3/s
Windfall	38.6	
Athabasca	74.1	
Open Water		
Champion	15	km
MWPL	2	
ANC	2	
Reaeration		
Open	a.	
Under Ice	a.	
BOD Decay Rate	0.6	
BOD Conversion Rate		
Background	5.50	
Effluent	1.05	
Background DO		
McLeod	7.7	mg/L
Berland	10.6	
Freeman	2.3	
Pembina	2.3	
Lesser Slave	12.1	
Others	10.6	
Background BOD_5		
McLeod	1.0	mg/L
Berland	1.3	
Freeman	1.3	
Pembina	1.3	
Lesser Slave	2.0	
Others	1.3	
Effluent Discharge		
Champion	1.31	m^3/s
MWPL	0.173	
ANC	0.173	

a. See Section 3.2.2

3.2 MODEL PARAMETERS

The model parameters for BOD decay and reaeration were refined from the original assumptions used by Beak (1988). The theoretical basis for the estimation of BOD decay rate and dissolved oxygen reaeration rates are discussed in the next two sections.

3.2.1 BOD Decay Rates

Biochemical Oxygen Demand (BOD) is the most commonly used parameter for measuring the oxygen-depletion characteristics of waste waters. The kinetics of the decay of BOD and the consumption of oxygen is given by the equation:

$$y = L(1 - \exp(-K1 \cdot t))$$

Where:

y	=	the BOD exerted at any time t (mg/L)
L	=	the ultimate or total BOD present at time 0 (mg/L)
$K1$	=	the decay rate constant (day^{-1})
t	=	time (days)

Typical decay rate values are given in Krenkel and Novotny (1980) in Table 2. It can be seen that the decay rate is variable and depends largely on the degree of treatment. From this, it might be concluded that the decay rate for a pulp mill effluent would be in the order of 0.15 day^{-1} to 0.25 day^{-1} at 20^oC.

TABLE 2: Typical BOD Decay Rate Coefficients[1,2]

Substance	K1(day^{-1})
Untreated Sewage	0.35 - 0.65
High-rate filters & anaerobic contact	0.28 - 0.51
High-degree biological treatment effluents	0.14 - 0.23
Rivers with high pollution	0.28 - 0.69
Rivers with low pollution	0.09 - 0.23

Notes: 1. From Krenkel and Novotny (1980)

2. K1 values are for base e equation at 20°C.

Temperature significantly affects the reaction rate of most biochemical reactions. The commonly used method to evaluate temperature effects is to relate the reaction rates at other temperatures to a reference reaction rate of 20°C using the van't Hoff-Arrhenius law:

$$K_T = K_{20}\,\theta^{(T-20)}$$

Where:
- K_T = the decay rate at temperature T (day^{-1})
- K_{20} = the decay rate at 20°C (day^{-1})
- T = the temperature (°C)
- θ = the thermal factor

Values for θ range from 1.02 to 1.184 (Krenkel and Novotny, 1980; Driscoll et al., 1983). Examination of data presented by Hiidenheimo and Wilson (1974) for untreated and treated effluents from a Kraft mill in Finland indicates that a value of 1.1 is reasonable. This means that reaction rates at 0°C are about 15% of those at 20°C.

3.2.1.1 Literature Review

Pulp mill wastes have their own unique characteristics and must be evaluated in the context of the wood source, pulp production processes, waste treatment processes and receiving environment conditions. Typical pulp wastes comprise wood sugars, organic acids, alcohols and lignins. The literature was examined to see how researchers had quantified the BOD decay processes for pulp mill effluents.

Raabe (1968) indicated that pulp mill wastes exhibited a 2-stage BOD process:

- o the first stage exhibited a rapid decay due to the oxidation of the carbohydrate constituents,
- o the second stage exhibited a slow decay due to the decomposition of lignin, by-products and other decomposable organics.

Work by Hiidenheimo and Wilson (1974) on the effluent from a Kraft pulp mill in Finland also suggested the 2-stage BOD decay process for untreated effluent. They indicated that the second stage decay was not due to nitrification processes (the exertion of oxygen demand due to the decay of nitrogen compounds) as the nitrogenous fraction of the untreated effluent was small. They also found that the treated effluent did not exhibit the 2-stage behaviour.

NCASI (1982 and 1985) evaluated BOD kinetics for a number of pulp mill effluents. NCASI (1982) indicated that there are two types of BOD in treated pulp mill effluents:

- o one which acts at a high (about $K1 = 1.0$ day^{-1}) rate and represents about 10% of the effluent's total BOD,
- o one (attributed to the lignins) which is oxidized at a much slower rate (about 0.02 day^{-1}) and represents the remaining portion of the effluent.

The 1982 paper examined eight different models for BOD kinetic processes and found that a single first-order model was not adequate and that a dual first-order model (i.e. "easy" and "hard" to decay BOD) gave the best results. The 1985 paper investigated BOD kinetics further. It supported the adequacy of the dual first-order model and presented a case for even more complex BOD models.

Limiting this assessment to the dual first-order model (which has found some acceptance in all of the references), the following decay parameters have been presented in the literature (Table 3):

TABLE 3: BOD Decay Parameters (dual first order model)

	Component 1		Component 2		
Effluent	K1	L1	K2	L2	Source
Bleached Kraft Secondary Effluent	0.48	48.7	0.017	370	NCASI (1982)
Bleached Kraft Secondary Effluent	0.45	54.5	0.017	349	NCASI (1982)
Kraft Biological Effluent	0.08	13.2	0.010	14.7	NCASI (1985)
Kraft Biological Effluent	0.03	17.4	0.033	6.0	NCASI (1985)
Unbleached Kraft Secondary Effluent	0.43	136	0.017	273	NCASI (1982)
Groundwood Secondary Effluent	0.36	37.5	0.017	82.8	NCASI (1982)
Kraft Secondary Effluent	0.08	143	0	0	Hiidenheimo (1974)
Kraft Effluent & River Water	1.05	33	0.166	65	Raabe (1986)

Notes: 1. K is BOD decay rate (base e) at 20°C (day^{-1}).

2. L is ultimate BOD (mg/L).

3.2.1.2 Athabasca River Data

Champion Forest Products (Alberta) Ltd. operate a bleached kraft pulp mill at Hinton on the Athabasca River. There have been 3 field programs carried out to determine the decay rate for this river during the low flow period in winter (the critical dissolved oxygen period for northern Alberta rivers).

Champion Field Program (1983 to 1986)

As part of Champion's ongoing monitoring program, BOD and dissolved oxygen conditions in the effluent, upstream, and at two locations (8 km and 48 km) downstream of the outfall have been monitored during winter low flow conditions. Thirteen sets of data were obtained over the course of 4 winters. The results were plotted and a dissolved oxygen model was calibrated to the data (Stanley, 1987). This work indicated a decay rate of 0.6 day^{-1} in the first 8 km (the open water reach) downstream of the outfall. The decay rate in the second reach (under ice cover) was found to be 0.1 day^{-1}.

Alberta Environment Program (1986)

In February, 1986, Alberta Environment measured BOD and dissolved oxygen at seven locations up to 60 km downstream of Champion's outfall (HydroQual, 1987). HydroQual calibrated a dissolved oxygen model to the data and found that a BOD decay rate coefficient of 0.81 day^{-1} was representative of the reach.

Alberta Environment Program (1988)

In February and in March of 1988, Alberta Environment conducted an extensive water quality monitoring program on the Athabasca River from Hinton downstream to Athabasca. Data were measured at 14 locations over a 540 km reach of the Athabasca River downstream of Hinton. Concentrations of parameters relevant to dissolved oxygen analysis (including BOD_5, dissolved oxygen and temperature) were measured. These data were made available to Beak Associates for use in calibrating their dissolved oxygen model for ANC.

BOD decay rate constants for a single first-order model could be determined from the BOD data for each of the 13 reaches; however, the uncertainty associated with this method was too large to allow this procedure to be meaningful. The only observable trend was that the decay rate is highest near the Hinton outfall and declines as the flow progresses downstream.

Samples of Champion's effluent were obtained during the two field programs. Each time three grab samples and one 24-hour composite sample were analyzed to determine the BOD_5, BOD_{10} and BOD_{14} values. From these data, the following decay rates were obtained (the data were not extensive enough to allow a dual first-order model to be developed).

TABLE 4: BOD Decay Rates for Champion's Effluent

Tests	Decay Rate K1 (day^{-1})	BOD_u L1 (mg/L)
February 1988	0.27	75
March 1988	0.21	54

Notes: 1. Decay rates are for base e equation at 20°C.

3.2.1.3 Calibration

The data from the Alberta Environment monitoring program in March 1988 were used to calibrate Beak's dissolved oxygen model. The BOD, dissolved oxygen and flow rate of Champion's effluent discharge to the Athabasca River mainstem and the contributions from the tributaries to the Athabasca were simulated. BOD decay rates were calibrated to match the BOD concentrations measured along the Athabasca mainstem for the March field trip. The BOD decay rates were found to be 0.6 day^{-1} from the Champion outfall to the Berland River confluence about 100 km downstream. The BOD decay rate downstream of the Berland

River was found to be about 0.04 day^{-1}. Upon further examination, it was decided that the most realistic modelling assumption was to partition the BOD into two components: the material which is easy to decay (which comprised nearly all of Champion's effluent) and the material which is hard to decay (which comprised the lignins in Champion's effluent and the background BOD).

The BOD decay rates exhibited in the river and in the effluent indicated how much variability there is in the effluent characteristics for a pulp mill. They also did not support the temperature adjustment relationships discussed earlier (i.e. the observed decay rates at 0°C are similar to those observed in laboratory tests at 20°C). However, the calibrated model simulated the BOD and DO conditions reasonably well (Figure 2). The BOD_5 and DO calibration statistics are presented in Tables 5 and 6.

Based on the above analysis, the modelled assumptions for BOD in the Athabasca River were:

- the BOD decay rate for effluent from the MWPL mill and ANC's proposed newsprint mill would approximate the BOD decay rate for kraft effluent from CHAMPION's mill;

- the average BOD decay rate of virtually all the pulp mill effluent in the river is 0.6 day^{-1}; and

- the background BOD, including tributary inflow BOD would have an average decay rate of 0.04 day^{-1}.

The assumed conditions of BOD loading from the various mills and the river discharges for the computer simulation are summarized in Table 7.

FIGURE 2 - MODEL CALIBRATION

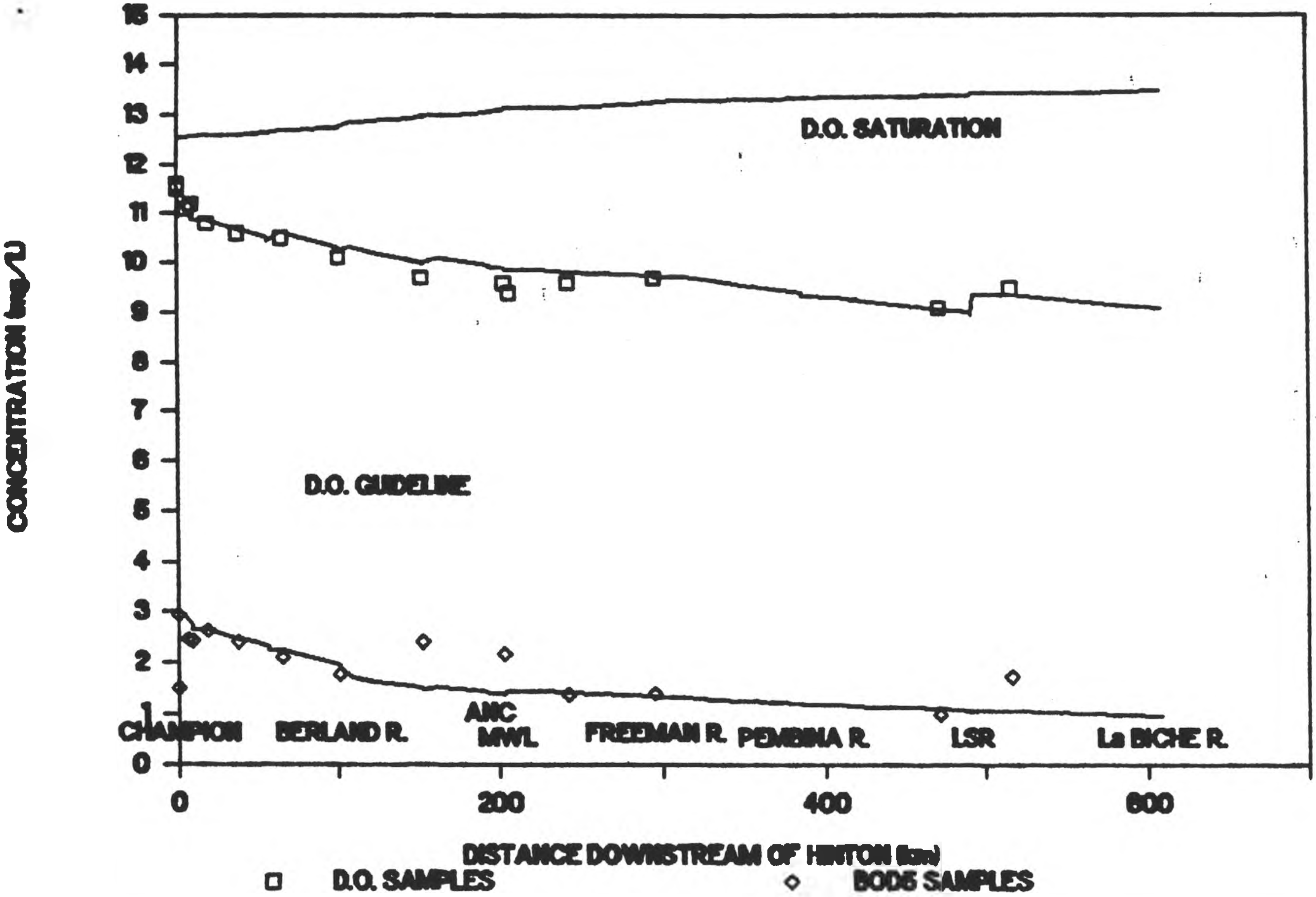


TABLE 5: BOD_5 Calibration Results for March Conditions

Item	Value
Number of points	14
Mean Concentration	2.02 mg/L
Average error	0.07 mg/L
Average error	3.4 %
Average absolute error	0.27 mg/L
Average absolute error	12.9 %

TABLE 6: Dissolved Oxygen Calibration Results for March Conditions

Item	Value
Number of points	15
Mean concentration	10.27 mg/L
Average error	-0.08 mg/L
Average error	-0.8 %
Average absolute error	0.17 mg/L
Average absolute error	1.7 %

TABLE 7: Run Descriptions for Calibrated Model

	BOD_5 Loading Rate (kg/T)				
Run	Champion[a]	MWPL[a]	ANC[b]	Flow	Comments
1	7.0	7.5	0.0	7Q10	Champion and MWPL only
2	7.0	7.5	0.0	7Q2	Champion and MWPL only
3	7.0	7.5	7.0	7Q10	All mills, extreme low flow
4	7.0	7.5	7.0	7Q2	All mills, normal low flow

a. Permit conditions

b. Projected discharge levels

3.2.2 Dissolved Oxygen Reaeration Rates

Downstream of each effluent discharge, there will be an open water reach where the river will be reoxygeneated during winter. Further downstream, some short reaches of the river remain open even during mid-winter due to high velocity (rapids) or due to the thermal effects of groundwater discharges. Some degree of reaeration will occur in these areas as well.

For open water conditions the reaeration rate coefficient is a function of the depth of flow, the velocity and the temperature. Driscoll et al. (1983) outlined a procedure for selecting an appropriate reaeration rate equation (from the equations of Owens, Churchill, or O'Connor-Dobbins). This was the procedure used to determine the open water reaeration rate in the modelling for ANC.

The reaeration rate coefficients in the ice-covered reaches were multiplied by a factor to account for the actual winter conditions. For the ice covered reach, it was found that reaeration occurred at 3% of the estimated open water value; reaeration rates varied between 0.02 day^{-1} and 0.10 day^{-1} depending on the hydraulic characteristics of each reach. For the open water lead downstream of Champion's outfall, it was found that reaeration rate was about 0.23 day^{-1}.

Based on the above assessment, the dissolved oxygen conditions in the Athabasca River for the ANC mill were assumed to be controlled by:

- o an ice cover reaeration rate of 2% of the predicted rate. (This has been reduced to account for the likely more severe temperature conditions during the 7Q10);

- o an open water reaeration rate of 0.23 day^{-1}; and

- o open water leads at 7Q10 flow of 15 km, 2 km and 2 km downstream of Champion, ANC and MWPL, respectively.

3.3 MODELLING RESULTS

The permitted BOD loadings from the Champion and MWPL mills are predicted to result in a significant reduction in Athabasca River DO under very low flow (7Q10) and average low flow (7Q2) conditions (Figures 3 and 4). Under the 7Q10 flow scenario, DO is expected to decline from 11.6 mg/L upstream of Champion to a minimum value of 6.0 mg/L at the confluence with the Lesser Slave River. Under the 7Q2 conditions, DO is predicted to decline from 11.6 mg/L to 6.4 mg/L.

The projected effects of adding the proposed ANC newsprint mill effluents on DO in the Athabasca River are shown in Figure 5 and Figure 6. The incremental effect of the ANC mill, assuming a BOD load of 7.0 kg/FMT, is relatively small. These additional loadings reduce DO levels under worst case conditions (e.g. winter flows, 7Q10) from 6.0 mg/L to 5.0 mg/L. Under more normal winter conditions (e.g. 7Q2), DO levels are reduced from 6.4 mg/L to 5.6 mg/L.

The environmental implications of these predictions are discussed in Section 4.0.

FIG. 3 - CHAMP MWL @ PERMITTED LOADINGS

(7Q10)

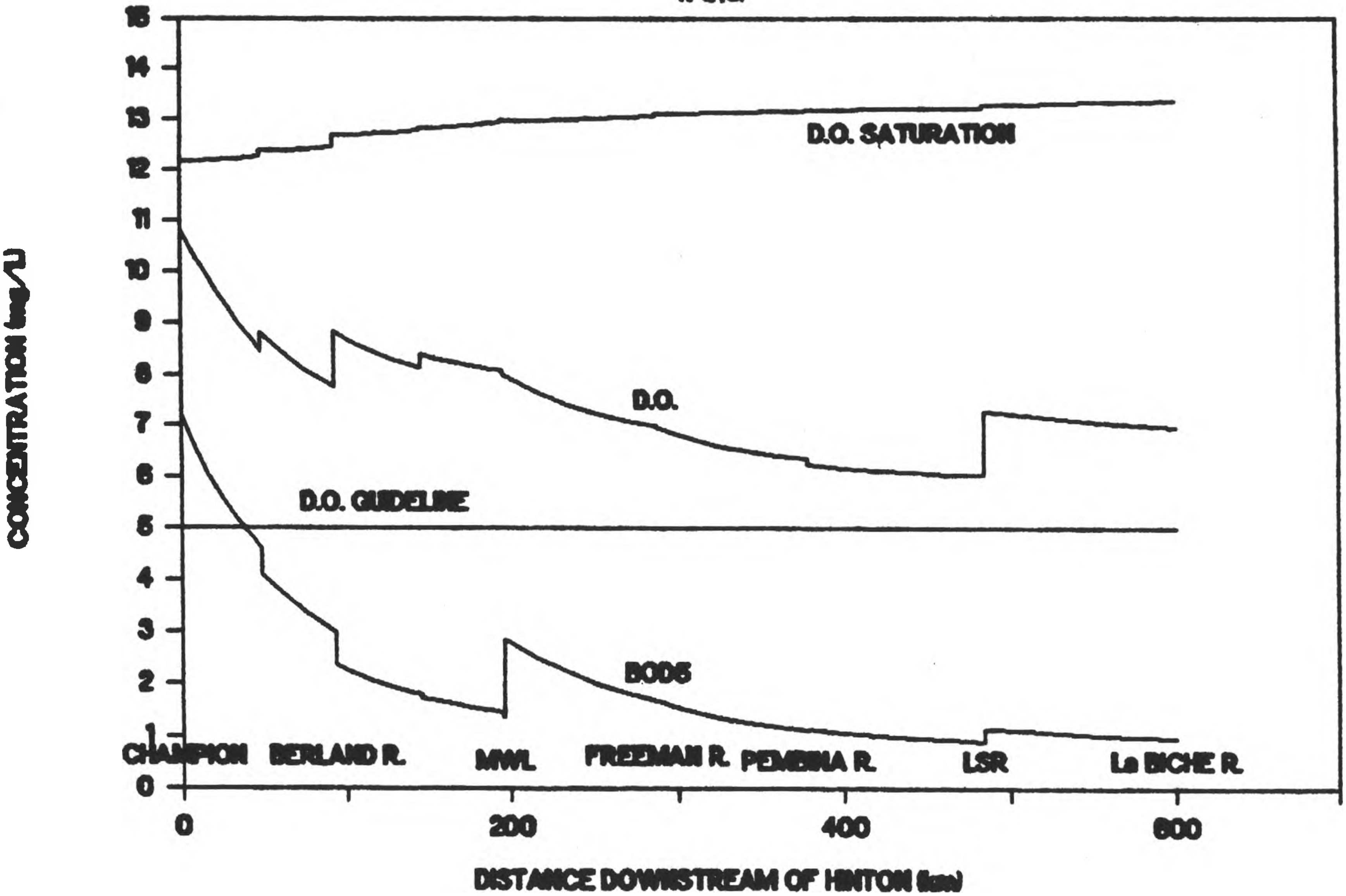


FIG. 4 - CHAMP MWL @ PERMITTED LOADINGS

(7Q2)

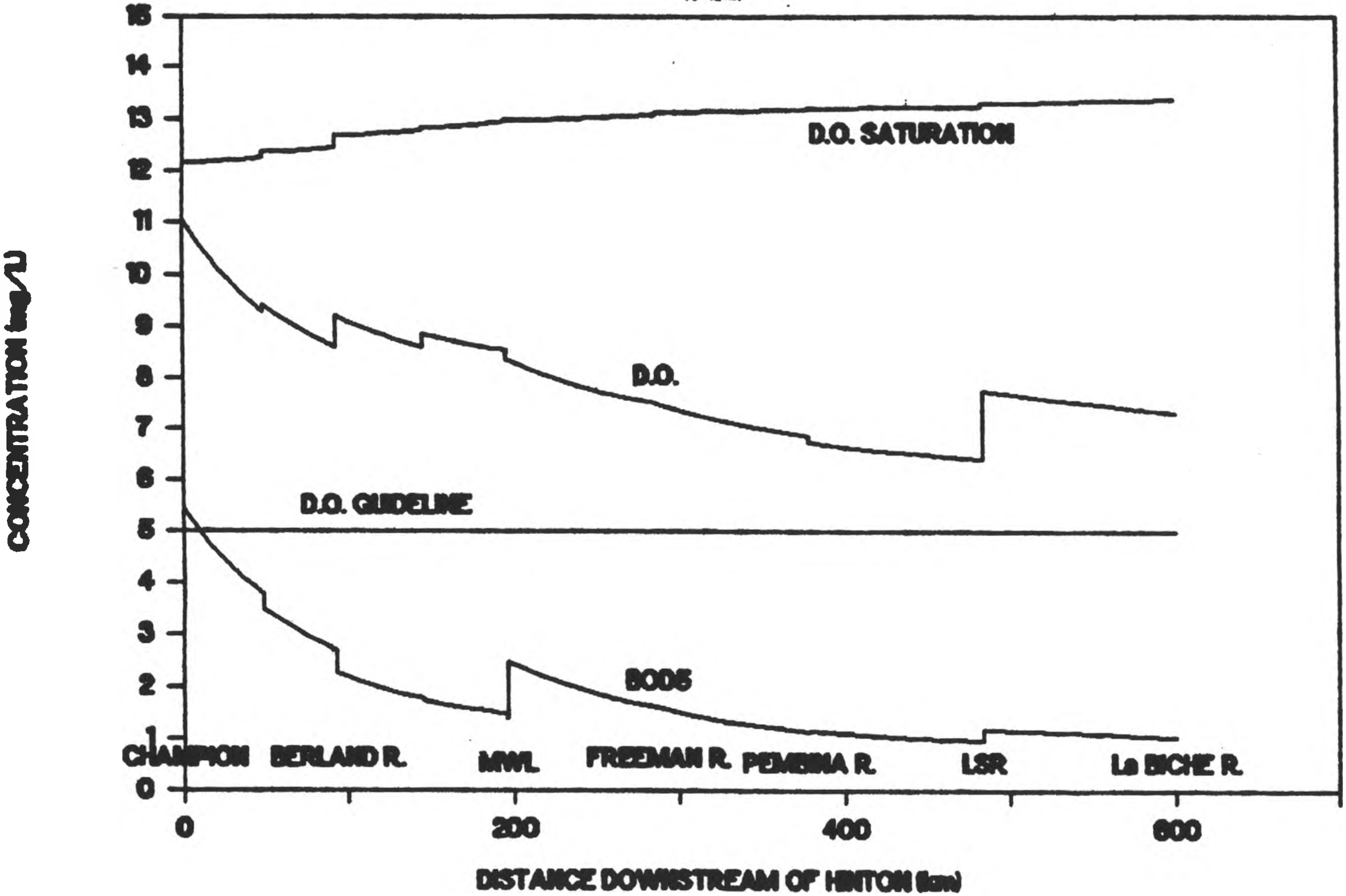


FIG. 5 - ANC @ 7 kg/FMT

(7Q10)

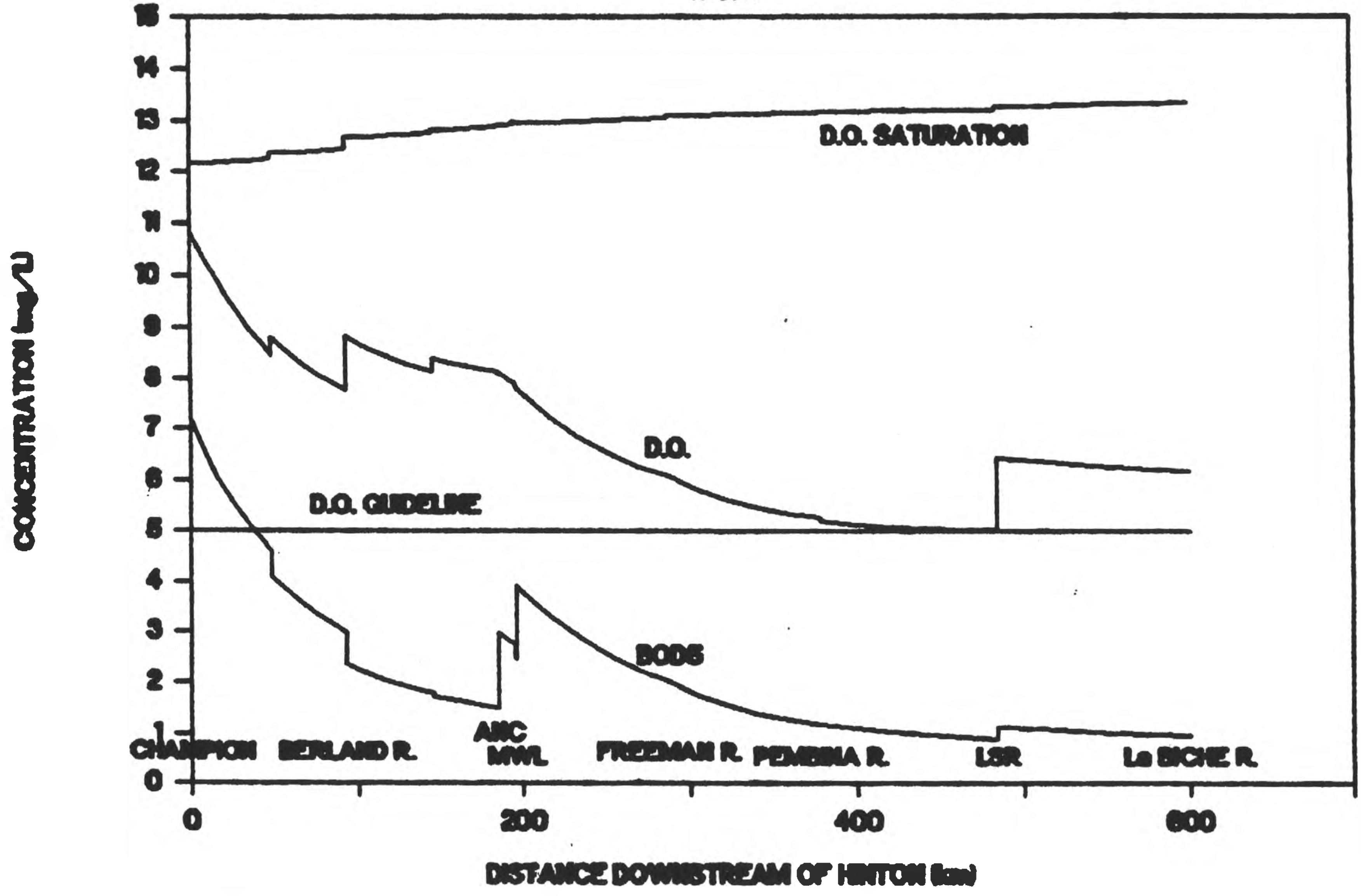
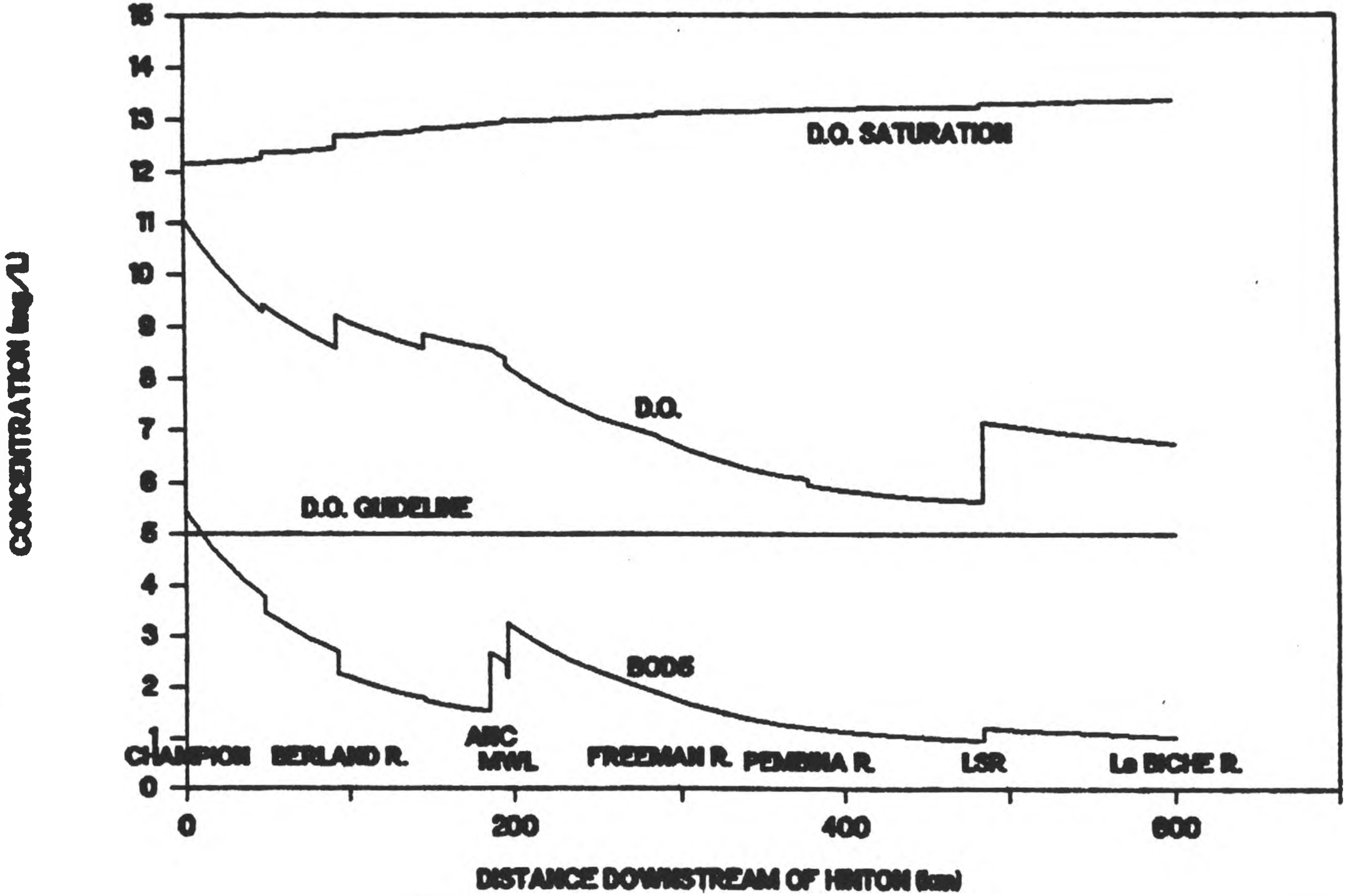


FIG. 6 - ANC @ 7 kg/FMT

(TQ2)



4.0 WATER QUALITY PARAMETERS

4.1 BIOCHEMICAL OXYGEN DEMAND

ANC is proposing to treat mill effluents using a primary clarifier leading to an aerated stabilization basin with a nominal 10 day retention time and 90% designed removal efficiency for BOD. The combined effects of the ANC and MWPL loadings on BOD concentrations in the river under varying conditions were shown in Figures 5 and 6. However the BOD loadings and concentrations in the river are of relatively little significance per se; it is their effect on dissolved oxygen concentrations that is of environmental significance.

4.2 DISSOLVED OXYGEN

The concentration of dissolved oxygen (DO) in water is critical to fish and other aquatic life. The U.S. Environmental Protection Agency (1986) has recommended that for cold-water species such as those in the Athabasca River, 30 day average DO concentrations should remain at 6.5 mg/L or above in order to avoid a loss in productivity. Seven day and one day mean minimums of 5.0 and 4.0 mg/L DO, respectively, were also recommended by the U.S.EPA (1986). Alabaster and Lloyd (1982) suggest 5.0 mg/L DO as a 5-percentile value, i.e. a value that should be equalled or exceeded 95% of the time.

None of these values represents a lethal DO level for fish. The EPA report points out that their dissolved oxygen criteria were set to provide maximum protection under worst case conditions. For fish, this will occur under high temperature conditions when metabolic activity is greatest. During more normal temperature periods, lower DO levels can generally be tolerated (Alabaster and Lloyd, 1982) and this tolerance should continue to increase as water temperatures drop.

In the Athabasca River, the lowest flow periods, and consequently, the periods of lowest DO concentrations, invariably occur during winter, under ice. Since this is the period when fish are expected to have the lowest DO requirements, use of 6.5 mg/L as a lower limit for long-term average DO concentrations and 5.0 mg/L as a lower limit for infrequent periods during the winter will provide excellent protection.

Simulated DO profiles along the Athabasca River under normal ANC operating conditions and two low river flow conditions were shown in Figures 5 and 6. Under the projected ANC BOD loadings, the minimum river DO concentrations during a winter low flow event corresponding to the $7Q_{10}$ are predicted to be 5.0 mg/L (Figure 5). By definition, average 7 day DO concentrations this low could be expected to occur, with a long term frequency of once every 10 years. As indicated previously, a DO concentration of 5.0 mg/L over a seven day period is considered reasonable by U.S. EPA (1986) and Alabaster and Lloyd (1982).

The predicted DO profile in the river is shown for a more normal low flow, the 7Q2, in Figure 6. In this scenario, minimum river DO concentrations reach 5.6 mg/L. This condition would be very unlikely to cause any problems for fish populations.

4.3 TOTAL SUSPENDED SOLIDS

Anticipated loadings and effluent concentrations of total suspended solids (TSS) from the ANC and MWPL mills, and the corresponding increases in river TSS concentrations that would occur after full mixing at the 7Q2, 7Q10, and minimum recorded flows are summarized in Tables 8 and 9 respectively. The minimum recorded flow is 19.3 m^3/s, or exactly half the computed 7Q2 flow. Mean monthly background TSS concentrations in the river are compared with ANC contributions in Table 10.

TABLE 8: TSS Loadings and Effluent Concentrations

Mill	Loading (kg/FMT)	Effluent Concentration (mg/L)
ANC	30	1,250
MWPL	30	1,340

TABLE 9: Increases in Athabasca River TSS Concentrations (mg/L)

Mill	7Q2	7Q10	Minimum
ANC	5.7	7.1	11.3
MWPL	6.0	7.9	12.0
ANC + MWPL	11.7	15.0	23.3

The assessment of impacts from TSS and other effluents assumes relatively rapid mixing. At both Champion and MWPL mills, although somewhat different technologies are proposed, relatively rapid mixing is anticipated by use of diffusers set perpendicular to the main flow. ANC will consider these and other methods to achieve similar rapid mixing.

TABLE 10: Mean Monthly TSS Concentrations in the Athabasca River After Final Dilution

Month	Mean Concentration (mg/L)			
	River Background[1]	ANC Contribution		
		Clarifier Solids	Bio-solids	Total
January	1.6	1.6	3.3	4.9
Feburary	2.9	1.7	3.5	5.2
March	2.1	1.8	3.6	5.4
April	114.0	0.8	1.7	2.5
May	70.5	0.3	0.6	0.9
June	198.0	0.1	0.3	0.4
July	247.0	0.1	0.3	0.4
August	64.4	0.2	0.3	0.5
September	40.7	0.3	0.6	0.9
October	7.9	0.5	0.9	1.4
November	10.5	0.9	1.9	2.8
December	3.6	1.3	2.7	4.0
Annual	63.6	0.3	0.7	1.0

1. At Town of Athabasca, Station 07BE001.

The 1986 Canadian water quality objective for TSS is 10 mg/L above background, when background concentrations are below 100 mg/L. Table 10 shows that following final dilution, the ANC effluent would meet this criterion except for the most extreme low flows. The ANC and MWPL loadings, if taken together, do not quite meet the criterion for the $7Q_2$ flow. ANC contributions of TSS to the river are low or insignificant compared to background concentrations except for the period December through March. On a yearly basis they amount to 1.6% of mean background concentrations (Table 10).

The TSS content of the effluent consists of 500 mg/L clarifier solids, with the remaining two-thirds being biosolids. The biosolids content of the MWPL TSS loading is estimated to be 75%. The clarifier solids remaining after primary treatment at ANC will consist primarily of fine wood fibres and inorganic colloidal material. The biosolids, a product of the final treatment process, will consist of the cells and cell fragments of the bacteria used to digest and break down the organics contained in the raw effluent. While the wood fibres and inorganic material will oxidize or degrade slowly in the river environment, a more rapid breakdown of the biosolids is expected to occur (Lee et al. 1978, 1979).

The solids discharged in pulp mill effluent following biotreatment are thought to be primarily non-settleable, i.e. they are small enough (in the size range 0.4 to 10 microns, approximately) to remain suspended indefinitely in moving water (Costa et al. 1979). For example, in studies using sediment traps, Costa et al. (1980) found that less than 5% of total suspended solids discharged from a pulp mill were deposited on the substrate, even in quiet reaches. Costa et al. (1979) reviewed various studies and found that, at the levels occurring in receiving waters, biosolids did not cause detectable benthal (bottom) deposits.

The rate of deposition of ANC solids on the river substrate is therefore expected to be very slow. Since deposition is the main environmental concern associated with TSS loads in a river environment (Costa et al. 1979), their relative impact should be very low. The biosolids in particular will also decrease in concentration over time through oxidation and entry into the food chain (Lee et al. 1979, Costa et al. 1980). The effects of oxidation, of course, are included in the total effluent BOD (Section 4.1). Costa et al. (1979) found that biosolids in receiving waters did not harm fish, deleteriously affect aquatic insects, or significantly change algae productivity, and concluded that normal biosolids discharge is insignificant as a pollutant. Similarly, Lee et al. (1978, 1979) believed non-settleable solids to be of minimal environmental importance. Therefore, no significant impacts from solids loading under either treatment alternative are predicted.

4.4 COLOUR

Effluent colour from the MWPL mill has been estimated at 1,000 units by Simons (1986) and 1,700 units by HydroQual et al. (in prep). Table 11 shows the predicted increases in Athabasca River colour following dilution of ANC and MWPL effluents at different flows, assuming the effluents to have the same colour concentration.

TABLE 11: Increases in Athabasca River Colour (Colour Units)

Mill	7Q2	7Q10	Minimum
ANC at 1,000	4.1	5.3	8.3
MWPL at 1,000	4.5	5.7	9.0
Total at 1,000	**8.6**	**11.0**	**17.3**
ANC at 1,700	7.0	9.0	14.1
MWPL at 1,700	7.7	9.7	15.3
Total at 1,700	**14.7**	**18.7**	**29.4**

Background levels of colour in the Athabasca River during winter are in the range of 25 to 30 units; when the ice cover is gone, levels are more variable, ranging from 15 to 40 (Hamilton et al., 1985).

The water quality objective for colour is an increase of less than 30 units above background. The table indicates that this objective will be met at either colour loading and at any low flow rate, both for ANC alone and for ANC plus MWPL.

The dilution factor is low enough in winter that some change in colour below the mill(s) might be detected in the open water area below the outfall. During seasons when the ice cover is gone, dilution of added colour will increase greatly and no change should be detectable. The impact of any added colour will be aesthetic and will not affect aquatic life.

4.5 SODIUM

Anticipated sodium concentrations in effluent from the ANC mill are 550 mg/L. This compares with estimated concentrations at MWPL of 950 mg/L by Simons (1986) and 2,000 mg/L by HydroQual et al. (in prep). Increases in Athabasca River sodium concentrations following final dilution of ANC and MWPL effluents are shown for different low flows in Table 12.

TABLE 12: Increases in Athabasca River Sodium Concentrations (mg/L)

Mill	7Q2	7Q10	Minimum
ANC	2	3	5
MWPL at 950	4	5	8
MWPL at 2,000	9	11	18
ANC + MWPL at 950	6	8	14
ANC + MWPL at 2,000	11	14	23

Background concentrations of sodium in the Athabasca River are about 15 mg/L in winter. During the ice-free period concentrations typically vary between 2 and 10 mg/L (Hamilton et al., 1985). There is no Canadian water quality objective for either drinking water or protection of aquatic life for sodium. The ANC contribution to the river's sodium content can be considered small, and would have no effect on aquatic life or on the value of the river as a source of drinking water.

4.6 SULPHATE

The average sulphate concentration of the ANC effluent is expected to be in the order of 350 mg/L. The MWPL effluent is estimated to contain 500 mg/L sulphate. The increases in Athabasca River sulphate concentrations caused by the combined effluents, following final dilution, would be approximately 4, 5 and 8 mg/L at the 7Q2, 7Q10 and minimum flows, respectively. These are of little consequence when compared to the winter Athabasca River background concentrations of about 50 mg/L reported by Hamilton et al. (1985) and the Canadian Drinking Water Guidelines of 500 mg/L, and would also not affect aquatic life.

4.7 DTPA

Diethylene triamine penta acetic acid (DTPA) use at the ANC mill is expected to average 75 kg/d, which would result in an effluent concentration of about 5 mg/L. By comparison, DTPA concentrations in MWPL effluent are estimated at 100 mg/L (HydroQual et al., in prep). At the minimum recorded flow, added DTPA concentrations in the river following final dilution would be approximately 0.1 mg/L downstream of ANC and 1 mg/L downstream of MWPL. Little seems to be known of the environmental effects of DTPA emissions, but research cited by HydroQual et al., (in prep), including a 96 hour LC_{50} value for DTPA of 425 mg/L , indicate that the projected concentrations in the Athabasca River are probably harmless. Should DTPA occur in effluents at toxic levels, this effect would be detected by the routine bioassay required for all pulp mill effluents.

4.8 RESIN ACIDS

The total resin acid content of the ANC effluent will be reduced to 2 mg/L or less by the proposed effluent treatment system which will result in an instantaneous dilution in the river to a concentration of 0.1 mg/L or less. Assuming that complete mixing occurs within 10 km, resin acid concentrations from the ANC effluent would be diluted to less than 0.02 mg/L at the MWPL mill outfall during the minimum recorded flow, and to 0.01 mg/L or less during the 7Q10 low flow.

Recent research indicates that resin acids are the principle toxic components of some pulp mill effluents (Servizi and Gordon 1986). Limited data, based on three samples, are available on the resin acid constituents of effluent from the Champion Mill at Hinton (Table 13). Since the resin acid species of an effluent are controlled by the types of wood processed, these data may be partially representative of the resin acids likely to occur in ANC effluents.

TABLE 13: Resin Acids in Champion Mill Effluent (adapted from Stanley, 1987)

Acid	96-hour LC_{50} (ug/L)	Occurrence
oleic/linoleic	2,000-8,200	3
linoleic	2,000-4,500	1
pimaric	700-1,200	1
sandaropimaric	360	1
isopimaric	400-1,000	3
palustric/levopimaric	500-1,000	1
dehydroabietic	800-1,740	1
abietic	700-1,500	1
neoabietic	610-730	2

The degree to which the resin acid loading of ANC effluent can be expected to resemble that of the Champion effluent is uncertain. The bleached kraft process used by Champion results in most resin acids being diverted to a recovery boiler where they are incinerated. In a CTMP process, such as that proposed by ANC, resin acid loadings are delivered directly to the effluent treatment system and so will be proportionally much higher prior to treatment. Servizi and Gordon (1986) reported total resin acid concentrations of 41.72 mg/L in raw CTMP effluent from the Quesnel River Pulp Co. (QRP) mill. Using aerated lagoons, they reported average final effluent loadings of 1.66, 1.13 and 0.72 mg/L resin acids after 5, 6 and 7 days of treatment. After 5 days treatment, however, the resin acid content was highly variable (0.02 - 6.46 mg/l and likely at toxic levels in some cases. Nominal retention time in the proposed ANC stabilization basin is 10 days, and the resin acid loadings to treatment will likely be lower than at QRP due to a less aggressive form of pulp treatment and less complex pulp production requirements. Therefore, resin acid content of the ANC effluent to the river would be expected to be less than that found at QRP.

Measurement of individual resin acids within the ANC effluent to determine sources of toxicity would be misleading because of additive effects and the presence of other potentially toxic effluent components. Direct measurement of whole effluent toxicity remains the best method of assessing potential toxic effects, including those of resin acids, in the aquatic environment. Under normal operating circumstances, NLK has predicted that the mill effluent will be able to pass the accepted test for acute (lethal) toxicity; i.e. at least 50% of test fish (rainbow trout) will survive 96 hours in undiluted effluent.

The possibility that limited chronic (sub-lethal) effects, such as changes in benthic invertebrate community structure, will occur due to effluent discharges cannot be ruled out. However, data collected over several years by Champion at much higher effluent loadings than those proposed by ANC show little change in downstream benthic organisms, with any effects being limited to points immediately below the outfall (Stanley, 1987).

4.9 KLEBSIELLA

Klebsiella spp. and most commonly Klebsiella pneumoniae is a common bacteria in pulp mill wastes (Huntley et al., 1976, Caplenas et al., 1981). The organism is wide spread in nature and is found naturally in many places including bark and wood (Duncan and Razell, 1972). It is also widely distributed in humans, occurring in cultures taken from the throats of 3 to 5% of the general population and 30 to 40% of the stool samples of the same population. Klebsiella make up approximately 1.5% of the coliform organisms in human feces (CCREM, 1987).

Recently, health officials have expressed concern over the presence of Klebsiella bacteria in pulp mill effluents. There appears to be two sources for this concern. The first, is that K. pneumoniae shows a positive response in both the standard total and fecal coliform tests. These tests are generally designed as an indirect measure of the extent of human wastes in drinking or recreational waters (CCREM, 1987). Current Canadian water guidelines make specific mention of the inherent problem of using these tests for waters receiving pulp and paper wastes, since they can greatly over-estimate the risks of becoming ill from contact with the water. Direct tests for Escherichia coli, which constitute approximately 97% of the coliform bacteria in human feces, are now recommended by the Canadian government, by the International Joint Commission and by the U.S. Environmental Protection Agency to measure fecal contamination (CCREM, 1987).

The second source of concern appears to have resulted from a U.S.EPA Project Summary (1981) which suggested that a link may exist between human health risks and waterborne K. pneumoniae. The summary report was based upon a study which found that one of 25 pulp and paper mill workers examined had K. pneumoniae in his upper respiratory tract (Kanarek and Caplenas 1981). No adverse health effects were reported, however, and the incidence of K. pneumoniae within the mill workers (4%) was almost identifical to the general average (3% to 5%). No evidence was presented by the EPA to support the claim to any link between waterborne K. pneumoniae and disease.

There is no question that K. pneumoniae under certain conditions is pathogenic i.e. capable of causing disease. Diseases associated with Klebsiella infection include bacterial pneumonia and genito-urinary infection (Steinhauer et al., 1965). No evidence, however, has been presented which even suggests that these infections were the result of waterborne K. pneumoniae (Eickhoff, 1980). Rather, infection by K. pneumoniae appears to occur primarily in people already hospitalized with other diseases (Eickhoff, 1979). The incidence of infection appears to increase with the level of care the patients had been receiving (i.e. how relatively ill they had been) and with use of antimicrobial drugs. Eickhoff (1979) found that pre-existing respiratory disease and being bedridden seemed to contribute most to bacterial infection. No data were found to support the hypothesis that waterborne (or airborne) K. pneumoniae are a source of disease, and this finding appears to be reflected in both the U.S. and Canadian water quality guidelines (U.S.EPA 1986, CCREM 1987), which do not list Klebsiella as a pathogen of concern.

4.10 ALUM

Alum discharges from the proposed mill are expected to amount to 1.5 T/d as a worst case, and less under normal circumstances. Assuming this figure represents hydrated aluminum sulphate, this corresponds to 120 kg/d of aluminum. The maximum effluent concentration of aluminum would be 8 mg/L and the worst case contribution to the river at the record low flow, following final dilution, would be 0.07 mg/L. This is below the federal guideline of 0.1 mg/L for waters of pH 6.5 and greater established by CCREM (1987). Under normal low flow conditions (e.g. mean February discharge of 48 m^3/s), the worst case aluminum contribution will be in the order of 0.03 mg/L. No impacts on drinking water supplies or aquatic biota are expected at these low concentrations, particularly in view of the relatively alkaline water chemistry of the Athabasca River.

5.0 BENTHIC BIOMONITORING

In addition to monitoring of acute effluent toxicity, ANC will be required to monitor the Athabasca River environment for long-term (chronic) effects. The analysis of benthic invertebrates (bottom dwelling organisms) has been successfully used to assess environmental quality for many years. Benthic invertebrates are a useful monitoring tool since their community structure can reflect general water quality conditions over time. Benthic invertebrate communities are good indicators of disturbance primarily because of the long-term stability of their populations and because they constitute an easily sampled community which is abundant and diverse enough to be responsive to both gross and subtle environmental changes. The general lack of mobility of benthic invertebrates provides fairly site-specific responses to environmental parameters. Monitoring benthic invertebrate communities is distinct from measurement of water quality parameters as the latter reflect conditions only at the time of sampling and for those parameters analyzed.

The study design should comprise two background sites upstream of the mill site and three or four sites downstream of the effluent outfall to provide information on impact and recovery. Benthic invertebrate sampling should preferably be conducted twice a year. Early spring sampling will provide information on water quality under ice cover and fall sampling on water quality during the open period. If only one survey a year is planned, it should be conducted in the fall when the numbers of benthic invertebrates are high and river conditions are more favourable for sampling.

A limited water quality program should also be conducted at each site consisting of the major parameters which will characterize the effluent.

Once the benthic organisms within the sample have been identified, the benthic community structure should be analysed using a pattern recognition technique, such as Reciprocal Averaging Ordination (RA). RA is a computer-assisted analysis technique which displays the distributional patterns of the benthos so that similar sites, in terms of their faunal composition, are grouped together into biological units (clusters). The separation and/or clustering of benthic communities indicated by RA generally occurs along the most significant environmental gradients which are then used to determine whether natural habitat differences or differences in water quality are causing the observed patterns in benthic community structure.

6.0 CONCLUSIONS

- Results of the river modelling to simulate dissolved oxygen levels in the Athabasca River indicated that under anticipated average monthly effluent loadings from the Champion, MWPL and ANC mills, minimum dissolved oxygen concentrations are 5.0 mg/L at the 7Q10 flow and 5.6 mg/L at the 7Q2 flows. At these levels, no impacts are predicted to occur.

- ANC solids loadings, following mixing, will meet current Alberta water quality guidelines during even severe low flow conditions. Combined ANC and MWPL loadings meet the guidelines for flows larger than the minimum monthly mean (March, 48 m^3/s). Since the majority of the solids will be non-settleable and biodegradable, and since installation of a diffuser system will allow rapid mixing of the effluent, no impact on the river environment from solids loadings is predicted.

- No impact is predicted due to colour, sodium, sulphate or alum loadings from the ANC effluent on the value of the river as a drinking water supply source or on the use of the river by aquatic fauna.

- The treatment system proposed by ANC should maintain levels of potential aquatic toxicants such as DTPA and resin acids within acceptable levels to protect the Athabasca River environment. Installation of the proposed effluent spill pond and an effective diffuser system will further reduce the possibility of release of an acutely toxic effluent into the Athabasca River. Biomonitoring, using benthic invertebrates, will provide a good measure of long-term (chronic) effects.

- Additional loadings of *Klebsiella sp.* will have no impact on human health.

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APPENDIX 2

AIR QUALITY ASSESSMENT

PROJECT: 561

DATE: May 16, 1988

ALBERTA NEWSPRINT COMPANY LIMITED
WHITECOURT, ALBERTA

EVALUATION OF METEOROLOGICAL, AIR QUALITY AND NOISE ASPECTS OF THE PROPOSED CTMP/NEWSPRINT PROJECT

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CIRRUS

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1.0 INTRODUCTION

Alberta Newsprint Co. Ltd. (ANC) is planning to construct a 220,000 finished metric tonne per year (FMT/a) newsprint mill near the Town of Whitecourt, Alberta. ANC, through Nystrom, Lee, Kobayashi and Associates, retained CIRRUS Consultants to conduct an environmental evaluation of the air quality resulting from the operation of the newsprint mill. In addition, CIRRUS Consultants was asked to comment on expected ambient noise levels in the vicinity of the mill.

A similar mill has also been constructed at Whitecourt, Alberta by Millar Western Pulp Ltd. (MWPL). This mill, which commences operation this year, is slightly different from the Alberta Newsprint Company mill in that more refining of the wood occurs at the Millar Western mill. However, the Alberta Newsprint Co. (ANC) mill has the addition of newsprint production with increased water vapour emissions.

The meteorological parameters, air quality projections and comments on noise are for the Environmental Impact Assessment being prepared by Nystrom, Lee, Kobayashi and Associates.

The study objectives are to:

- use existing climatological data and appropriate literature to determine the meteorological conditions relevant to the air quality aspects of the ANC newsprint mill project;

- evaluate the impact of particulate, gaseous (NO_x & SO_2) and possible odour emissions from the mill;

- determine whether water vapour and condensed water droplet emissions from the mill significantly contribute to increased fog levels in the area.

2.0 METEOROLOGICAL EVALUATION

The meterological data used in this evaluation is from a weather observing station in Whitecourt operated from December 1942 until July 1978. The station was located slightly over 1 km southeast of the community of Whitecourt in the Athabasca River Valley. The station was also approximately 3 km from the confluence of the Athabasca and McLeod Rivers. The ANC mill is located approximately 3.5 km NNW of the current airport, 8.5 km from Whitecourt and 9.5 km from the weather station.

The observing site was surrounded by undulating and heavily wooded terrain. Environment Canada noted that elevations to the north attained heights of 914 m within 20 km north-northeast of the station versus a valley bottom elevation of approximately 700 m.

The ridges to the south were more sharply defined and attained elevations of 1097 m (differential 400 m) within 11 km to the south-southwest. Therefore, the observations are taken in a broad valley with a differential elevation of about 400 m. The immediate area of the mill has a shallower Athabasca River valley height of about 100 m. The mill site can be considered as being more representative of valley conditions than the current airport location.

The meteorological and climatological review is based on the Principal Station Data of Environment Canada for Whitecourt (1) and a climatological study of air pollution potential by Environment Canada (2). The parameters considered are:

- temperature/relative humidity
- precipitation
- wind speed and direction

- visibility/fogging

- inversions and mixing heights.

2.1 Temperature and Relative Humidity

Table 1 summarizes the temperature, humidity, precipitation, atmospheric pressure, wind speed and direction parameters.

The meteorological tables and the Figure are contained in a separate section at the end of the report. The annual temperature variation is representative of central Alberta with mean maxima/minima of -10.8 and -22.3 °C in January and 22.2 and 7.9 °C in July respectively. The daily mean temperature varies from -16.6 °C in January to a maxima of 15.1 °C in July.

The extreme minimum temperatures, which provides an engineering design and operational parameter for the operation of the mill and effluent treatment system, is -50 °C.

Environment Canada data indicated a general relative humidity range of 60 to 81% with an annual average of 73%. The mean dew points vary from -18.9 °C in January to 9.5 °C in July. Environment Canada provides more detailed information with respect to temperature/relative humidity frequency distributions. However, these distributions are more appropriate for use in detailed engineering design and for the Application for Permits to Construct rather than for an environmental assessment.

2.2 Precipitation

The mean precipitation values are also presented in Table 1. The Whitecourt area experiences an annual average precipitation of 552.5 mm with the highest levels occurring in June, July and August. The annual precipitation values include the water equivalent of 173.7 cm of snow. Snowfall has occurred in every month of the year with the exception of July, based on the Environment Canada data. The maximum 24 hour snowfalls, on an average basis

Environment Canada data. The maximum 24 hour snowfalls, on an average basis occur in January, December, February, March, November and April in a declining order of snowfall rate.

The extreme 24 hour precipitation rates vary from 88.9 mm in June to a minima of 23.1 mm in December. The extreme snowfall for a 24 hour period varies from 31.9 cm in April to a minima of no snowfall in July.

With respect to the air quality evaluation, precipitation is normally associated with the passage of a weather or frontal system. These systems increase the ventilation rate and tend to minimize air quality levels. The higher precipitation rates in summer are often associated with "thunderstorms" which can also improve air quality following the passage of the storm as a result of increased ventilation in the lower layers of the atmosphere.

2.3 Wind Speed and Direction

The annual prevailing wind direction is from the west. This prevailing wind direction occurs from June through to February with easterly winds prevailing in March and April. During May, west-northwest winds prevail. The prevailing wind direction, speed and peak wind speed summaries are presented in Table 1 with more detailed summaries of wind directions and wind speed in Tables 2 and 3 respectively. The average wind speed, on an annual basis is 9.6 km/h with a maxima of 11.2 km/h in May and a minima of 8.5 km/h in August. The peak wind speed of 105 km/h was recorded in January. The peak wind speed is defined as "the maximum gust speed on record observed from a dial indicator or abstracted from a continuous chart record".

The more detailed summary of wind directions at Whitecourt is presented in Table 2. Calms, which are often associated with minimum dispersion, vary from a minimum of 9.5% in May to a maximum of 17.8% in December.

The associated wind speeds are presented in Table 3, calms and winds less than 10 km/hr (2.8 m/s) occur the majority of the time on both a monthly and annual basis. Wind speeds between 11-20 km/hr (3.1-5.6 m/s) occur from 24-34% of the time depending on the month.

2.4 Visibility/Fog

Since visibility measurements have been historically associated with the operation of aircraft, statistical summaries have been prepared by Environment Canada showing the ceiling and/or visibility criteria with respect to various sites. In the case of Whitecourt, visibility ceilings data tends to have a minima in the early morning period as illustrated on Table 4.

On average, low visibility/ceiling conditions of 1 km and /or <60 m respectively are relatively infrequent. A maximum of 6.4% occurs as expected in the early morning decreasing to less than 2% at 09:00 MST and to a negligible level during the day.

Table 5 summarizes visibility occurrences of less than one kilometer, smoke or haze occurrences and fog occurrences on a monthly and annual basis. The fog frequency is a maxima during the early morning hours (06:00 MST) varying from 27% in August to 5% in December and January. Since the winter fogs have the greatest potential for persistence as the result of mill emissions (evaluated in Section 4.2), it is important to note that these fogs are relatively infrequent with a declining frequency during daytime hours.

2.5 Mixing Height and Inversions

Environment Canada has published a number of frequency distributions of mixing depth parameters in Canada. The July 1979 "Regional Frequency Distributions of Mixing Depth Parameters in Canada, A Climatological Study of Air Pollution Potential" was used as a reference for estimating air pollution potential. In this context, "air pollution potential" would be better termed as a measurement of "dispersion capability of the atmosphere". If the air pollution potential is lower, it doesn't necessarily result in air pollution. Pollution is a function of meteorology, emissions and topography. This air pollution potential addresses meteorology only.

The "mixing depth" concept was developed by Holzworth in 1967 and is founded on the principal that heat transferred to the atmosphere by the earth's surface results in convection, vertical mixing and establishment of a dry adiabatic lapse rate. The maximum (afternoon) mixing heights were calculated by Environment Canada at the height above ground at which the dry adiabatic temperature extension from the maximum surface temperature intersects the vertical temperature profile observed at a radiosonde station at 1200 GMT (Figure 1). The mean wind speed within that layer of air is calculated by a simple average of the winds observed at approximately the same time at standard pressure levels and the surface to or immediately below the top of the mixing layer. An index is established by combining these two indices into a single value called the ventilation coefficient which is taken as the product of the maximum mixing height and the mean wind speed through the mixing layer. The higher the ventilation coefficient, the greater is the ability of the atmosphere to disperse materials emitted into the layer.

For the purposes of an environmental evaluation of a newsprint mill with low emission rates, this type of meteorological analysis is appropriate. Whitecourt is included in the "lee of the Rockies region" or central as defined by Environment Canada, The mixing heights, mean wind speeds in the mixing layer (to the mixing height) and the ventilation coefficients are summarized in Tables 6, 7, 8 respectively. These Tables are evaluated on a seasonal basis in the rest of Sub-section 2.5.

2.5.1 Spring

In the spring, mixing heights are consistently greater than 200 m with mixing heights of less than 200 m occurring only 5.2% of the time. The prevailing mean wind speeds are 4.0 - 8.0 m/s leading to moderate ventilation coefficient distributions.

2.5.2 Summer

During the summer months, periodic synoptic scale upper level (ie., above the valley) atmospheric "short wave troughs" embedded in the westerly flow aloft and surface thermal instability can result in substantial daytime mixing. Consequently, a minima of low mixing heights occurs during this time period. The mean wind speeds are more prevalent in the 4.0 - 8.0 m/s range compared to spring leading to the lowest frequency of low ventilation coefficients (<2000 m^2/s) of any season of the year.

2.5.3 Fall and Winter

The presence of stagnant high pressure ridges and cold air inversions in the lower level of the atmosphere are common during the fall and winter. Almost 50% of the winter cases occur in this low ventilation category. The frequency of low mixing heights (<200 m) in fall is approximately twice that of spring and 5 times that of summer. Winter frequencies are 4 times that of fall or 20 times that of summer. The prevailing wind speed shifts from 4.0 - 8.0 m/s in spring, summer and fall to 0 - 4.0 m/s in winter. Consequently, the greatest frequency of low ventilation rates (<1000 m^2/s) is almost half of the time in winter compared to only 1/8 of the time in fall.

The effect of Chinooks, and the movement of major low pressure systems through the area tend to improve the ventilation rate and mixing height that has been limited as a consequence of stagnant high pressure ridges and cold air inversions in the lower levels of the atmosphere.

Therefore, for an air quality evaluation, the winter period generally represents a more restrictive condition for air quality evaluations. Additionally, since water vapour and fogging has been expressed as a potential concern for any large industrial facility, the lower winter temperatures limit the ability of the atmosphere to retain moisture in vapour form. Therefore, the evaluation of water emissions and fogging will concentrate on winter emissions with strong inversion layers and light winds (i.e., low ventilation coefficient).

3.0 EMISSION PROJECTIONS

3.1 Process Emissions

A CTMP newsprint mill complex is different from a kraft pulp mill with respect to air emissions. Specifically, kraft mill odourous emissions (total reduced sulphur), chlorine and potential dioxin discharges from a kraft mill are not released from a CTMP mill due to the different nature of the process.

The emissions from the mill will be:

- wood volatiles from the pulping process;

- particulate from the wood waste burner and minor emissions from the mill;

- nitrogen oxides from the gas fired power boiler, the glycol/water heater and the wood waste burner;

- water vapour or condensed water droplets.

3.1.1 Wood Volatiles & Odour

The Pulp & Paper Research Institute of Canada evaluated the recovery of steam from the thermomechanical pulping process (Azarniouch, et al, 1979). The paper noted that one method to reduce vapour emissions was to use the steam from the heat recovery system in the paper dryer. For periods when the heat recovery system may be off line (i.e., process upset, maintenance), the steam may be vented to the atmosphere. The trace impurities in this steam are listed in Table 9.

With the selection of heat recovery for the ANC mill, the mill water vapour emissions are reduced. This approach substantially reduces the discharge of trace contaminants in the steam. The primary effect of these emissions is not an effect on the atmospheric environment. Rather, when these emissions are condensed, additional treatment is required in the effluent lagoon. NLK has advised that this factor is taken into consideration in the design of the lagoon.

TABLE 9 IMPURITIES IN TMP EXHAUST

Compound	Concentration (% by weight)
Turpentine	0.02
Formic & Acetic Acid	0.0075
Resin Acids	0.0025
Other extractives	0.01
Fibers	0.005 -0.2
Air	5-20

(Azarniouch, 1979)

A survey was conducted for the Millar Western EIA in the vicinity of the Quesnel River Pulp Company mill. No detectable odour levels were detectable downwind with the exception of the smell of fresh chips near the chip pile (CIRRUS Consultants, 1986). Therefore, these types of emissions should not be a concern for the ANC mill near Whitecourt.

3.1.2 Particulate

Particulate emissions from the mill are negligible with the exception of the wood waste incinerator. The pulping and paper machine areas are low particulate areas as there is no combustion component or dry handling of fine granular material in the process. The packaged boiler and the glycol/water heater are natural gas fired.

The wood waste burner incinerator will be similar to that currently installed by Millar Western Industries Ltd. at their Whitecourt sawmill. That is the unit will burn wood waste from the log yard, wood-room and dewatered sludges from the primary (effluent treatment) clarifier.

The unit, which will be designed to meet Alberta Environment requirements should emit the same or less particulate than for a similar incinerator tested on Vancouver Island in the early 1970's. That test used a specially erected platform and a low stack exit velocity sampling system. The emission rate was 0.1 gr/scf (approximately 0.23 g/dSm^3). This results in a particulate emission rate of about 1.4 t/d.

Since fly ash can adversely effect the quality of the chips (and the resulting paper), the incentives of meeting Alberta Environment's requirements and maintaining pulp and paper quality should limit the particulate emissions from the incinerator.

Particulate emissions from the natural gas fired power boiler and glycol/water heater were based on measurements from a large industrial unit. These measurements showed that these emissions should be lower than predicted in U.S. EPA Guideline AP-42.

3.1.3 Oxides of Nitrogen

Oxides of nitrogen are emitted from combustion processes, specifically the package boiler, glycol/water heater and the wood waste incinerator. The packaged boiler and the glycol/water heater are primarily intended to provide start up steam for the mill and heating in winter when the mill is in a temporary shutdown mode. Compared to a electrical utility power boiler or a kraft mill recovery boiler, the combustion temperature in a wood waste incinerator is much lower. Therefore, the emission rates, as defined in Table 10 for oxides of nitrogen are relatively low.

The predicted emission rate of 6.69 t/d is low on the order of 0.99% of the 678 t/d estimated NO_x for the Province of Alberta (Acid Deposition Research Report, 1987). Of the total emission rate, 88% is from the package boiler, 8% from the glycol/water heater and 4% from the incinerator.

3.1.4 Sulphur Dioxide

Sulphur dioxide emissions are emitted from combustion sources. However, since both the package boiler and the glycol\water heater are fired with natural gas, sulphur dioxide emissions are negligible. Sulphur dioxide emissions from the incinerator are also negligible compared to residual oil based combustion.

3.1.5 Water Vapour

Water vapour, while technically not a pollutant, is considered as an emission due to its potential to create a visible plume and/or fog under certain weather conditions. The water discharge rates are also tabulated based on information provided by NLK on Table 10.

Water vapour is also emitted from the effluent treatment lagoon. An analysis of lagoon convective and radiative losses and solar radiation gains, the foam covering on the treatment pond tends to minimize these losses can be conducted when the parameters for the lagoon are defined for the Application for a Permit to Construct.

In this report, a general review is made of fogging in Section 4.2.

3.1.6 Fugitive Dust Emissions

Fugitive dust can occur from log handling and storage, chip handling and storage and from the movement of large vehicles on the site. However, since these areas are paved or watered as required, road dust can be kept to a minimum.

TABLE 10 PROJECTED MILL EMISSION LEVELS

Source	No. of Discharges	kg/hr	Total Flow Nm3/min	Am3/min	deg C	Water Vapour %v/v	Humidity	Ht. m	Stack Diam. mm	Vel. m/sec	Contaminates Partic. g/s	NOX g/s	SOX g/s	Remarks
PULPING AREAS														
Heat Recovery Vent	1	3,700	75	97	95	83	Sat.	34	400	12.9	-	-	-	Normal Operation, all refiner steam condensed
*Refiner Steam Vent	1	90,000	2,000	2,600	100	99	Sat.	34	2100	12.5	-	-	-	Abnormal operating conditions
Pulp Thickener Hoods	3	21,000	300	320	40	7		34	550	7.5	-	-	-	Continuous
Pulping Area Ventilation	2	349,000	5,000	5,300	35	7		34	1800	17.4	-	-	-	Continuous
PAPER MACHINE														
Paper Machine Dryer Hood	3	261,000	3,800	4,200	50	11	Sat.	32	1400	15.2	-	-	-	Continuous
** PM Dryer Hood	3	273,000	4,100	4,700	60	19		32	1400	17.0	-	-	-	Abnormal operating condition
Saveall Hoods	2	14,000	200	220	40	7		32	550	7.7	-	-	-	Continuous
Paper Machine Ventilation	6	977,000	14,000	14,800	35	7		32	1800	16.2	-	-	-	Continuous
UTILITIES														
Packaged Boiler	1	100,000	1,500	2,700	230	18		34	2100	13.0	Neg	67.8	0.23	Intermittent
Glycol/Water Heater	1	14,000	210	410	260	17		34	850	12.0	Neg.	6.4	0.03	Intermittent for space heating
WOOD PREPARATION AREA														
Wood Waste Incinerator	1	297,000	4,300	13,200	550	10		26	8500	3.9	3.2	3.2	0.32	Operation in /association with wood preparation

* When Heat Recovery System not Operating
** When Economizer not Operating

4.0 AIR QUALITY PROJECTIONS

The air quality projections are segregated into the standard emissions of particulate and gaseous materials, and water vapour.

4.1 Incremental Particulate and Gaseous Air Quality Effects

In the evaluation of ambient air quality through computer modelling, two types of models can be applied. These models are:

- a screening model to determine whether air quality is a concern;

- a more sophisticated model to more precisely define the ambient air quality levels if the screening model identifies the requirement for further evaluation.

Screening models are for an initial evaluation. Building wake effects, which are not evaluated in the screening models used in this report, will be addressed as part of the Application for the Clean Air Permit following delineation of building heights.

4.1.1 General Dispersion Model

For this study, screening models have been applied to determine whether air quality is a concern in the study area. The Alberta "STACKS" model has been selected for this evaluation since:

- it is a screening model which is generally conservative (i.e. tends to over-predict air quality ground level concentration levels);

- readily predicts one hour concentrations for comparison to the guidelines;

- considers valley bottom terrain of a gently rolling nature consistent with the populated areas in the vicinity of the ANC mill site near Whitecourt.

The plumes discharged from a facility, such as the CTMP mill, are assumed to be trapped under an inversion layer. The plume then dilutes gradually in the atmosphere under this layer. To be conservative, no absorption of the emissions is considered and consequently, the model tends to conservatively over-predict the actual concentration in the receiving environment.

The plume emitted from a stack tends to rise in the atmosphere due to buoyancy or the fact that the plume is warmer than the surrounding air. In addition, the plume has a certain exit speed or velocity when it leaves the stack. This exit speed or velocity contributes to plume rise. The U.S. EPA, NOAA and Atomic Energy Commission have conducted a series of new studies and developed a series of parameters for plume rise. These types of parameters have been included in the Alberta "STACKS" model.

From the point of maximum plume rise, the plume dilutes in the atmosphere. For each wind direction, the location for and concentration of particulates and NO_x have been determined. Based on these concentrations, the ambient level for contaminants discharged from the stack can be determined for various areas.

4.1.2 Predicted Ambient Levels

The oxides of nitrogen emissions were evaluated using the operating characteristics designated in Table 10. The predicted ambient air quality values are listed in Table 11. These emission parameters were based on data supplied by NLK and emission factors from U.S. EPA-42 as listed in Appendix 1. The computer printouts for the stacks program are attached as Appendix 2.

The maximum predicted 1 hour NO_x as NO_2 ambient air quality level is 217 ug/m^3 which is about 2/3 of the ambient air quality standard of 300 ug/m^3.

The maximum predicted particulate level (from the wood waste incinerator) is 3.6 ug/m^3 for one hour. The 24 hour guideline is 100 ug/m^3. Since a 24 hour ambient level would be lower than a predicted 1 hour level and the 1 hour level is well within the guidelines, compliance with the particulate guideline from point sources should be achieved. Area sources should not be a concern beyond the mill site if appropriate operating procedures are followed.

TABLE 11 PREDICTED AMBIENT AIR QUALITY LEVELS

Maximum Predicted 1 hour ground level concentrations[1]
(ug/m^3)

Source	SO_2	NO_x	Particulate[2]
Package Boiler	0.50	189	0.06
Glycol Heater	0.08	28	0.01
Incinerator	0.30	<1	3.59
Total	0.88	217	3.66

Note: 1. Maximum refers to the total ground level concentration.
2. Particulate guideline is for 24 hours. An approximate 24 hour value would be 1/6 of the 3.66 ug/m^3 or <1 ug/m^3.

4.2 Water Vapour

Winds in the Whitecourt area tend to flow parallel to the Athabasca River Valley. Consequently, water vapour emissions from the mill, including the effluent lagoon would flow parallel to the river valley. This air flow would be parallel to the approach path to the Airport. Consequently, fogging at the airport from the operation of the mill should not be a major concern under light wind conditions. Similarly, with respect to Highway 43, the same situation would occur where the fog tends to remain parallel to the valley alignment. When morning daytime heating occurs, particularly for nocturnal summer fogs, the fog could be drawn up the hill towards the highway. A transient situation could occur where the plume would move across that road. However, this type of situation could occur naturally and would in fact be no different from natural fogs.

For the Town of Whitecourt, the community already has a CTMP mill, a sawmill and a residential area contributing to air emissions. In the event of very light wind flows from the ANC site towards the Town of Whitecourt, it is expected that any incremental fog would disappear well before the plume reaches Whitecourt. This in part is due to the approximate 8.5 km travel distance from the mill to the Town of Whitecourt and due to the differences in elevation between the mill and the town. As the mill is higher in elevation than the town, any emission from the mill would have to travel downslope on its path to Whitecourt. In doing so, it should be subject to increased atmospheric mixing which would tend to dissipate the fog. Therefore, regional fog and climatic changes should not a consequence in the proposed development of this mill.

Under stronger wind conditions, good mixing occurs and condensed water vapour plumes should not persist for any great distance from the mill.

In addition, studies by Environment Canada indicate that August, September and November are the months with the highest frequency of fogs. During August and September, the fogs are primarily of a nocturnal nature and disappear early in the morning.

In November and during winter, the mill water vapour emissions will be reduced through the heat recovery system. In addition, enhanced plume rise can be expected due to the greater differential between stack emission and winter ambient air temperatures. Fogs are also associated with calms or light wind conditions which can also enhance plume rise. These operating conditions should reduce the potential for fog.

Natural fogs can be expected to occur an average of 39 days per year over the period of record, based on Environment Canada Records. In addition, based on information from fog studies for Quesnel, British Columbia, it was estimated that CTMP project induced fogs could increase the frequency of fog days by about 15 percent.

5.0 NOISE

As part of the EIA for the Millar Western Pulp Co., ambient noise measurements were conducted in the vicinity of the Quesnel River Pulp Co. at Quesnel, B.C. These levels were reported in Appendix 3 of the Millar Western EIA. Noise levels in the range of 50 to 65 dbA are considered to be generally appropriate for a residential area. In the case of the ANC mill, there are no nearby residences. In addition, the following measures will be implemented to reduce ambient noise levels:

- Noise suppression devices for compliance with noise criteria for workers inside the mill;

- Enclosing of blowers (for the lagoon), and major mill equipment within mill buildings to minimize noise travelling beyond the site;

- Maintenance of buffer zones along the river and the highway, again minimizing noise from the site.

Since the Millar Western mill can be located adjacent to the Town of Whitecourt without any significant noise concerns, the noise levels in a more rural area should also be acceptable. While it is recognized that background noise levels are generally lower, the Quesnel River Pulp Company noise survey, as part of the Millar Western EIA, identified that vehicular traffic on highways were more significant. Therefore, noise levels should not be a concern for a properly operated CTMP mill.

6.0 CONCLUSIONS

The conclusions of the air quality studies are as follows:

- the particulate and NO_x (as NO_2) emissions from point sources should meet ambient air quality levels;

- SO_2 emissions are from the trace sulphur components in natural gas and wood waste. No significant emissions, ambient air quality levels or adverse impacts are expected from these discharges;

- odour emissions are primarily from wood volatiles and should not be detectable at ground level. Experience and observations at the Quesnel River Pulp Company in Quesnel, B.C. has shown this to be the case;

- the odour and other concerns expressed for kraft mills (ie., dioxins) are not relevant to a CTMP mill as a CTMP mill is a different process and does not use chlorine;

- the heat recovery system minimizes water vapour emissions in the winter when persistent fogging conditions are more likely to occur. While fog is more frequent in the summer, its persistence would be less. In addition, the summer temperatures of the atmosphere are higher providing for a greater assimilative capacity for water vapour emissions;

- the planned use of subsurface aerators in the effluent lagoon and a foam cover on the lagoon tends to limit water vapour emissions from that source. However, when significant water vapour emissions occur, the thermal rise from the basin places the resultant plume or fog at a substantial height above ground level thereby reducing the potential for ground fog. Consultation with a former manager of the Quesnel River Pulp Company CTMP mill has verified that ground fog has not been observed emanating from the mill (to the extent that it would create an area concern);

- road generated dust should be minimized by the use of paved access roads, a portal crane for wood storage and appropriate operating procedures;

- noise emissions should be low to the extent that noise levels from Highway 43 should be a more significant source than the mill.

Following further delineation of the design, a more detailed evaluation of the fogging potential should be considered at the discretion of Alberta Environment. This study would use the stability data from the Whitecourt airport and/or the previous monitoring site and hourly meteorological parameters (wind speed, wind direction, temperature, relative humidity) to more precisely delineate the distances in which visible water droplet emissions are evaporated to the invisible state.

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METEOROLOGICAL
TABLES &
FIGURE

CIRRUS

FIGURE 1

Determination of Maximum Mixing Height

1200 GMT Profile

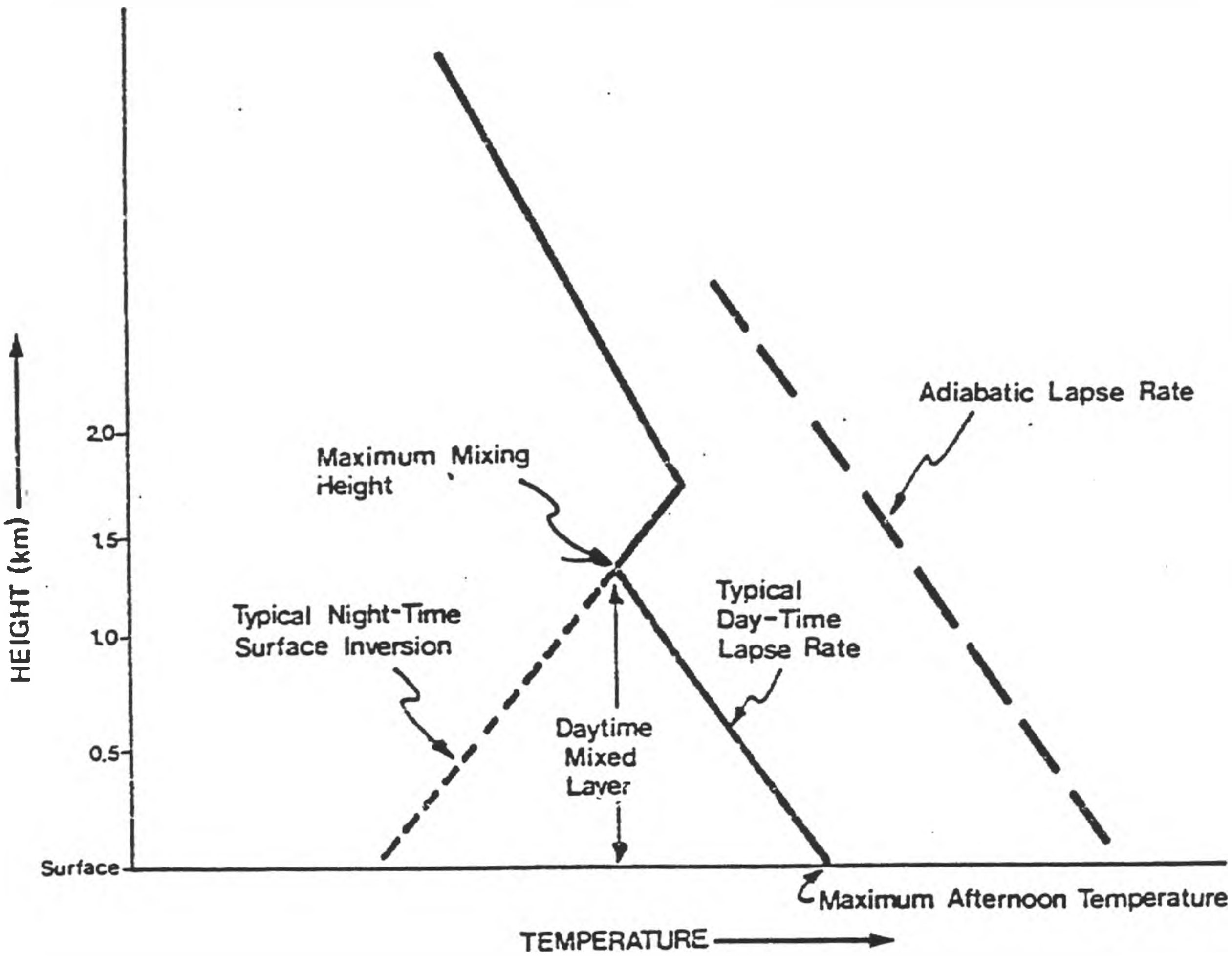

TABLE 1 MEANS OF TEMPERATURE, PRECIPITATION, HUMIDITY, PRESSURE, WIND SPEED AND DIRECTION

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Temperature (C)													
Maximum	-10.80	-3.30	0.80	9.70	16.70	19.90	22.20	20.80	15.80	10.00	-0.80	-7.70	7.80
Minimum	-22.30	-16.90	-12.60	-4.40	1.60	5.50	7.90	7.00	2.00	-3.40	-11.70	-18.50	-5.50
Mean	-16.60	-10.20	-5.90	2.70	9.20	12.70	15.10	13.90	8.90	3.40	-6.30	-13.10	1.20
Extreme Maximum	15.00	16.70	18.90	30.00	31.70	33.30	33.90	33.30	30.60	27.80	22.20	13.30	33.90
Extreme Maximum	-50.00	-47.80	-41.70	-37.20	-12.20	-3.30	-3.30	-3.90	-18.30	-25.60	-38.30	-43.40	-50.00
Precipitation													
Rainfall (mm)	1.5	1.0	1.4	10.3	50.6	91.3	101.6	88.3	31.4	11.9	4.2	2.3	395.8
Extreme in 24 hr	7.1	4.6	5.6	16.8	59.1	88.9	82.6	60.2	32.3	14.7	19.6	9.1	88.9
Snowfall (cm)	31.9	26.5	25.5	17.5	3.4	0.4	0.0	T	3.4	15.6	21.9	27.6	173.7
Extreme in 24 hr	22.4	40.4	27.4	32.0	20.3	8.1	0.0	T	13.2	34.8	26.9	28.4	40.4
Total (mm)	29.3	24.0	24.0	27.0	54.2	91.7	101.6	88.3	34.6	27.6	23.5	26.7	552.5
Extreme in 24 hr	24.1	40.4	27.7	29.5	59.1	88.9	82.6	60.2	32.3	34.8	24.6	23.1	88.9
Humidity													
Vapour Pressure (kpa)	0.18	0.25	0.32	0.45	0.66	0.98	1.22	1.2	0.85	0.54	0.33	0.23	0.6
Dew Point (c)	-18.9	-13.9	-10.3	-4.8	0.5	6.2	9.5	9.3	4.1	-2.3	-9.8	-15.5	-3.8
Relative Humidity (%)	78	76	72	63	60	68	73	78	78	73	79	81	73
Pressure													
Sea Level (kpa)	102	101.7	101.6	101.5	101.4	101.3	101.5	101.5	101.6	101.4	101.6	101.7	101.6
Wind													
Prevailing Direction	W	W	E	E	WNW	W	W	W	W	W	W	W	W
Speed	9.6	9.5	10.1	10.5	11.2	10.4	9.3	8.5	9.1	9.2	8.8	8.8	9.6
Peak Wind (km/h)	105	89	93	84	79	71	97	80	64	102	84	74	105

CIRRUS

TABLE 2 PERCENTAGE FREQUENCY OF WIND DIRECTION

Direction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Calm	15.0	13.7	12.8	11.2	9.5	11.0	12.5	15.4	13.3	14.5	16.7	17.8	13.6
N	1.0	1.5	2.2	3.7	3.8	3.4	3.0	3.1	2.8	2.4	1.5	0.9	2.4
NE	6.1	6.9	8.1	8.4	7.1	5.4	5.0	5.1	4.6	5.2	6.1	4.4	6.0
E	14.8	18.3	23.5	19.3	16.7	13.5	11.2	11.6	12.6	12.4	14.4	14.3	15.2
SE	2.1	3.2	4.7	7.0	8.4	7.8	7.1	7.0	6.1	5.0	3.3	2.5	5.4
S	2.2	3.0	2.8	4.3	4.6	5.9	6.6	6.2	5.7	4.8	3.4	3.0	4.4
SW	9.9	9.9	6.7	6.6	6.7	7.8	8.9	9.3	9.3	10.4	10.8	11.7	9.0
W	38.8	33.3	27.8	25.8	27.8	30.3	30.9	28.6	30.7	32.6	34.0	36.2	31.4
NW	10.1	10.2	11.4	13.7	15.4	14.9	14.8	13.7	14.9	12.7	9.8	9.2	12.6

TABLE 3 PERCENTAGE FREQUENCY OF WIND SPEED OBSERVATIONS

Wind Speed (km/h)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Calm	15.0	13.7	12.8	11.2	9.4	11.1	12.5	15.4	13.3	14.4	16.7	17.8	13.6
1 - 10	47.7	51.1	48.3	47.0	45.6	48.5	53.6	55.0	54.8	53.2	52.6	50.4	50.7
11 - 20	28.7	27.3	30.4	31.9	33.9	30.7	27.9	25.1	24.9	24.3	24.0	24.9	27.8
21 - 30	7.6	6.4	7.3	8.6	9.7	8.7	5.5	4.1	6.1	6.7	5.5	6.1	6.9
31 - 40	0.9	1.3	1.1	1.1	1.3	1.0	0.5	0.4	0.9	1.2	1.0	0.8	1.0
41 - 50	0.1	0.2	0.1	0.2	0.1	*	*	*	*	0.2	0.2	*	0.1
51 - 60	*	*	*		*		*	*	*	*	*		0.0
61 - 70		*						*		*		*	0.0
71+													0.0

TABLE 4 PERCENTAGE FREQUENCY OF CEILING/VISIBILITY OBSERVATIONS

	Ceiling and/or Visibility					
Hour (MST)	480m/10Km	300m/5Km	150m/2Km	60m/1Km	30m/0.5Km	Total Obsv.
00	11.8	6.3	2.1	0.7	0.3	9,343
03	15.1	9.3	4.8	2.1	1.2	9,343
06	20.1	13.3	7.3	4	2.4	9,343
09	17.8	11.3	4.1	1.3	0.6	9,343
12	13.1	6.9	1.8	0.2	*	9,343
15	9.5	5	1.2	0.2	*	9,343
18	9.1	4.7	1.4	0.2	0.1	9,343
21	10.2	5.2	1.7	0.3	0.1	9,343
All Hours	13.3	7.7	3	1.1	0.6	224,229

TABLE 5 NUMBER OF OBSERVATIONS WITH FOG, SMOKE OR HAZE AND VISIBILITY <1 km

Local Time (MST)		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
00	Fog	24	22	19	9	9	19	17	46	28	34	61	36	27
	Smoke or Haze	1	1			3	2		4	1	3	3	1	2
	Visibility <1km	8	3	4	3		2	1	12	4	8	24	14	7
	Total Observations	806	734	806	780	806	780	806	775	750	775	750	775	779
03	Fog	37	30	37	19	27	53	68	115	77	32	68	38	50
	Smoke or Haze		3	4		2	2		2		1	2		1
	Visibility <1km	10	3	15	7	8	30	36	65	47	15	23	15	23
	Total Observations	806	734	806	780	806	780	806	775	750	775	750	775	779
06	Fog	43	43	50	43	51	96	123	209	133	48	72	42	79
	Smoke or Haze		2	2		5	4		1			1		1
	Visibility <1km	16	8	15	16	16	53	81	130	80	24	33	16	41
	Total Observations	806	734	806	780	806	780	806	775	750	775	750	775	779
09	Fog	52	44	57	37	25	34	32	89	94	54	68	44	53
	Smoke or Haze		2	7		6	3	2	2		1	3		2
	Visibility <1km	12	11	17	9	2	3	7	31	43	24	22	15	16
	Total Observations	806	734	806	780	806	780	806	775	750	775	750	775	779
12	Fog	34	25	18	16	11	15	13	22	21	33	56	36	25
	Smoke or Haze		3	4	1	3		3	6		1	4	1	2
	Visibility <1km	5	2	5	5					1	13	11	15	5
	Total Observations	806	734	806	780	806	780	806	775	750	775	750	775	779
15	Fog	18	11	8	5	9	10	7	14	12	13	44	28	15
	Smoke or Haze	1	1	2		4	4	1	5		2	1	1	2
	Visibility <1km	7	2	9	4		1				5	5	7	3
	Total Observations	806	734	806	780	806	780	806	775	750	775	750	775	779
18	Fog	17	10	7	9	13	10	10	9	14	16	49	25	16
	Smoke or Haze	1		2		5		3	4		4	4	2	2
	Visibility <1km	10	4	5	3		1	2		2	6	6	9	4
	Total Observations	806	734	806	780	806	780	806	775	750	775	750	775	779
21	Fog	26	25	8	9	11	10	11	10	16	20	55	33	20
	Smoke or Haze	1		3		4	2	2	4		3	3		2
	Visibility <1km	6	1	8	3		1	1		2	4	12	10	4
	Total Observations	806	734	806	780	806	780	806	775	750	775	750	775	779
All Hours	Fog	743	630	617	411	468	754	873	1537	1176	768	1407	835	852
	Smoke or Haze	13	44	63	2	91	55	35	87	4	39	61	17	43
	Visibility <1km	200	94	227	152	84	253	370	731	498	313	408	310	303
	Total Observations	19343	17616	19344	18720	19344	18720	19343	18600	17999	18600	18000	18600	18686

TABLE 6 LEE OF THE ROCKIES REGION - MIXING HEIGHTS

Mixing Heights (m)	Percentage Frequencies (Mean) Spring	Summer	Fall	Winter	Annual
0 - 200	5.2	1.9	9.8	37.2	13.5
201 - 400	9.7	2.3	13.7	36.7	15.6
401 - 600	8.7	3.4	11.7	11.4	15.6
601 - 800	6.6	5.1	9.9	6.3	7.0
801 - 1000	5.2	3.7	8.3	2.5	5.0
1001 - 1200	6.6	5.2	7.9	1.4	5.3
1201 - 1400	4.6	4.4	7.3	1.4	4.4
1401 - 1600	4.9	6.4	7.0	0.6	4.7
1601 - 1800	5.6	5.1	5.0	0.5	4.1
1801 - 2000	4.8	6.8	5.8	0.8	4.6
>20.1	38.3	55.7	13.7	1.1	27.2

Source: Environment Canada

TABLE 7 LEE OF THE ROCKIES REGION - MEAN WIND SPEED

Mean Wind Speed (m/s)	Percentage Frequencies (Mean) Spring	Summer	Fall	Winter	Annual
0 - 4.0	21.7	21.5	20.5	47.6	27.8
4.1 - 8.0	40.9	49.8	45.1	30.8	41.7
8.1 - 12.0	26.6	22.3	22.4	12.6	21.0
12.1 - 16.0	8.7	5.6	8.9	6.5	7.4
16.1 - 20.0	2.2	0.8	2.4	2.0	1.9
20.1 +	0.3	0.0	0.6	0.5	0.4

Source: Environment Canada

TABLE 8 LEE OF THE ROCKIES REGION – MEAN WIND SPEED

Ventilation Coefficient (m^2/sec x 10^3)	Percentage Frequencies (Mean)				
	Spring	Summer	Fall	Winter	Annual
0 – 1.0	8.6	1.9	12.5	49.7	18.2
1.1 – 2.0	7.9	3.0	10.8	20.0	10.4
2.1 – 3.0	6.8	4.7	8.1	8.5	7.0
3.1 – 4.0	5.8	5.5	8.0	5.2	6.1
4.1 – 5.0	4.5	4.2	5.1	2.4	4.1
5.1 – 6.0	3.6	4.6	5.9	2.4	4.1
6.1 – 7.0	3.6	3.3	5.6	1.0	3.4
7.1 – 8.0	4.9	4.4	3.5	1.9	3.7
8.1 – 9.0	3.5	4.5	3.3	1.1	3.1
9.1 – 10.0	4.0	4.8	3.5	1.7	3.5
10.1 – 11.0	1.9	3.8	3.6	1.0	2.6
>11.1	45.1	55.4	30.0	5.4	34.0

Source: Environment Canada

APPENDIX 1

ENGINEERING DESIGN
CRITERIA

BOILER COMBUSTION CALCULATION for ALBERTA NEWSPRINT COMPANY PACKAGED BOILER

INPUTS

Heat Release	252	GJ/hr
Excess Air	10	percent
Stack Gas Temperature	230	deg C
Ash Discharge Temperature	20	deg C
Ambiant Temperature	20	deg C
Combustion Air Temperature	20	deg C
Combustion Air Humidity	0.010	kg/kg dry air
Radiant & Misc. Losses	1.5	percent
Nominal Steam Enthalpy	2,200	kJ/kg

FUEL: Natural Gas

Fuel Analysis (ash free, dry basis)

Carbon	75.00	percent
Hydrogen	25.00	
Oxygen	0.00	
Sulphur	0.00	
Nitrogen	0.00	
Moisture	0.0	percent
Ash	0.0	percent
Higher Heating Value	51.1	MJ/kg

CALCULATED CONDITIONS

MASS BALANCE (kg/hr)

	in	out
Dry Fuel, Ash Free	4,935	
Water with Fuel	0	
Ash	0	0
Combustion Air	94,738	
Stack Gas		
Carbon Dioxide		13,572
Oxygen		1,974
Nitrogen		72,086
Sulphur Dioxide		0
Water Vapour		12,042
Totals	99,674	99,674

ENERGY BALANCE (MJ/hr)

	in	out
Fuel	252,000	0
Combustion Air	0	0
Dry Stack Gas		18,490
Water Vapour	2,090	31,517
Ash	0	0
Radiant Loss		3,780
Steam (by difference)		200,302
Totals	254,090	254,090

COMBUSTION AIR

Mass Flow	94,700	kg/hr
Volume Flow	1,322	Nm3/min

STACK GAS

Mass Flow	99,700	kg/hr
Volume Flow	1,453	Nm3/min
Volume Flow	2,594	Am3/min
Temperature	230	deg C

% V/V	wet	dry
Oxygen	1.7	2.1
Carbon Dioxide	8.5	10.5
Suphur Dioxide	0.0	0.0
Nitrogen	71.2	87.4
Water	18.5	
Total	100.0	100.0

STEAM GENERATION

Enthalpy	200,300	MJ/hr
Steam Flow	91,000	kg/hr
per kg Dry Fuel	18.4	kg
Thermal Efficiency	79.5	percent

BOILER COMBUSTION CALCULATION for ALBERTA NEWSPRINT COMPANY GLYCOL/WATER HEATER

INPUTS

Heat Release	32	GJ/hr	FUEL: Natural Gas		
Excess Air	20	percent	Fuel Analysis (ash free, dry basis)		
			Carbon	75.00	percent
Stack Gas Temperature	260	deg C	Hydrogen	25.00	
			Oxygen	0.00	
Ash Discharge Temperature	20	deg C	Sulphur	0.00	
Ambiant Temperature	20	deg C	Nitrogen	0.00	
Combustion Air Temperature	20	deg C			
			Moisture	0.0	percent
Combustion Air Humidity	0.010	kg/kg dry air	Ash	0.0	percent
Radiant & Misc. Losses	1.5	percent			
Nominal Steam Enthalpy	2,200	kJ/kg	Higher Heating Value	51.1	MJ/kg

CALCULATED CONDITIONS

MASS BALANCE (kg/hr)

	in	out
Dry Fuel, Ash Free	627	
Water with Fuel	0	
Ash	0	0
Combustion Air	13,124	
Stack Gas		
Carbon Dioxide		1,723
Oxygen		501
Nitrogen		9,986
Sulphur Dioxide		0
Water Vapour		1,540
Totals	13,751	13,751

ENERGY BALANCE (MJ/hr)

	in	out
Fuel	32,000	0
Combustion Air	0	0
Dry Stack Gas		2,950
Water Vapour	290	4,117
Ash	0	0
Radiant Loss		480
Steam (by difference)		24,742
Totals	32,290	32,290

COMBUSTION AIR

Mass Flow	13,100	kg/hr
Volume Flow	183	Nm3/min

STACK GAS

Mass Flow	13,800	kg/hr
Volume Flow	201	Nm3/min
Volume Flow	378	Am3/min
Temperature	260	deg C

% V/V	wet	dry
Oxygen	3.2	3.8
Carbon Dioxide	7.9	9.5
Suphur Dioxide	0.0	0.0
Nitrogen	71.8	86.7
Water	17.2	
Total	100.0	100.0

STEAM GENERATION

Enthalpy	24,700	MJ/hr
Steam Flow	11,200	kg/hr
per kg Dry Fuel	17.9	kg
Thermal Efficiency	77.3	percent

BOILER COMBUSTION CALCULATION for ALBERTA NEWSPRINT COMPANY SMOKELESS BURNER

INPUTS

Heat Release	230	GJ/hr
Excess Air	265	percent
Stack Gas Temperature	550	deg C
Ash Discharge Temperature	600	deg C
Ambiant Temperature	20	deg C
Combustion Air Temperature	20	deg C
Combustion Air Humidity	0.010	kg/kg dry air
Radiant & Misc. Losses	1.5	percent
Nominal Steam Enthalpy	2,200	kJ/kg

FUEL: Wood

Fuel Analysis (ash free, dry basis)

Carbon	54.49	percent
Hydrogen	6.02	
Oxygen	39.39	
Sulphur	0.00	
Nitrogen	0.10	
Moisture	50.0	percent
Ash	2.0	percent
Higher Heating Value	20.1	MJ/kg

CALCULATED CONDITIONS

MASS BALANCE (kg/hr)

	in	out
Dry Fuel, Ash Free	11,456	
Water with Fuel	11,456	
Ash	229	229
Combustion Air	281,093	
Stack Gas		
Carbon Dioxide		22,889
Oxygen		46,777
Nitrogen		213,893
Sulphur Dioxide		0
Water Vapour		20,447
Totals	304,235	304,235

ENERGY BALANCE (MJ/hr)

	in	out
Fuel	230,000	0
Combustion Air	0	0
Dry Stack Gas		156,852
Water Vapour	6,201	66,607
Ash	0	266
Radiant Loss		3,450
Steam (by difference)		9,026
Totals	236,201	236,201

COMBUSTION AIR

Mass Flow	281,100	kg/hr
Volume Flow	3,924	Nm3/min

STACK GAS

Mass Flow	304,000	kg/hr
Volume Flow	4,324	Nm3/min
Volume Flow	12,441	Am3/min
Temperature	550	deg C

% V/V	wet	dry
Oxygen	13.6	15.2
Carbon Dioxide	4.8	5.4
Suphur Dioxide	0.0	0.0
Nitrogen	71.0	79.4
Water	10.6	
Total	100.0	100.0

STEAM GENERATION

Enthalpy	9,000	MJ/hr
Steam Flow	4,100	kg/hr
per kg Dry Fuel	0.4	kg
Thermal Efficiency	3.9	percent

APPENDIX 2

DISPERSION MODEL

SIMULATION

ALBERTA DEPARTMENT OF THE ENVIRONMENT, PRESCRIBED METHOD FOR STACK DESIGN
ALBERTA NEWSPRINT - WHITECOURT (SO2)
PARAMETERS FOR STACK NUMBER 1

STACK HEIGHT = 34.0 M
STACK DIAMETER = 2.100 M
GAS EXIT SPEED = 13. M/S
GAS TEMPERATURE = 230. C
EMISSION RATE = 0.232500 G/S AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE = 2.0 C
STACK DISTANCE = 0. M FROM ORIGIN

PARAMETERS FOR STACK NUMBER 2

STACK HEIGHT = 34.0 M
STACK DIAMETER = 0.850 M
GAS EXIT SPEED = 12. M/S
GAS TEMPERATURE = 260. C
EMISSION RATE = 0.032200 G/S AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE = 2.0 C
STACK DISTANCE = 0. M FROM ORIGIN

PARAMETERS FOR STACK NUMBER 3

STACK HEIGHT = 26.0 M
STACK DIAMETER = 8.500 M
GAS EXIT SPEED = 4. M/S
GAS TEMPERATURE = 550. C
EMISSION RATE = 0.318000 G/S AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE = 2.0 C
STACK DISTANCE = 0. M FROM ORIGIN

AMBIENT TEMPERATURE = 10. C
DIFFUSION WITHIN A MIXING LAYER BENEATH AN ELEVATED INVERSION
INVERSION BASE AT LEVEL OF HIGHEST PLUME OR 100. M, WHICHEVER IS LARGER

TEN-METRE WINDSPEEDS BETWEEN 1.0 AND 20.0 M/S IN INCREMENTS OF 0.5 M/S ARE EXAMINED
FLAT, ROUGH TERRAIN
(SEARCH IS PERFORMED USING EQUAL LOGARITHMIC INCREMENTS OF DISTANCE)
HEIGHT OF TREE CANOPY = 10. M
DISTANCE TO TREE CANOPY = 0. M FROM ORIGIN
OVERALL MAXIMUM TREETOP CONCENTRATION = 0.807 UG/M^3 AS A 1.00 HOUR AVERAGE
DISTANCE OF OCCURRENCE = 437. M
CRITICAL TEN-METRE WINDSPEED = 20.0 M/S
MAXIMUM PERMISSIBLE CONCENTRATION =****** PPM AS A 1.00 HOUR AVERAGE

STACK NUMBER	EFFECTIVE STACK HEIGHT (M)	CONTRIBUTION TO OVERALL MAXIMUM UG/M^3
1	38.	0.510
2	30.	0.100
3	60.	0.197

ALBERTA DEPARTMENT OF THE ENVIRONMENT, PRESCRIBED METHOD FOR STACK DESIGN
ALBERTA NEWSPRINT - WHITECOURT (SO2)
PARAMETERS FOR STACK NUMBER 1

STACK HEIGHT = 34.0 M
STACK DIAMETER = 2.100 M
GAS EXIT SPEED = 13. M/S
GAS TEMPERATURE = 230. C
EMISSION RATE = 0.232500 G/S AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE = 2.0 C
STACK DISTANCE = 0. M FROM ORIGIN

PARAMETERS FOR STACK NUMBER 2

STACK HEIGHT = 34.0 M
STACK DIAMETER = 0.850 M
GAS EXIT SPEED = 12. M/S
GAS TEMPERATURE = 260. C
EMISSION RATE = 0.032200 G/S AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE = 2.0 C
STACK DISTANCE = 0. M FROM ORIGIN

PARAMETERS FOR STACK NUMBER 3

STACK HEIGHT = 26.0 M
STACK DIAMETER = 8.500 M
GAS EXIT SPEED = 4. M/S
GAS TEMPERATURE = 550. C
EMISSION RATE = 0.318000 G/S AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE = 2.0 C
STACK DISTANCE = 0. M FROM ORIGIN

AMBIENT TEMPERATURE = 10. C
DIFFUSION WITHIN A MIXING LAYER BENEATH AN ELEVATED INVERSION
INVERSION BASE AT LEVEL OF HIGHEST PLUME OR 100. M, WHICHEVER IS LARGER

TEN-METRE WINDSPEEDS BETWEEN 1.0 AND 20.0 M/S IN INCREMENTS OF 0.5 M/S ARE EXAMINED

DISTANCE FROM ORIGIN IN METRES	ELEVATION ABOVE ORIGIN IN METRES
1000.	50.00
2000.	150.00
3000.	200.00
5000.	250.00
6000.	300.00
7000.	350.00

HEIGHT OF TREE CANOPY = 10. M
DISTANCE TO TREE CANOPY = 0. M FROM ORIGIN
OVERALL MAXIMUM TREETOP CONCENTRATION = 0.879 UG/M^3 AS A 1.00 HOUR AVERAGE
DISTANCE OF OCCURRENCE = 1000. M
CRITICAL TEN-METRE WINDSPEED = 7.5 M/S
MAXIMUM PERMISSIBLE CONCENTRATION =****** PPM AS A 1.00 HOUR AVERAGE

STACK NUMBER	EFFECTIVE STACK HEIGHT (M)	CONTRIBUTION TO OVERALL MAXIMUM UG/M^3
1	41.	0.501
2	25.	0.077
3	102.	0.301

CIRRUS

ALBERTA DEPARTMENT OF THE ENVIRONMENT, PRESCRIBED METHOD FOR STACK DESIGN
ALBERTA NEWSPRINT - WHITECOURT (NOx)
PARAMETERS FOR STACK NUMBER 1

STACK HEIGHT = 34.0 M
STACK DIAMETER = 2.100 M
GAS EXIT SPEED = 13. M/S
GAS TEMPERATURE = 230. C
EMISSION RATE =67.800000 G/S AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE = 2.0 C
STACK DISTANCE = 0. M FROM ORIGIN

PARAMETERS FOR STACK NUMBER 2

STACK HEIGHT = 34.0 M
STACK DIAMETER = 0.850 M
GAS EXIT SPEED = 12. M/S
GAS TEMPERATURE = 260. C
EMISSION RATE = 6.432000 G/S AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE = 2.0 C
STACK DISTANCE = 0. M FROM ORIGIN

PARAMETERS FOR STACK NUMBER 3

STACK HEIGHT = 26.0 M
STACK DIAMETER = 8.500 M
GAS EXIT SPEED = 4. M/S
GAS TEMPERATURE = 550. C
EMISSION RATE = 3.180000 G/S AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE = 2.0 C
STACK DISTANCE = 0. M FROM ORIGIN

AMBIENT TEMPERATURE = 10. C
DIFFUSION WITHIN A MIXING LAYER BENEATH AN ELEVATED INVERSION
INVERSION BASE AT LEVEL OF HIGHEST PLUME OR 100. M, WHICHEVER IS LARGER

TEN-METRE WINDSPEEDS BETWEEN 1.0 AND 20.0 M/S IN INCREMENTS OF 0.5 M/S ARE EXAMINED

DISTANCE FROM ORIGIN IN METRES	ELEVATION ABOVE ORIGIN IN METRES
1000.	50.00
2000.	150.00
3000.	200.00
5000.	250.00
6000.	300.00
7000.	350.00

HEIGHT OF TREE CANOPY = 10. M
DISTANCE TO TREE CANOPY = 0. M FROM ORIGIN
OVERALL MAXIMUM TREETOP CONCENTRATION = 217.203 UG/M^3 AS A 1.00 HOUR AVERAGE
DISTANCE OF OCCURRENCE = 1000. M
CRITICAL TEN-METRE WINDSPEED = 4.0 M/S
MAXIMUM PERMISSIBLE CONCENTRATION =****** PPM AS A 1.00 HOUR AVERAGE

STACK NUMBER	EFFECTIVE STACK HEIGHT (M)	CONTRIBUTION TO OVERALL MAXIMUM UG/M^3
1	63.	188.814
2	30.	28.363
3	194.	0.026

CIRRUS

ALBERTA DEPARTMENT OF THE ENVIRONMENT. PRESCRIBED METHOD FOR STACK DESIGN
ALBERTA NEWSPRINT - WHITECOURT (Particulate)

PARAMETERS FOR STACK NUMBER 1

STACK HEIGHT = 34.0 M
STACK DIAMETER = 2.100 M
GAS EXIT SPEED = 13. M/S
GAS TEMPERATURE = 230. C
EMISSION RATE = 0.055700 G/S AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE = 2.0 C
STACK DISTANCE = 0. M FROM ORIGIN

PARAMETERS FOR STACK NUMBER 2

STACK HEIGHT = 34.0 M
STACK DIAMETER = 0.850 M
GAS EXIT SPEED = 12. M/S
GAS TEMPERATURE = 260. C
EMISSION RATE = 0.007700 G/S AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE = 2.0 C
STACK DISTANCE = 0. M FROM ORIGIN

PARAMETERS FOR STACK NUMBER 3

STACK HEIGHT = 26.0 M
STACK DIAMETER = 8.500 M
GAS EXIT SPEED = 4. M/S
GAS TEMPERATURE = 550. C
EMISSION RATE = 3.180000 G/S AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE = 2.0 C
STACK DISTANCE = 0. M FROM ORIGIN

AMBIENT TEMPERATURE = 10. C
DIFFUSION WITHIN A MIXING LAYER BENEATH AN ELEVATED INVERSION
INVERSION BASE AT LEVEL OF HIGHEST PLUME OR 100. M, WHICHEVER IS LARGER

TEN-METRE WINDSPEEDS BETWEEN 1.0 AND 20.0 M/S IN INCREMENTS OF 0.5 M/S ARE EXAMINED

DISTANCE FROM ORIGIN IN METRES	ELEVATION ABOVE ORIGIN IN METRES
1000.	50.00
2000.	150.00
3000.	200.00
5000.	250.00
6000.	300.00
7000.	350.00

HEIGHT OF TREE CANOPY = 10. M
DISTANCE TO TREE CANOPY = 0. M FROM ORIGIN
OVERALL MAXIMUM TREETOP CONCENTRATION = 3.660 UG/M^3 AS A 1.00 HOUR AVERAGE
DISTANCE OF OCCURRENCE = 2000. M
CRITICAL TEN-METRE WINDSPEED = 6.0 M/S
MAXIMUM PERMISSIBLE CONCENTRATION =****** PPM AS A 1.00 HOUR AVERAGE

STACK NUMBER	EFFECTIVE STACK HEIGHT (M)	CONTRIBUTION TO OVERALL MAXIMUM UG/M^3
1	41.	0.057
2	24.	0.008
3	105.	3.595

ALBERTA DEPARTMENT OF THE ENVIRONMENT, PRESCRIBED METHOD FOR STACK DESIGN
ALBERTA NEWSPRINT - WHITECOURT (Particulate)
PARAMETERS FOR STACK NUMBER 1

STACK HEIGHT = 34.0 M
STACK DIAMETER = 2.100 M
GAS EXIT SPEED = 13. M/S
GAS TEMPERATURE = 230. C
EMISSION RATE = 0.055700 G/S AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE = 2.0 C
STACK DISTANCE = 0. M FROM ORIGIN

PARAMETERS FOR STACK NUMBER 2

STACK HEIGHT = 34.0 M
STACK DIAMETER = 0.850 M
GAS EXIT SPEED = 12. M/S
GAS TEMPERATURE = 260. C
EMISSION RATE = 0.007700 G/S AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE = 2.0 C
STACK DISTANCE = 0. M FROM ORIGIN

PARAMETERS FOR STACK NUMBER 3

STACK HEIGHT = 26.0 M
STACK DIAMETER = 8.500 M
GAS EXIT SPEED = 4. M/S
GAS TEMPERATURE = 550. C
EMISSION RATE = 3.180000 G/S AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE = 2.0 C
STACK DISTANCE = 0. M FROM ORIGIN

AMBIENT TEMPERATURE = 10. C
DIFFUSION WITHIN A MIXING LAYER BENEATH AN ELEVATED INVERSION
INVERSION BASE AT LEVEL OF HIGHEST PLUME OR 100. M, WHICHEVER IS LARGER

TEN-METRE WINDSPEEDS BETWEEN 1.0 AND 20.0 M/S IN INCREMENTS OF 0.5 M/S ARE EXAMINED
FLAT, ROUGH TERRAIN
(SEARCH IS PERFORMED USING EQUAL LOGARITHMIC INCREMENTS OF DISTANCE)
HEIGHT OF TREE CANOPY = 10. M
DISTANCE TO TREE CANOPY = 0. M FROM ORIGIN
OVERALL MAXIMUM TREETOP CONCENTRATION = 3.310 UG/M^3 AS A 1.00 HOUR AVERAGE
DISTANCE OF OCCURRENCE = 1445. M
CRITICAL TEN-METRE WINDSPEED = 10.5 M/S
MAXIMUM PERMISSIBLE CONCENTRATION =****** PPM AS A 1.00 HOUR AVERAGE

STACK NUMBER	EFFECTIVE STACK HEIGHT (M)	CONTRIBUTION TO OVERALL MAXIMUM UG/M^3
1	48.	0.071
2	32.	0.011
3	96.	3.227

ALBERTA DEPARTMENT OF THE ENVIRONMENT, PRESCRIBED METHOD FOR STACK DESIGN
ALBERTA NEWSPRINT - WHITECOURT (NOx)
PARAMETERS FOR STACK NUMBER 1

STACK HEIGHT = 34.0 M
STACK DIAMETER = 2.100 M
GAS EXIT SPEED = 13. M/S
GAS TEMPERATURE = 230. C
EMISSION RATE =67.800000 G/S AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE = 2.0 C
STACK DISTANCE = 0. M FROM ORIGIN

PARAMETERS FOR STACK NUMBER 2

STACK HEIGHT = 34.0 M
STACK DIAMETER = 0.850 M
GAS EXIT SPEED = 12. M/S
GAS TEMPERATURE = 260. C
EMISSION RATE = 6.432000 G/S AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE = 2.0 C
STACK DISTANCE = 0. M FROM ORIGIN

PARAMETERS FOR STACK NUMBER 3

STACK HEIGHT = 26.0 M
STACK DIAMETER = 8.500 M
GAS EXIT SPEED = 4. M/S
GAS TEMPERATURE = 550. C
EMISSION RATE = 3.180000 G/S AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE = 2.0 C
STACK DISTANCE = 0. M FROM ORIGIN

AMBIENT TEMPERATURE = 10. C
DIFFUSION WITHIN A MIXING LAYER BENEATH AN ELEVATED INVERSION
INVERSION BASE AT LEVEL OF HIGHEST PLUME OR 100. M, WHICHEVER IS LARGER

TEN-METRE WINDSPEEDS BETWEEN 1.0 AND 20.0 M/S IN INCREMENTS OF 0.5 M/S ARE EXAMINED
FLAT, ROUGH TERRAIN
(SEARCH IS PERFORMED USING EQUAL LOGARITHMIC INCREMENTS OF DISTANCE)
HEIGHT OF TREE CANOPY = 10. M
DISTANCE TO TREE CANOPY = 0. M FROM ORIGIN
OVERALL MAXIMUM TREETOP CONCENTRATION = 199.461 UG/M^3 AS A 1.00 HOUR AVERAGE
DISTANCE OF OCCURRENCE = 479. M
CRITICAL TEN-METRE WINDSPEED = 10.5 M/S
MAXIMUM PERMISSIBLE CONCENTRATION =****** PPM AS A 1.00 HOUR AVERAGE

STACK NUMBER	EFFECTIVE STACK HEIGHT (M)	CONTRIBUTION TO OVERALL MAXIMUM UG/M^3
1	48.	167.084
2	32.	32.112
3	98.	0.265

APPENDIX 3

BIOPHYSICAL ASSESSMENT

Whitecourt Newsprint Mill

Environmental Impact Assessment

(Biophysical Studies)

Prepared for:

Nystrom, Lee, Kobayashi & Associates,

Vancouver, B.C.

Prepared by:

D.S. Kerr, E. Gasser and D.A. Young

Environmental Management Associates

Calgary, Alberta

May 1988

ACKNOWLEDGEMENTS

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1.0 INTRODUCTION

On behalf of Alberta Newsprint Co. Ltd., Nystrom, Lee, Kobayashi and Associates is preparing an environmental impact assessment regarding a proposed newsprint mill near the town of Whitecourt, Alberta. The Chemi-thermomechanical mill will be located on a 200 hectare site approximately 8 km upstream of the town of Whitecourt along the North bank of the Athabasca River.

Environmental Management Associates (EMA) was retained to undertake the biophysical (terrain, soil, vegetation and wildlife) section of the environmental impact assessment. The study area encompasses the mill site, rail line, access road, power line, and gas and water lines within the site. The evaluation of the forested area from which timber will be cut to supply the mill is not considered in this report.

Other aspects of the biophysical environment related to air quality, meteorology, noise and river water quality were to be covered by others.

2.0 TERMS OF REFERENCE

The terms of reference for this study covered the following items:

a. A description of the important relevant elements of the existing environment related to soils, vegetation and wildlife on site and for the rail line, access road, power line, and gas and water lines in the site proper.

   ANC's has stated that its objective, where feasible, is to leave as large a tree buffer as possible. Consistent with this objective, the extent and location of the buffer must also meet safety and good operating practice criteria and provide for effective siting of the mill facilities and access to the site.

b. Woodland caribou were specifically considered within the wildlife evaluation.

c. A description of the potential significant environmental impact for each of the above elements, and recommend practical mitigative measures to offset or minimize negative effects arising from the construction and operational phases of the project.

For the off-site work, as agreed with Alberta Environment, the Environmental Impact Assessment will be limited to the wildlife component only for the infrastructure i.e.; access road, rail line, bridge crossing, power and gas line routes from the existing line facilities to the mill site. The evaluations of the woodlands areas will be considered separately under the Alberta Forest Service approach to operations under a Forest Management Agreement.

3.0 EXISTING ENVIRONMENT

3.1 SURFICIAL GEOLOGY

The study area is located on a broad alluvial terrace within the Athabasca River Valley. It is characterized by a level to gently undulating surface comprised of coarse gravel extending to a depth in excess of 20m (Peterson 1980). Subrounded quartzite clasts make up over 80 percent of the gravel size material which is held within a sandy clay matrix. Locally, the terrace is overlain by up to 2m of fine grained sand resulting from overbank deposition during flood periods. An inspection of the gravel pits in the vicinity reveals that this sequence is repeated at depth, as discontinuous, fine grained sand and silty clay seams occur throughout the deposit. The coarse grained texture of the deposit allows rapid drainage resulting in a depression of the water table to a depth of 10m (Peterson 1980).

Within the northwest margins of the study area, the topography becomes locally more hummocky, marking the transition of a discontinuous ground moraine overlying the gravel terrace. A distinctive mosaic of non-sorted clay, sands and gravels occur which affords microtopographic variations in relief and drainage conditions. At this point, the vegetation changes abruptly from jack pine to a mixture of aspen and white spruce.

In the vicinity of the mill site, the north bank of the Athabasca River is marked by a steep slope of approximately 40 to 60 percent. The top of the bank is approximately 20m above low water level. Despite the marked steepness of the slope, there is little evidence of slumping or underbank cutting and erosion is limited to surface creep and local slope wash. The relatively stable nature of the slope is attributed to the linear nature of the river bank at this stretch of the river and a natural gravel armouring at the river's edge.

3.2 SOILS

Soils within the study area are a function of parent material, topographic position, aspect, vegetation and drainage conditions. The Athabasca River valley has contributed a variety of parent materials in the form of alluvial terraces and aeolian veneers. A further parent material has resulted from the deposition of glacial ground moraine on the upland margins of the alluvial terrace. Within this mosaic of parent materials, three distinctive soil types can be recognized.

The dominant soil has developed from an aeolian (wind blown) veneer overlying the main gravel terrace on the north bank of the Athabasca River. It is well to rapidly drained and can be classified as an Eluviated Eutric Brunisol (Canadian System of Soil Classification 1987) on the basis of a well-developed, coarse, sandy Bm horizon underlying an eluvial or leached Ae horizon (Table 1). The Ae horizon varies in thickness from 2 to 7 cm but is of a uniform fine sand to sandy loam texture. The B horizon is characterized by a mixture of coarse, subrounded gravelly and cobbly fragments held within a coarse, sandy matrix which is high in base saturation (Table 1). The underlying C horizon or parent material is typically moderately to strongly calcareous and again is composed of a high percentage of gravel and cobble material. A lack of any organo-mineral horizon, apart from a partly decomposed litter layer, combined with a low soil moisture retention severely limits the understory vegetation of such soils to bearberry, lichen and a few grass species. This soil can be correlated to the Heart Soil series as mapped by Wynnyk et al. (1969).

Soils developing under fine-textured ground moraine typically reflect deeper soil profiles and greater moisture

TABLE 1
SOIL PROFILE DESCRIPTION OF AN ELUVIATED EUTRIC BRUNISOL

HORIZON	DEPTH (CM)	DESCRIPTION
L-H	5-0	Loose pine needles, lichen and semi-decomposed organic matter; abrupt, smooth boundary
Ae	0-4	Light yellowish brown (10YR 6/4 m); fine sand to sandy loam; weak, fine platy; many fine and coarse roots; abrupt, wavy boundary
Bm	4-28	Strong brown (7.5YR 5/8 m); coarse sand; single grain; loose; few medium and coarse roots; 50% subrounded gravelly and cobbly coarse fragments; irregular, wavy boundary
Cca	28-97+	Light brown (7.5YR 6/4 m); coarse to moderately fine sand; single grain, loose, very few coarse roots; 80% subrounded cobbly coarse fragments; moderate to strongly calcareous

SELECTED CHEMICAL ANALYSIS

HORIZON	PARAMETER								
	% Sand	% Silt	% Clay	Texture Class	pH	C.E.C.	TOT.C	TOT.N.	C:N Ratio
L-H	-	-	-	organic	4.6	-	19.8	0.436	45.4
Ae	60.6	8.4	31.0	Sl	6.0	12.2	2.28	0.239	9.53
Bm	57.6	10.4	32.0	Sl	5.0	10.8	2.68	0.238	11.30
Cca	11.6	36.4	52.0	SicL	7.9	2.2	0.33	0.19	17.70

retention. Within the northwest margins of the study area, the dominant soil is a Brunisolic Gray Luvisol, characterized by a thin mineral Ahe horizon overlying clay-rich Bt horizons (Table 2).

The profile reflects greater organic matter accumulation at the surface where a well-developed LFH litter layer is composed of aspen leaf and grass detritus. The humified, silty loam Ahe horizon serves to hold moisture which generally promotes a more mesic soil environment for a diversity of understory species. Soil drainage is variable within the more hummocky terrain, however, it is generally well developed and the soil profile reflects the downward translation of clay materials and accumulation in the Bt horizons. The B horizon is immediately distinguishable from that of the previous soil by having a distinctive blocky to subangular structure which is a function of the cohesion of soil aggregates provided by a larger percentage of clay. Two Bt horizons can be identified within the soil profile on the basis of differences in clay content and structure. A Bm horizon, consisting of sandy clay loam lenses overlies the calcium-rich parent material. This soil can be correlated to the Clouston complex soil series (Wynnyk et al. 1969).

The third soil occupies the low-lying river flats and benches occurring adjacent to the Athabasca river in the southeast portion of the study area. No attempt has been made to classify these soils beyond the general description of alluvium, however, the general characteristics are of a sandy to silt loam texture deposited in a sequence of layers which reflect overbank flood events. These soils are generally moderately well drained, however, low-lying depressions may be poorly drained and in some cases may support organic soils.

TABLE 2
SOIL PROFILE DESCRIPTION OF A BRUNISOLIC GRAY LUVISOL

HORIZON	DEPTH (CM)	DESCRIPTION
LFH	8-0	Semi-decomposed deciduous leaf and surface litter; moderately well humified in the lower portion; abrupt, smooth boundary
Ahe	0-3	Dark grayish brown (10YR 4/2 m); silty loam; weak, medium platy to moderate, fine subangular blocky; very friable; non-sticky, non-plastic; abundant, fine and medium roots; clear, smooth boundary
Bt1	3-16	Yellowish brown (10YR 5/6 m); loam; moderate, medium subangular blocky; firm; slightly sticky; non-plastic; many fine and medium roots, few coarse roots; gradual, smooth boundary
Bt2	16-34	Yellowish brown (10YR 5/6 m); clay loam; moderate coarse subangular blocky; clay skins on ped surfaces; firm; sticky; non-plastic; few medium and coarse roots; abrupt, wavy boundary
Bm	34-78	Strong brown (7.5YR 5/6 m); sandy clay loam; weak, coarse subangular blocky; friable; non-sticky, non-plastic; very few coarse roots; 20% coarse gravelly fragments; irregular, wavy boundary
Cca	78-103+	Light yellowish brown (10YR 6/4 m); sandy loam; very weak, coarse subangular blocky to massive; very friable; non-sticky, non-plastic; 35% coarse gravelly to cobbly fragments.

TABLE 2 (Continued)

SELECTED CHEMICAL ANALYSIS

HORIZON	PARAMETER								
	% Sand	% Silt	% Clay	Texture Class	pH	C.E.C.	TOT.C	TOT.N.	C:N Ratio
LFH	-	-	-	Organic	6.1	-	43.5	0.479	90.8
Ahe	47.6	19.4	33.0	L	6.7	13.6	2.15	0.193	11.1
Bt1	33.6	25.4	41.0	L	6.7	10.5	0.44	0.024	18.0
Bt2	41.6	18.4	40.0	L	7.1	10.7	0.78	0.059	13.2
Bm	73.6	11.4	15.0	Sl	7.9	7.5	0.24	0.024	9.83

3.3 VEGETATION

The study area forms part of the Boreal Mixedwood ecoregion as described by Strong and Leggat (1981); an ecoregion can be considered as an area recognized and delineated on the basis of regional climate as expressed by the vegetation. It is characterized by deciduous aspen and balsam poplar forests, intermixed with extensive tracts of white and black spruce coniferous forests. The region has a low energy climate, with short winter days and long summer days. Despite the length of summer days, potential solar energy available at the ground surface is low. Within the moist mixedwood subregion, mean summer temperatures range from 10.5 to 13.5^{o} C, with a mean frost free period of 85 days. The mean summer precipitation is about 320 mm, with a range of 300 to 380 mm. The majority of the rainfall occurs in July, reflecting the influence of the mid-Alberta storm track.

Within the immediate river valley, three broad vegetation associations can be recognized. The hummocky topography occupying the northwestern margins of the study site is characterized by a mix of mature aspen and white spruce. Aspen trees reach a height of 15-22 m, with average stem diameters of 25-35 cm. Canopy diversity is added by silver birch and a minor component of balsam poplar, however, the overall impression is one of a mature to over-mature aspen canopy supporting regeneration by white spruce. In many instances aspen trees have broken over, with a resultant decrease in the canopy closure and greatly increased amount of deadfall. The understory is dominated by willow, red-osier dogwood, wood's rose, fireweed and brome grass. Where the canopy cover is particularly dense, bunchberry and various wintergreen species are common.

The gravel terrace which dominates the study site is composed of a near uniform stand of jack pine, interspersed with white spruce. Such stands are typical of well to rapidly drained sandy deposits throughout the Boreal Mixedwood ecoregion. It is particularly common along gravel terraces within the Athabasca and McLeod River Valleys. Ericaceous shrubs such as blueberry, bearberry and crowberry dominate the understory with lichens comprising the immediate ground cover. Jack pine stands provide a moderately closed canopy cover of between 60 to 80 percent where trees range from 10 to 18 m in height; these trees have an average stem diameter of 15 to 20 cm. The uniformity of tree species and level to undulating topography is in marked contrast to the previously described vegetation association.

A third vegetation type is recognized on the basis of restricted drainage conditions where an elevated water table favours the establishment of white spruce. This type occurs within the gravel terrace where a minor topographic depression can be recognized by a gradual transition of jack pine to white spruce. Such sites vary in areal extent within the gravel terrace and add diversity to an otherwise uniform jack pine stand.

The immediate river banks support an understory similar to that of aspen-white spruce association; it is, however, characterized by an increased component of willows, red-osier dogwood and fireweed. Wolf willow and bearberry in particular are more conspicuous beneath a generally open canopy.

3.4 ECOLOGICAL LAND CLASSIFICATION

3.4.1 Approach

In order to provide a framework within which environmental impacts can be more readily evaluated, the techniques of ecological land classification were adopted. This involves the integration of landform, soil and vegetation elements of the study area through the identification and mapping of homogeneous land units or habitat types (Environmental Conservation Service Task Force 1981). Map units were delineated from the interpretation of 1983, 1:15000 scale aerial photographs, complemented by limited ground truthing.

Three broad land systems were subdivided into a total of twelve habitat types on the basis of uniformity of surficial materials, slope characteristics, soil type, vegetation association and drainage characteristics (Table 3). Such uniformity in characteristics has implications for wildlife utilization as map units often reflect a functional relationship between habitat characteristics and wildlife utilization. In impact assessment, map units can be considered the product of various geomorphic processes and can be expected to react in more or less predictable ways to extraneous inputs such as during site clearing, grading and construction. This allows impact assessment to be compiled on a map unit basis and subsequently to assign various terrain sensitivity ratings which can be used to recommend mitigation measures if necessary. The objective in utilizing this approach is to provide an integrated study design which addresses the range of biophysical concerns in an encompassing, concise fashion.

3.4.2 Ecosite Descriptions

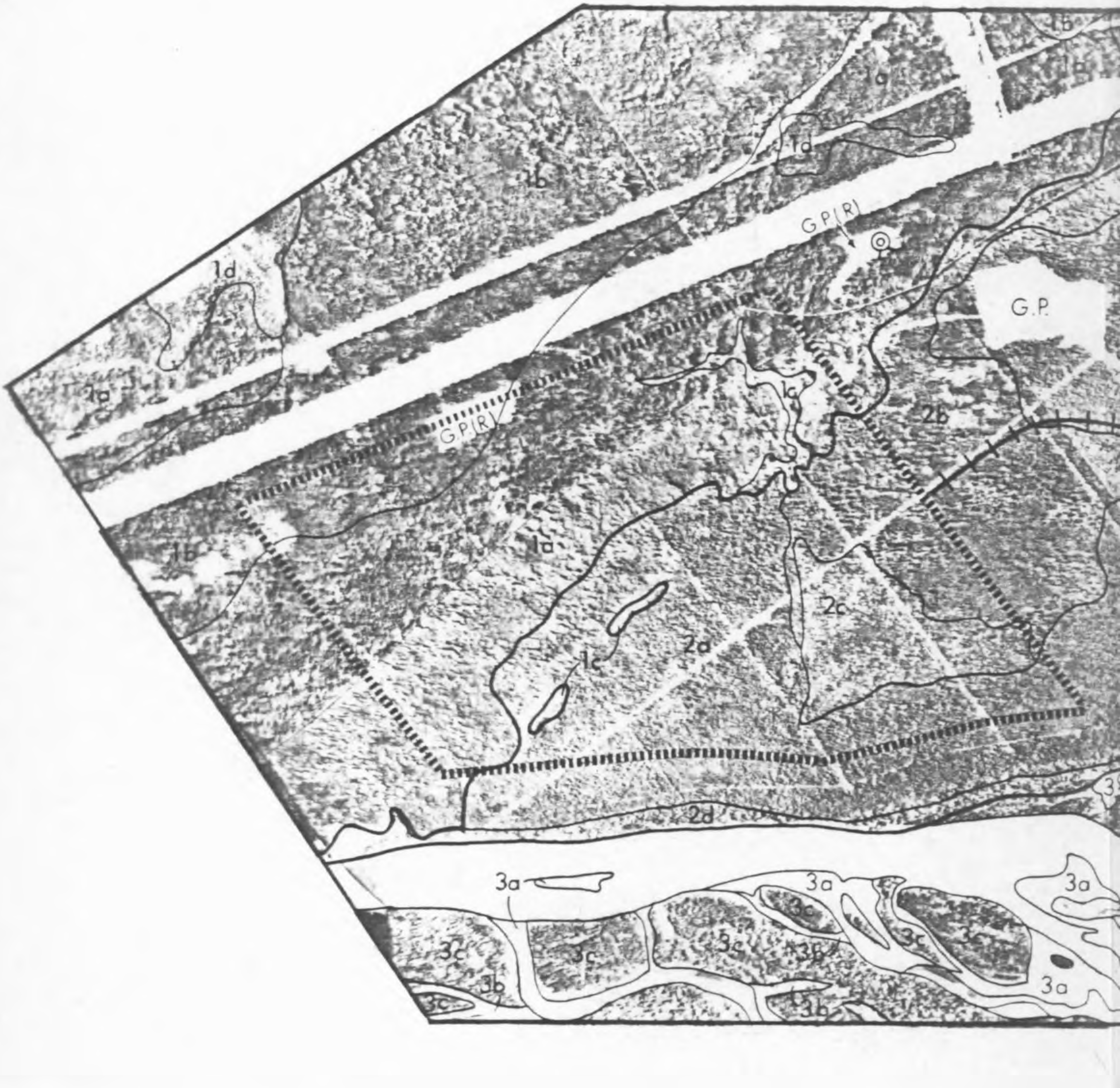
Within the Athabasca River Valley, three broad land systems can be identified: Ground Moraine, Alluvial Terrace and Alluvial Floodplain. Subdivisions of the these areas were based on differences in topography, vegetation, soils and drainage conditions (Figure 1, Table 3).

The ground moraine land system consists of discontinuous blanket of glacial till occurring primarily in the northwestern margin of the study area. Land type 1a consists of rolling to hummocky terrain supporting a mix of mature aspen and white

TABLE 3

AN ECOLOGICAL LAND CLASSIFICATION
OF THE MILL SITE AND ACCESS CORRIDORS

LAND REGION			BOREAL MIXEDWOOD			
LAND DISTRICT			ATHABASCA RIVER VALLEY			
LAND SYSTEM		I GROUND MORAINE		II ALLUVIAL TERRACE		III ALLUVIAL FLOODPLAIN
LAND TYPES	1a	Rolling - hummocky Aspen - White spruce Brunisolic Gray Luvisol Moderate to well drained	2a	Gently undulating Jack pine - bearberry Eluviated Eutric Brunisol Well to rapidly drained	3a	Level - undulating Sparsely vegetated sand flats Orthic Regosol Rapidly drained
	1b	Rolling Upland Aspen - fireweed Orthic Gray Luvisol Well drained	2b	Undulating Jack pine - White spruce Eluviated Eutric Brunisol/ Orthic Eutric Brunisol Well drained	3b	Level - undulating Willow complex Cumulic Regosol Well to moderately well drained
	1c	Depressional seepage sites Willow - sedge Gleyed Gray Luvisol Imperfect to poorly drained	2c	Low-lying depressions Black spruce - Jack pine, Dystric Eutric Brunisol/ (locally peaty phase Eluviated Eutric Brunisol) Imperfect to moderately well drained	3c	Undulating lower floodplain White spruce - aspen - willow Orthic Eutric Brunisol Imperfect to moderately well drained
	1d	Level - depressional Black spruce - sphagnum Terric Mesisol Poorly drained	2d	River bank Sparce white spruce - aspen willow Eroded soil complex Rapidly drained (Note: 2d' identifies former bank separating upper and lower terraces)	3d	Undulating upper floodplain White spruce - Jack pine Eluviated Eutric Brunisol - Dystric Eutric Brunisol Rapidly drained



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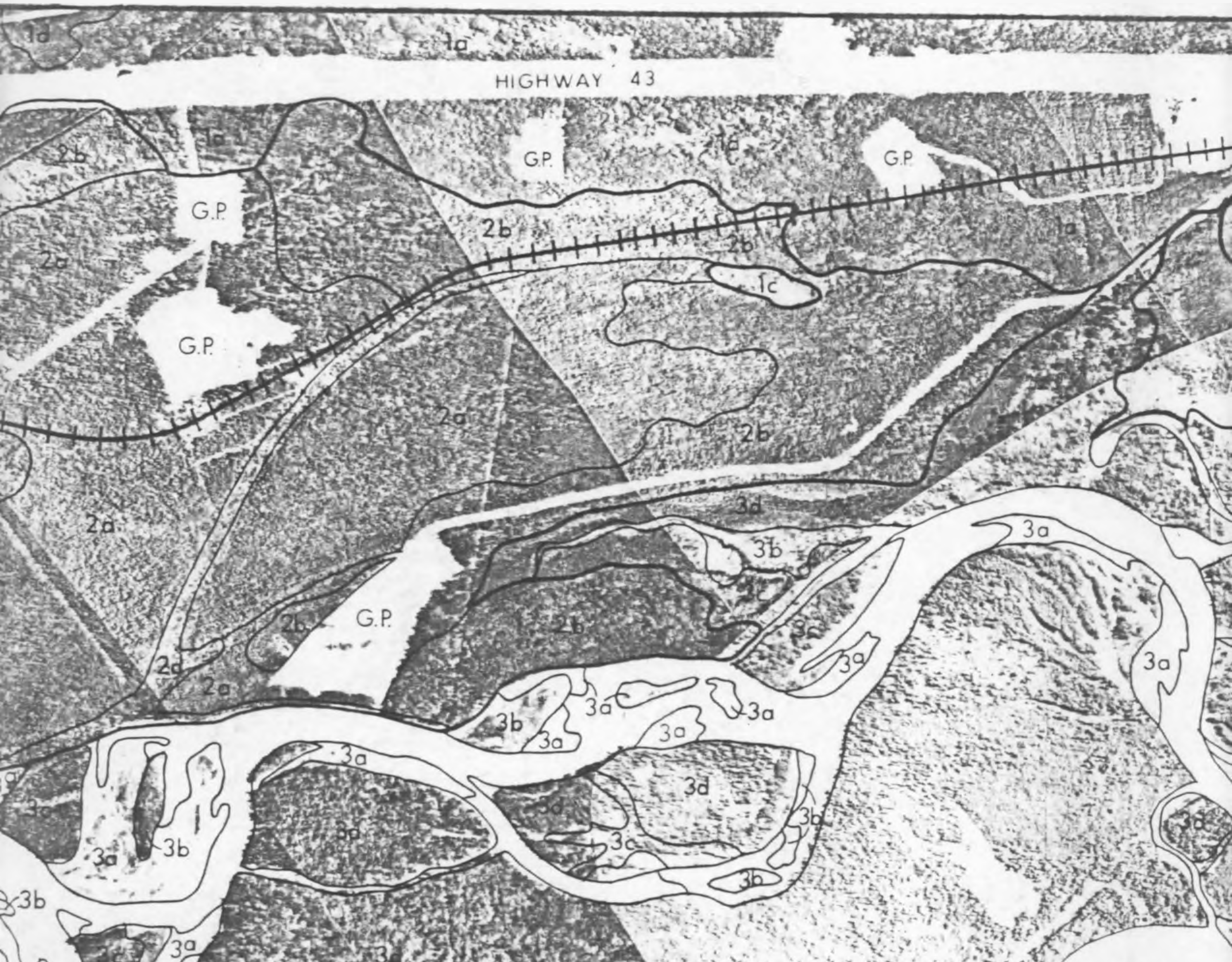
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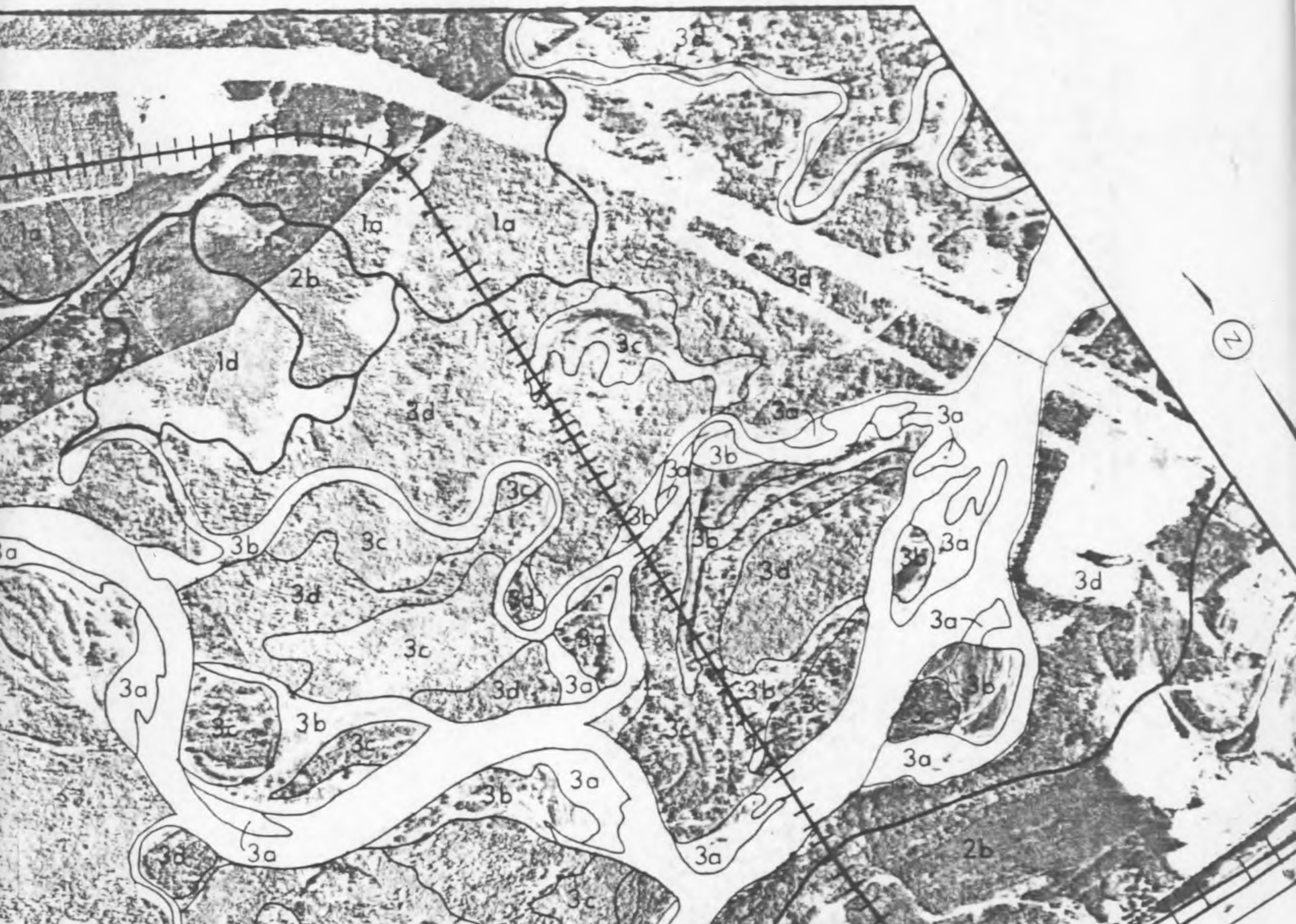

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OF THE

LAND REGION			
LAND DISTRICT			
LAND SYSTEM		I GROUND MORAINE	
	1a	Rolling - hummocky Aspen - White spruce Brunisolic Gray Luvisol Moderate to well drained	2a
LAND TYPES	1b	Rolling Upland Aspen - firewood Orthic Gray Luvisol Well drained	2b
	1c	Depressional seepage sites Willow - sedge Gleyed Gray Luvisol Imperfect to poorly drained	2c
	1d	Level - depressional Black spruce - sphagnum Terric Mesisol Poorly drained	2d

G.P Gravel Pit

G.P.(R) Reclaimed Gravel Pit

Proposed Rail Line

Existing Rail Line

Development Site

Archery Range

E

M

AN ECOLOGICAL LAND CLASSIFICATION
OF THE MILL SITE AND ACCESS CORRIDORS

BOREAL MIXEDWOOD

ATHABASCA RIVER VALLEY

) MORAINE		II ALLUVIAL TERRACE		III ALLUVIAL FLOODPLAIN
- hummocky White spruce lic Gray Luvisoi e to well drained	2a	Gently undulating Jack pine - bearberry Eluviated Eutric Brunisol Well to rapidly drained	3a	Level - undulating Sparsely vegetated sand flats Orthic Regosol Rapidly drained
Upland firewood Gray Luvisol ained	2b	Undulating Jack pine - White spruce Eluviated Eutric Brunisol/ Orthic Eutric Brunisol Well drained	3b	Level - undulating Willow complex Cumulic Regosol Well to moderately well drained
ional seepage sites - sedge Gray Luvisol ct to poorly drained	2c	Low-lying depressions Black spruce - Jack pine, Dystric Eutric Brunisol/ (locally peaty phase Eluviated Eutric Brunisol) Imperfect to moderately well drained	3c	Undulating lower floodplain White spruce - aspen - willow Orthic Eutric Brunisol Imperfect to moderately well drained
depressional pruce - sphagnum Mesisol drained	2d	River bank Sparce white spruce - aspen willow Eroded soil complex Rapidly drained (Note: 2d' identifies former bank separating upper and lower terraces)	3d	Undulating upper floodplain White spruce - Jack pine Eluviated Eutric Brunisol - Dystric Eutric Brunisol Rapidly drained

l Pit

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ECOLOGICAL LAND CLASSIFICATION OF THE MILL SITE AND ACCESS CORRIDORS

ENVIRONMENTAL MANAGEMENT ASSOCIATES

spruce. Soils are predominantly Brunisolic Gray Luvisols and are well to moderately well drained. Approximately 40 percent of the mill site is located within this land type (Figure 1). Land type 1b comprises the highest elevation within the study area and is characterized by a dominant aspen vegetation cover and Luvisolic soils which have developed from more extensive, clay-rich till material. Land types 1c and 1d account for depressional seepage sites, ephemeral drainage channels and more extensive peat deposits. Within the mill site, a few depressional sites (land type 1c) mark the outline of a relic drainage channel orientated from northeast to southwest.

The alluvial terrace land system is comprised of a series of level to gently undulating surfaces where vegetation differences mark variations in drainage conditions and soil characteristics. Two distinctive terraces are separated by a former river bank to the southeast of the mill site. Although they differ in elevation, they are mapped within the same land type (2a) due to similar parent materials and uniform vegetation cover of jack pine-bearberry. The soil profile consists of a thin, eluviated, mineral topsoil, developing within an aeolian veneer which overlies extensive cobble and gravel material. A noticeable feature of this land type is the rapid drainage of such coarse-textured material. This land type comprises approximately 30 percent of the mill site. Land type 2b differs from the previous land type in that white spruce adds diversity to the forest canopy. Drainage is not as rapid in this type and the topography is generally more varied. Within the terrace surface, minor topographic depressions are capped by a veneer of clay which sufficiently restricts drainage conditions to allow the development of a black spruce-jack pine vegetation association. This land type (2c) occurs in the southeast portion of the mill site area and occupies approximately 15 percent of that area. Although the surface organic layer is more well developed and soil moisture conditions are improved, soils remain primarily Brunisolic.

The alluvial floodplain consists of the instream islands, braided channels and immediate river banks adjacent to the Athabasca River. To the southeast of the mill site, the proposed rail line crosses the floodplain in the vicinity of the existing Highway 43 road bridge. The characteristics of the crossing point are mapped and described in Figure 1. Land type 3a consists of the most recently deposited sands and silts along the riverbank and channel margins. As vegetation becomes established, the successional sequence can be followed through land types 3b, 3c, and 3d which reflects the gradual increase in elevation, improvement in drainage conditions and progressions in vegetation succession.

4.0 WILDLIFE

4.1 METHODOLOGY

A thorough review of all available literature was conducted for the Whitecourt area. This included relevant government documents (Provincial and Federal), University theses, journals and related impact assessments for adjacent developments. In addition, key government personnel were interviewed to document their knowledge of the wildlife resources of the area, concerns regarding the development and recommendations for mitigation. A list of those persons contacted is provided in Appendix 1. Mr. G. Swarren, owner of the registered trapline encompassing the mill site, was also interviewed.

A site reconnaissance was conducted on March 24, 1988 to obtain information on habitat types present and relative use by wildlife of each type. Observations of wildlife signs, food sources and integrity of the site were recorded for each habitat type present as well as along the Athabasca River. This limited survey provided sufficient information to determine which wildlife species might use the site and to predict impacts on these species arising from site construction and operation. Mitigation measure selection was considered in light of the topography and vegetation present, and the specific needs of the wildlife species of concern.

4.2 WILDLIFE SPECIES

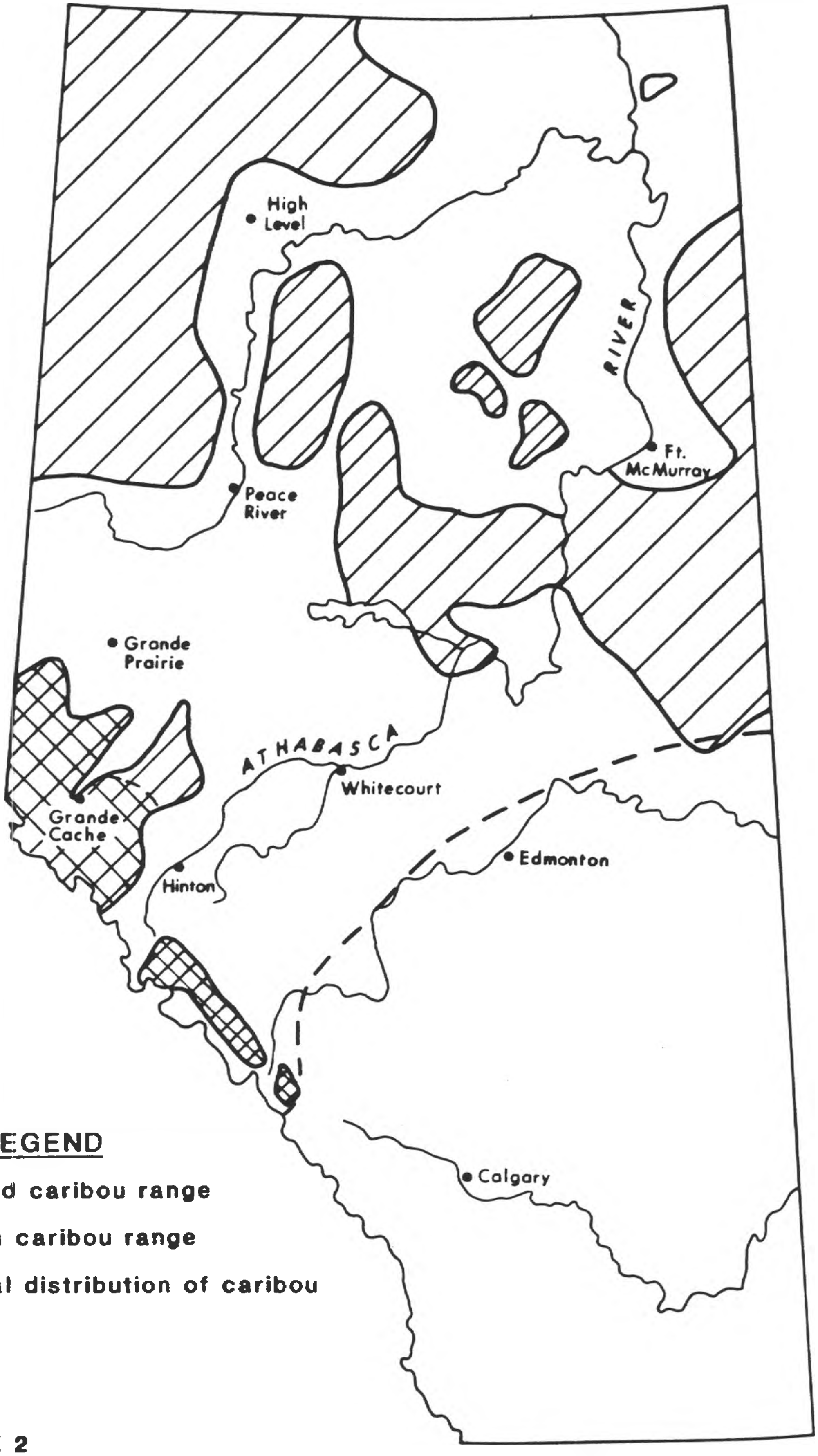
4.2.1 Ungulates

The proposed mill site is located within an area designated as a key ungulate habitat zone by Alberta Fish and Wildlife (J. Taggart pers. comm.). Such zones are known to contain higher than average densities of ungulates. Canada Land

Inventory rates the area as $3W_F$ (Environment Canada 1973). Lands in this class have moderately high capability for ungulate production, however, slight limitations are present due to characteristics of the land that affect the quality or quantity of habitat. Lands in class 3W are those in which animals from surrounding areas depend on for winter habitat.

Four species of ungulates currently use the study site; moose, wapiti or elk, mule deer and white-tailed deer. Woodland caribou were distributed continuously throughout the mixed coniferous and boreal forest zones prior to the 1900's and occurred historically at the site (Edmonds 1986). Since the early 1900's, however, woodland caribou numbers and distribution have declined substantially. The nearest herds now exist over 60 kilometers west of Whitecourt in the Grande Cache/Willmore area (approximately 40 animals) and 140 kilometers north in the Lesser Slave Lake/Chisholm area (approximately 72 animals) [Figure 2]. Approximately 600 to 800 animals were recorded in the Swan Hills/West of Slave Lake area by Stelfox (1966), however, there have been no recent sightings of this group recorded.

Alberta Fish and Wildlife Division aerial ungulate census surveys do not currently include the study site due to the thick timber which reduces animal visibility (K. Smith pers. comm.). However, survey results for moose in WMU's 350 and 346, north and south of the site, suggest an average of 0.9 to 1.3 moose per square kilometre over the entire area (K. Smith pers. comm.)(Figure 3). Moose numbers within the study site and east and west along the Athabasca River may locally be higher than this due to a reduced predation pressure from wolves which appear to avoid the proposed mill site area due possibly to the influence of Highway 43 (G. Swarren pers. comm.). Elimination of wolf predation is known to produce local increases in moose populations in areas until habitat or some other environmental factor limits the population (Bergerud et al. 1983). Reduced hunting pressure



LEGEND

Woodland caribou range

Mountain caribou range

Historical distribution of caribou

FIGURE 2

Current knowledge of caribou distribution within Alberta (After Edmonds 1986).

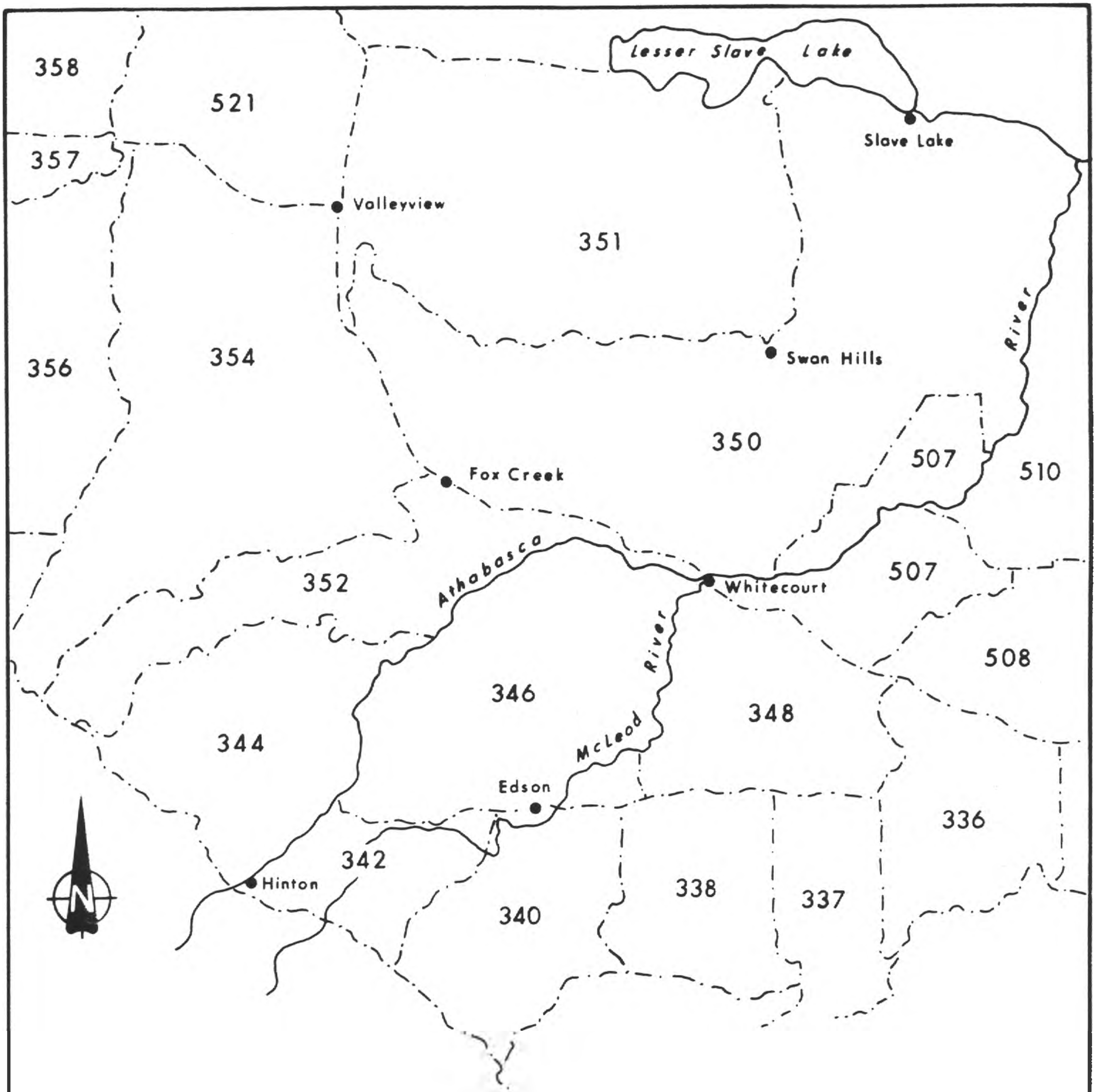


FIGURE 3

Location of wildlife management units in central Alberta.

may also contribute to increased moose density at the study site (D. England, pers. comm.). The island complex within the Athabasca River between the study site and Whitecourt (land type 3b and 3c) also maintains a local concentration of moose, possibly as high as 1.9 - 2.5 moose per square kilometre or more (J. Taggart, pers. comm.).

Moose prefer more open mixed wood forest and subclimax forest with good shrub growth (Krefting 1974) as well as shrub patches in open areas such as cutlines, road allowances and riverbanks. Site reconnaissance revealed greater utilization of open mixed wood and aspen stands such as those within land type 1a and 1b, as well as along cutlines and in forest immediately adjacent to the road allowance and the river bank. Moose utilization was recorded to a lesser extent in the heavy conifer areas (land type 2a and 2b). This may be expected in this habitat during late winter as snow depths are less in this habitat; snow depth influences movement and habitat selection in late winter (Krefting 1974).

A small herd of 20-25 elk occur in the area and make some use of the study site (J. Taggart, pers. comm.). Evidence of elk was recorded during the site reconnaissance in aspen and mixed forest areas (particularly land type 1a) as well as in grassy clearings and along the Highway 43 road allowance. This herd is known to wander along the Athabasca River right to the edge of Whitecourt but is more concentrated to the north of Highway 43 and west of the study site, often in the neighborhood of Chickadee Creek to the west (J. Taggart, G. Swarren pers. comm.).

Population estimates for deer are not available from the Fish and Wildlife Division due to the difficulty in obtaining accurate survey information in heavy coniferous forest cover (K. Smith pers. comm.). However, both species are known to occur at the site in about equal numbers (K. Smith, G. Swarren, pers.

comm.). There is a local concentration of deer around the Whitecourt area which extends to the study site (J. Taggart, K. Smith, pers. comm.). Evidence of deer use was recorded in all habitats on site and with more frequency than other ungulates. jack pine forest stands (land type 2a and 2b), however, exhibit less use than other habitats. White-tailed deer can be expected to use forest openings at the site (K. Smith pers. comm.) such as clearcut areas and cutlines. Mule deer prefer more rugged sites and are expected to occur in the mixed wood and conifer habitats. South-facing slopes along the Athabasca River are also important for deer (K. Smith pers. comm.) and use can be expected in such habitat as well.

4.2.2 Furbearers

The study site encompasses habitat suitable for most furbearers in the family Mustelidae (wolverine, fisher, marten, mink, river otter, short-tailed and least weasel); Canidae (coyote, wolf, red fox); Ursidae (grizzly bear, black bear); Felidae (cougar, lynx); as well as beaver, muskrat and red squirrel.

Aquatic Furbearers

Beaver are plentiful along the Athabasca River and its tributaries (J. Taggart, G. Swarren pers. comm.), although populations tend to fluctuate with trapping pressure. Trappers will trap them to very low levels when prices are high (as in 1986/87), however, populations recover swiftly when trapping pressure is reduced (D. England, pers. comm.). Evidence of beaver activity (cut aspen and willow) is present on the north bank of the Athabasca River at the mill site despite the steep slope of that shoreline. Greater use no doubt occurs on the midstream islands and along the more gently sloping south bank of the Athabasca River.

Mink numbers in the area appear to be variable. Evidence of mink in the area was scarce four years ago but the population is showing signs of rebuilding at present (G. Swarren, pers. comm.). Mink can be expected to use the river/forest edge at the site.

Otter were formerly nearly extinct in the Whitecourt area (J. Taggart pers. comm.). Recent sightings, however, suggest they are now a locally rare species (J. Taggart, pers. comm.) and a few have been accidentally caught by trappers along the rivers in the area within the last few years (D. England, pers. comm.). One pair of otter was recorded in 1986/87 between the proposed mill site and the town of Whitecourt (G. Swarren, pers. comm.).

Muskrat also occur in the Athabasca River but are much more abundant in the marshes and lakes of the Whitecourt District (D. England, pers. comm).

Terrestrial Furbearers

Of the terrestrial furbearers occurring on site, red squirrel, coyote, short-tailed weasel, least weasel, marten and black bear are the most common. The mixed wood and conifer forest stands provide excellent habitat for red squirrel and the site reconnaissance survey confirmed their occurrence; land type 1a was particularly well used. Coyote are currently fairly numerous in the area and the site is regularly used by this species (G. Swarren pers. comm.). Both species of weasel also can be expected in the site vicinity in good numbers.

Marten tend to exhibit a patchy distribution in the Whitecourt area (D. England, pers. comm.) which is typical for the species (Hawley and Newby 1957). They are, however, locally quite numerous at the study site. This area and the forest north of

Highway 43 and south of the Athabasca River (for at least 8 km east and west of the proposed mill site) contains some of the best marten populations in the local Whitecourt Area (G. Swarren, pers. comm.). Some fluctuations in population size have occurred, but marten appear to have always been present around the study site even in years characterized by lower regional populations. Marten can be expected to make use of all forest types on site, concentrating in the oldest growth conifer stands, such as occurs within land type 2a.

Black bear are, at present, very common in the Whitecourt area, occurring at the site, in all habitat types and along the Athabasca River. They are particularly prevalent in the spring when they seek washed up carcasses for food along the river banks. Occasionally they also enter the townsite itself (D. England, pers. comm.). The current management strategy for black bear is to reduce their population as they are purported to be taking a high toll of young ungulates. An average of 6 animals per year are trapped and removed from the townsite area and hunters are issued two tags per license to encourage the harvest in the area (D. England, pers. comm.). The high harvest close to town likely results in young bears moving into the area in search of unoccupied territory with the result that some bear use may always be present at the site.

Lynx are not currently common in the Whitecourt area. This, however, is not due to lack of habitat but rather to fluctuations in their prey population. The peak in the lynx cycle was achieved in 1982/83, with the low occurring at present (K. Smith, pers. comm.). Populations should begin to recover gradually. When populations are high, lynx have been recorded around the site but most animals have been transients (G. Swarren, pers. comm.).

Wolves are fairly common in the Whitecourt area, ranging to within a few kilometers of the town itself (J. Taggart, pers. comm.). However, the forest between Highway 43 and the Athabasca River appears to be little used, possibly as a result of disturbance from traffic. Wolf tracks are not common around the study site (G. Swarren, pers. comm.).

Several species of furbearers are relatively rare around Whitecourt and, although they do occasionally occur in the general area, are expected only as very rare transients at the study site. In decreasing order of likelihood of occurrence, they are: fisher, cougar, grizzly bear, red fox and wolverine (D. England, J. Taggart, K. Smith, G. Swarren, pers. comms.).

4.2.3 Raptors

Many raptors have experienced population declines as a result of pesticides, unwarranted killing and loss of habitat. Most are considered vulnerable species and some are sensitive to disturbance on nest sites.

The study area potentially could harbour representatives of 16 species either as transients (4) or potential nesters (12) (Table 4). Of these species, the most likely to occur on site are the Northern Goshawk, Red-tailed Hawk, Osprey, Great Horned Owl, and Rough-legged Hawk, the latter being a spring and fall migrant only. Of these species, Ospreys are of most concern since their known nesting areas have significantly declined in past years. However, no nest sites have been recorded for the study area (J. Taggart, pers. comm.). None were observed during site reconnaissance surveys. Nests for some raptors are likely present on the site but other nesting species are better able to relocate to new nest sites and are less dependant on traditional nest locations.

TABLE 4
RAPTOR SPECIES THAT MAY BE EXPECTED TO USE THE STUDY SITE AND THEIR PREDICTED STATUS IN THE WHITECOURT AREA

SPECIES	STATUS	ABUNDANCE
Northern Goshawk	PR(N)	C
Sharp-shinned Hawk	SR(N)	U
Cooper's Hawk	SR(N)	U
Rough-legged Hawk	M	C
Golden Eagle	SR(T)	U
Bald Eagle	SR(T)	U
Osprey	SR(N)	C
Peregrine Falcon	(T)	R
Merlin	SR(N)	U
American Kestrel	SR(N)	U
Great Horned Owl	PR(N)	C
Great Gray Owl	PR(N)	U
Northern Hawk-Owl	SR prob PR(N)	C
Boreal Owl	PR(N)	U
Barred Owl	PR(N)	R
Saw-whet Owl	poss PR(N)	U

STATUS: PR = Permanent Resident, SR = Summer Resident,
M = Migrant, (N) = Nesting, (T) = Transient

ABUNDANCE: C = Common, U = Uncommon, R = Rare

4.2.4 Other Species

The absence of ponds or lakes within the study site restricts use of the area by waterfowl to the Athabasca River. Canada Geese, Mallards, Northern Pintails, American Wigeon, Northern Shovelers, Common Goldeneye, Bufflehead and possibly Harlequin Ducks can be expected in small numbers along the Athabasca River, with geese being the most common. The steep riverbank and lack of even a narrow strip of level bank or back water adjacent to the river at the study site severely limits nesting or loafing by waterfowl species in this area. The Athabasca River as a whole near Whitecourt is rated as 6B by Canada Land Inventory (Environment Canada 1969) indicating severe limitations to the production of waterfowl due to adverse topography and fast or excess waterflow restricting the development of marsh habitat.

The remaining bird and mammal species occurring at the study site should be representative of the boreal mixedwood forest community of West Central Alberta. No unusual habitat types exist on site to attract species which would require special attention.

4.3 THREATENED, RARE AND ENDANGERED SPECIES

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) defines the terms threatened, endangered and rare as follows (World Wildlife Fund 1987).

Endangered: Any indigenous species of fauna or flora whose existence in Canada is threatened with immediate extirpation or extinction throughout all or a significant portion of its range, owing to the actions of man.

Threatened: Any indigenous species of fauna or flora that is likely to become endangered in Canada if the factors affecting its vulnerability do not become reversed.

Rare: Any indigenous species of fauna or flora that, because of its biological characteristics, or because it occurs at the fringe of its range, or for some other reasons exists in low numbers or in very restricted areas in Canada, and so is vulnerable, but is not a threatened species.

Four Canadian wildlife species occurring in West Central Alberta fall under these three categories; the Peregrine Falcon (subspecies <u>anatum</u>), the Western Woodland Caribou, the Wolverine and the Trumpeter Swan. Of these, the Peregrine Falcon is considered endangered while the remaining are considered rare.

While the COSEWIC list is useful in recognizing species in danger in Canada as a whole, it does not list species in danger only in Alberta, that may exist in good numbers in other parts of the country. The Policy for the Management of Threatened Wildlife in Alberta (Alberta Fish and Wildlife Division 1985) identifies four levels of threat to wildlife species in Alberta; Endangered, Threatened, Vulnerable and Viable. Of the eleven species listed for Alberta in the first three categories, the Peregrine Falcon (Endangered), Woodland Caribou (Threatened) and Trumpeter Swan (Vulnerable) are of concern in west central Alberta. During the workshop on Endangered Species in the Prairie Provinces (Jan 24-26, 1986), the Northern Leopard Frog, another species that would exist in West Central Alberta, was also declared endangered in the province due to a great decline in numbers and apparent absence over much of its former range (Roberts 1987). Each of these species is discussed briefly in reference to the study site.

Peregrine Falcon

Although the study site is within the range of the anatum subspecies of the Peregrine Falcon, these birds are extremely rare and unlikely to nest in the Whitecourt area due to the absence of preferred habitat which includes steep cliffs and ledges. A rare transient bird would not be expected to be adversely affected by mill site construction or operation.

Western Woodland Caribou

As a result of their current distribution, woodland caribou are not a species of concern for mill site development in the Whitecourt area, although impacts on this species will need to be addressed in the Forestry Management Area. Plans for the provincial restoration of woodland caribou (Edmonds 1986) do, however, include expansion into historical range. Such expansion is not currently expected as far east and south as Whitecourt (K. Smith, pers. comm.).

Wolverine

Wolverine in the Whitecourt area are extremely rare. The few recorded in the past 8-10 years have not occurred near the study site (D. England, pers. comm.). Use of the study site by wolverine is not expected.

Trumpeter Swans

Approximately 44 percent (285 birds) of the Canadian breeding population of Trumpeter Swans nest in the Peace River Block of northwestern Alberta, west of the town of Grande Prairie (Shandruk 1987). In recent years, pioneering pairs of Trumpeter Swans have also been observed nesting 25 km northeast of Edson (Nordstrom 1984). Future pioneering may occur near Whitecourt due to its close proximity, however, the proposed mill site does not offer suitable habitat for nesting. Trumpeter Swans could occur occasionally in the Athabasca River, particularly in open backwaters prior to complete ice break-up but such use should be minor. Disturbance to any birds on the river could be minimized by an adequate buffer zone between the river and the site.

Northern Leopard Frog

Suitable habitat for Northern Leopard Frogs is not available on the proposed mill site due to the rapid soil drainage which prevents the prolonged presence of standing water.

4.4 WILDLIFE UTILIZATION

4.4.1 Hunting

The study site is located within Wildlife Management Unit 352 of Big Game Zone 3 and Game Bird Zone 2 (Figure 3). Hunting seasons in this zone are available for white-tailed deer, mule deer (antlered only), moose, elk, non-trophy sheep (none present at site), black bear, spring grizzly bear, cougar, male Ring-neck Pheasants (none at site), Ruffed Grouse, Spruce Grouse, Blue Grouse, Sharp-tailed Grouse (none at site), ptarmigan (none at site), Gray Partridge (none at site), ducks, White-fronted Geese, Canada Geese, Snow/Ross's Geese, Coots/Rails/Wilson's Snipe (not expected at site). Sunday hunting is permitted in the area for all but migratory waterfowl.

From a provincial perspective, Big Game Zone 3 ranked second in the province for the number of moose and black bear harvested in 1986 (25.3 and 23.1 percent of provincial harvest respectively), third for elk harvest (12.7%) and fifth for mule deer and white-tailed deer (8.5% and 7.9% respectively) (Alberta Fish and Wildlife, 1987). The Zone ranked first for the number of active hunters for moose, black bear, mule and white-tailed deer (37.5%, 24.4%, 19.0% and 17.8% respectively) and second for elk (26.2%) for the same year. These rankings are fairly typical for the Zone and mark it as an important big game hunting area.

Within Big Game Zone 3, WMU 352 has a lower rating for number of ungulates harvested. It is fourth for moose (hunters 7.3%, moose harvested 6.3%) and eighth for mule deer (hunters 5.5%, mule deer harvested 3.4%). The site itself, though within WMU 352, is located in such a narrow strip, bounded by the Athabasca River and Highway 43 (Figure 2) that for all intents and purposes, trends in WMU's 350 and 346 are considered more representative for the area than those for WMU 352 by Alberta Fish and Wildlife personnel (J. Taggart, K. Smith, pers. comms.).

A review of harvest statistics for 1986 for WMU's 350 and 346 (Appendix 2), reveals that both WMU's represent important moose, mule deer and white-tailed deer hunting areas in Big Game Zone 3. WMU 350 ranked first for all three species in numbers of animals harvested (moose 42.1%, mule deer 33.9%, white-tailed deer 30.5%), as well as first for number of active hunters (moose 38.0%, mule deer 30.6%, white-tailed deer 33.6%). WMU 346 ranked second for both hunters and for animals harvested for the same species. All three WMU's (350, 352 and 346) represent the three WMU's with the most black bear hunters as well (WMU 350 - 41.6%, WMU 346 - 13.0%, WMU 352 - 10.6%). Elk, however, are not common in WMU's 352 and 350 which rank fourth (11.9%) and tenth (2.5%) respectively for number of animals harvested and eighth (5.9%) and ninth (5.6%) for number of active hunters. WMU 346 does provide the most number of elk harvested (23.2%) and attracts the most active elk hunters in Big Game Zone 3 (14.8%).

Locally, hunting use of the site concentrates largely on moose or deer. Many Whitecourt residents drive at least 16 kilometers from town before commencing to hunt, resulting in the site itself being only lightly hunted by a few locals (D. England, pers. comm.). Some hunting from boats for black bear does occur along the Athabasca River, particularly in the spring season, however, this use is also light and the uplands at the study site are not intensively hunted for this species (D. England, G. Swarren, pers. comm.). Elk are not a highly sought-after species at the site due to the low numbers of animals and their greater use of areas north of Highway 43. No cougar hunting occurs in the area due to the rareness of the animal. Only one local resident is known to own cougar hounds within the Whitecourt-Edson-Hinton area (J. Taggart, pers. comm.). In 1986, three cougars were harvested in Big Game Zone 3, but none of these were from WMU's 350, 352 or 346.

For the Province as a whole, Game Bird Zone 2 ranked first for number of Ruffed Grouse harvested (49.5%) (estimated number of hunters 42.9%) and second for numbers of Spruce Grouse harvested 26.4% (estimated number of hunters (3.3%) (Alberta Fish and Wildlife, 1987). Goose and duck hunting, however, ranked only fourth (16.0%) and 5th (6.8%) for number of birds harvested in the zone in 1986, indicating the lesser importance of this area to waterfowl hunting due to the limited lake and wetland habitat.

4.4.2 Trapping

The study site is contained within Fur Management Zone 4 which has seasons open for badger, beaver, coyote, fisher, lynx, red/arctic fox, marten, mink, muskrat, red squirrel, weasel, wolf, wolverine and black bear. Lynx season is currently closed due to the currently reduced population but will open again once numbers increase.

In Mapsheet 83J (Whitecourt), there were 94 traplines present from 1970-1975 representing a total of 4239.3 square miles trapped (Boyd et al. 1977). The central part of the province, including mapsheet 83J, has the highest density of trapper areas and the smallest trapping areas (Provincial average 164 square kilometres per trapline, compared to 117 square kilometres for traplines in 83J). This area receives a high degree of trapper use probably as a result of the generally good access to most areas and the moderate to good furbearer habitat available for most species. The average annual value for traplines in 83J was $13.30/square kilometre from 1970-1975 (Boyd et al. 1977) which is only slightly below the provincial average of $13.60/square kilometre.

For mapsheet 83J as a total, the most important species in terms of total fur value contributed per trapline from 1970-75 were lynx (35%), beaver (32%) and coyote (14%). Beaver occur on 94% of all traplines in 83J, red squirrel on 72%, lynx on 67%, coyote on 65%, weasel on 56%, muskrat on 53%, mink on 47%, fisher on 40%, wolf on 13%, marten on 12%, fox on 6% and wolverine on 2% (Boyd 1979). However, abundance of a species on a trapline does not compare to the number of that species trapped each year. The yearly harvest of individual species is most often related to current fur price for that species (Todd and Geisbrecht 1977). This price shifts from year to year. Trapper effort, distance of the line from the trapper's home and size of the trapline are the most important factors determining the actual yield per trapline (Fox 1977, Boyd et al. 1977). For these reasons, analysis of the number of species caught per year on an individual trapline or comparisons between individual traplines is not revealing. The best rating of a particular trapline or trapper can be obtained from the local Fish and Wildlife officer in the area.

The proposed mill site is included within trapline number 376, owned by Gilbert Swarren of Whitecourt Alberta. This line is one of the largest in the area (J. Taggart, pers. comm.) (Appendix 3).

Fish and Wildlife personnel rate Mr. Swarren as one of the best trappers in the district, confirming that he expends a great deal of effort in trapping with good success (J. Taggart pers. comm). Since 1980-81, Mr. Swarren has trapped beaver, coyote, fisher, mink, muskrat, weasel, marten, red squirrel, lynx, red fox, skunk and black bear on his line, with the greatest effort consistently applied to beaver. Beaver rank in the top two or three species for total value per trapline in Alberta (Boyd 1977) but are also the least affected by resource development and increased access. This latter is an important consideration to the resident trapper (G. Swarren pers. comm) as his line surrounds the city of Whitecourt and, as a result, has been increasingly subjected to disturbance in recent years by recreationalists (snowmobile and cross country ski trails), road development, seismic activity and other resource exploration (D. England, G. Swarren pers. comms.).

The species most available for trapping in the study site itself are red squirrel, weasel, mink, beaver, marten, muskrat, coyote and black bear, with marten and beaver of most interest. Fisher, lynx and wolf are transients in the area and seldom form part of the catch. Badger, red/arctic fox and wolverine are not expected. Although Mr. Swarren's recent emphasis has been on trapping beaver, a shift to other species can be expected as fur prices change and other species become more valuable.

5.0 IMPACT ASSESSMENT AND MITIGATION

5.1 TERRAIN

Terrain disturbances will be confined to grading operations which can be expected during site preparation. Such disturbances will be minimized by the project design and layout. In total, approximately 70 hectares will be cleared within the 200 hectare mill site. Impacts to the terrain arising from site preparation and access corridor development will essentially result from excavation, filling and levelling of surfaces. Given the existing level nature of the topography, grading is expected to be minimal (particularly within land type 2a). Where grading occurs in the ground moraine in the northwestern portion of the mill site (land type 1a), slope movement or failure is considered unlikely due to the gentle slopes and inherently cohesive nature of the clay-rich material. The well-drained surfaces also ensure stability of terrain. Existing gravel pits will provide a ready source of fill material for both the road and rail access corridors.

5.2 SOILS

Soil impacts will result from excavation, filling and burial of soil profiles. As such, these impacts can be considered physical in nature, resulting in removal or alteration in the soil horizon sequence. Given the limited depth of topsoil material which occurs within the jack pine-white spruce vegetation association (land type 2a, 2b and 2c), salvage of topsoil material is considered impractical. Such salvage may be possible within the aspen-white spruce association (land type 1a), however the stripping of the surface litter and upper portion of the B horizon in such soils will likely provide a minimum of topsoil material for site landscapping. Where topsoil material is salvaged the storage site should be seeded with a suitable grass/legume mix and the location identified.

Soil erosion impacts could occur when the subsoil is exposed, particularly given the heterogeneous nature of the soil texture. Mitigation will involve the maintenance of surface drainage control and construction stop-work orders during extreme wet weather. Soils within the mill site and access corridors are inherently well-drained which will reduce the possibility of soil erosion.

5.3 VEGETATION

Site clearing and access corridor construction will result in the removal of native vegetation cover. The forestry potential of the immediate site is considered low and thus clearing of the existing timber should result in no impacts to commercial logging operations. Where merchantable timber is encountered, trees will be felled and salvaged. This is considered more likely within land types 2a and 2b.

A review of the existing literature indicates that no rare or endangered plant species occur within the proposed mill site or access corridor development area (Argus and White 1978). Generally, vegetation impacts can be considered localized and mitigable through revegetation upon site decommissioning.

5.4 WILDLIFE

Disturbances to wildlife from site development will take the form of direct impacts through loss of habitat and displacement of resident species during construction and site operation. This will affect all forest species resident in the area but will be of most concern to pine marten which exhibit a patchy distribution in the Whitecourt area but are locally present in good numbers at the site. Indirect disturbances will largely relate to increased vehicle use on Highway 43 which may result in a somewhat higher wildlife mortality and disturbance of use patterns. As well some disturbance and mortality will arise from the proposed railroad spur line. Increased access is often identified as an impact on wildlife during and after development occurs. However, the presence of numerous cutlines in the study area already provides unrestricted access for hunting. New site development with site restrictions for hunting may actually reduce access in the area and create a protected habitat for wildlife.

The small size of the settling ponds and the nature of the material to be contained within it should make them unappealing to waterfowl.

Disturbance to wildlife species along the Athabasca River should be minimal if an adequate forest buffer is maintained between the site and the river.

The single most important mitigation necessary to maintain wildlife adjacent to the mill site is the provision of an adequate travel corridor in the area between the Athabasca River and the mill site. Alberta Fish and Wildlife personnel recommend that a tree buffer be left from the top of the river bank extending north to the mill property (J. Taggart, K. Smith, pers. comm.) The river bank area itself is too steep and exposed to act as a travel corridor without such a buffer above it. Such a buffer would allow large ungulates and furbearing species adequate cover to ensure that use of the habitat between the mill and Whitecourt continues. It would also screen activity and noise from the Athabasca River, thereby eliminating disturbance to aquatic furbearers, waterfowl and raptors which might hunt or feed here (particularly Osprey). Available habitat for raptor nests would also be maintained for tree nesting species such as Osprey, Red-tailed Hawks, Goshawks and Great Horned Owls. The current route planned for the rail line spur would provide a buffer of desirable width.

Restrictions of firearm use on site will also reduce wildlife losses particularly for ungulates which may be expected to feed on grass and shrubs surrounding the mill and its access routes.

Incineration of all garbage on site or containment and removal to an approved land fill site is the best method of preventing bear conflict and resulting negative impact on either black or possible grizzly bears. Loss of furbearing species, particularly marten, is difficult to mitigate. It is recommended that an agreement be negotiated with the registered trapper to provide the right of access for trapping to the site. Assuming a suitable width, this buffering zone should still provide a rich harvest of both terrestrial and aquatic furbearers for harvest.

Other mitigation should concentrate on methods of reducing animal death due to road and rail collision. Placement of vehicle signs directing motorists to watch for wildlife would also be useful.

The proposed mill site would be sufficiently small that its presence would not represent a significant impact on the total habitat in the Whitecourt area provided an adequate travel corridor is left for wildlife. Therefore, enhancement measures are not proposed as part of the mitigation plan.

6.0 RESIDUAL IMPACTS

6.1 BIOPHYSICAL RESOURCES

Residual terrain impacts will only involve the disturbance of surficial deposits. Cut and fill operations will result in the simplification of slope angles, levelling of microtopographic features and a local discontinuity in the immediate pattern of the landscape. No rare or unique geomorphic feature will be removed as a result of the project. Overall the residual impact on terrain is expected to be minimal.

Soil profiles will be disturbed during the construction phase of the development. As practicable, topsoil material will be stripped and salvaged from the cleared areas to be used in eventual reclamation. The lack of any agricultural use of existing soils and limited forestry potential indicates that residual soil impacts are expected to be minimal and localized in extent.

Mature stands of aspen, balsam poplar, jack pine and white spruce will be removed during construction phases of the development. This will result in open areas within the canopy which will ultimately be revegetated as part of the reclamation process. The effect will be to add vegetation diversity to the Athabasca River Valley which may be advantageous to wildlife species in terms of enhancing foraging and browsing opportunities.

6.2 WILDLIFE RESOURCES

The proposed mill site, although it will entail the removal of some habitat and consequent disturbance and displacement of associated wildlife species, is of a small enough size to not represent a significant impact on local and regional wildlife species provided an adequate buffer zone or travel corridor is left between the Athabasca River and the mill site. Loss of habitat will primarily affect pine martens as these animals are locally abundant at the site and exhibit a rather patchy distribution elsewhere in the Whitecourt area. Other species should have adequate adjacent habitat to move into to prevent population decline. The site does not present any potential problems for rare or endangered species that may occur in west Central Alberta. In fact, the site will develop into a refuge due to the restrictions of hunting on the site and the maintenance of an undisturbed buffer zone.

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APPENDIX 1
CONTACT LIST

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Swarren, Gilbert. Owner of Trapline #376. Box 44, Whitecourt, Alberta T0E 2L0 (648-2131).

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APPENDIX 2
HARVEST STATISTICS FOR RESIDENT BIG GAME
AND GAME BIRD HUNTERS IN 1986

MOOSE

WMU	EST. DID HUNT	% OF TOTAL HUNTERS IN WMU	RANK	EST. HARVEST	% OF TOTAL HARVEST	RANK
346	3258	15.6	2	653	18.2	2
350	7949	38.0	1	1509	42.1	1
352	1536	7.3	4	227	6.3	4
TOTAL BG3	20900	37.5	1	3581	25.3	2
TOTAL PROVINCE	55736			14151		

MULE DEER

WMU	EST. DID HUNT	% OF TOTAL HUNTERS IN WMU	RANK	EST. HARVEST	% OF TOTAL HARVEST	RANK
346	1508	14.5	2	599	17.2	1
350	3173	30.6	1	528	33.9	2
352	570	5.5	8	69	3.4	5
TOTAL BG3	10380	19.0	2	1963	8.5	5
TOTAL PROVINCE	54715			24678		

WHITE-TAILED DEER

WMU	EST. DID HUNT	% OF TOTAL HUNTERS IN WMU	RANK	EST. HARVEST	% OF TOTAL HARVEST	RANK
346	2448	18.8	2	599	26.9	1
350	4362	33.6	1	528	30.5	2
352	828	6.4	5	69	3.5	5
TOTAL BG3	12991	17.8	2	1963	7.9	5
TOTAL PROVINCE	73035			24678		

ELK

WMU	EST. DID HUNT	% OF TOTAL HUNTERS IN WMU	RANK	EST. HARVEST	% OF TOTAL HARVEST	RANK
346	1214	14.8	1	84	23.2	1
350	457	5.6	9	9	2.5	10
352	481	5.9	8	43	11.9	4
TOTAL BG3	8212	26.2	2	362	12.7	3
TOTAL PROVINCE	31351			2843		

BEAR						
346	231	13.0	2	0	0	-
350	737	41.6	1	77	58.3	1
352	187	10.6	3	22	16.7	2
TOTAL BG3	1771	24.4	1	132	23.1.7	2
TOTAL PROVINCE	7265			572		
DUCKS						
Zone 2	2513	8.8	5	16039	6.8	5
Zone 4	10274	36.0	1	80522	34.1	1
TOTAL PROVINCE	28538			236351		
GEESE						
Zone 2	3492	15.4	5	16373	16.0	4
Zone 4	5018	22.1	2	17105	16.7	3
TOTAL PROVINCE	22666			102344		
RUFFED GROUSE						
Zone 2	11264	42.9	1	95622	49.5	1
Zone 4	6979	26.6	3	21567	11.2	3
TOTAL PROVINCE	26269			193088		
SPRUCE GROUSE						
Zone 2	244	3.3	2	10569	26.4	2
Zone 4	1417	19.3	3	4005	10.0	3
TOTAL PROVINCE	7338			40068		

APPENDIX 3
BOUNDARY DESCRIPTION FOR
REGISTERED TRAPPING AREA NUMBER 376

cor. Sec. 21-59-12, thence E. 5 miles to the SE. cor. Sec. 19-59-11, N. approx. 4 miles to the N. bank of the Athabasca River, thence W'ly along N. bank approx. 1 mile to the W. bdry. of NW. 6-60-11, thence N. approx. 5 miles to NW. cor. Sec. 31-60-11, thence E. 8 miles to point of commencement. All West of the 5th Meridian. Excluding from the above all privately-owned or leased lands excepting those of the Licencee.

must be presented when disposing of any and all furs.

FEE $10.00
EXPIRES ON
AUGUST 31, 1985

INTERIM RECEIPT NO. ________

Alberta

ENERGY AND NATURAL RESOURCES
Fish and Wildlife Division

Season
1C

RECEIVED
MAY -2 1985
Fish & Wildlife Div.

CERTIFICATE OF REGISTRATION OF A TRAPPING AREA

Subject to the provisions of "The Wildlife Act"

8 ________ (LAST NAME) 26 ________ (FIRST NAME) ___ (INITIAL)

38 ________ (ADDRESS)

60 ________ (CITY OR TOWN) 77 ________ (POSTAL CODE)

is hereby granted the right to hunt, trap and kill Fur-Bearing Animals and Fur-Bearing Carnivores during the open season, and as permitted under the Wildlife Act and Regulations, on Registered

Trapping Area Number 83 ____ but not elsewhere

[illegible]

Date of birth of licensee 87 ____ YR MON DAY

Date of issue 93 ____ YR MON DAY

99 ____ DISTRICT

FOR ASSISTANT DEPUTY MINISTER FISH & WILDLIFE DIVISION

This certificate is not transferable and the trapping area must be operated by the permittee.
Sub-letting of the trapping area or any portion thereof is absolutely prohibited.

FORM WA11/84

APPENDIX 4

SOCIO-ECONOMIC STUDY

ANC NEWSPRINT MILL
SOCIO-ECONOMIC IMPACT ASSESSMENT

Prepared for:

Nystrom, Lee, Kobayashi & Associates, Vancouver

Prepared by:

The DPA Group Inc.
Calgary

May 11, 1988

NLK 8463-6/4991

EXECUTIVE SUMMARY

In accordance with the Alberta Environment's Guidelines, this assessment is prepared to identify the potential socio-economic impacts of the proposed Alberta Newsprint Company Ltd. (ANC) Newsprint Mill on the host community, the Town of Whitecourt and its surrounding region, namely Improvement District 15 (ID 15). The focus of the assessment is on issues and concerns that are important to the host community and region. Three areas of impacts are examined: regional economy (income and employment), population and community infrastructure and services.

Consultation with key community informants is an important aspect in this assessment.

The proposed ANC Newsprint Mill will be located approximately 8 km west of the Town of Whitecourt in ID 15. The capital cost of the project is estimated at $335 million. Construction is expected to commence in the summer of 1988 and it will last for approximately 24 months to the second quarter of 1990. Operation of the mill will then commence. The mill will require an annual operating expenditure of approximately $90 million.

During construction, a direct labour force of up to 850 person-years will be required over the 24-month period. At the peak, up to 600 people could be working on the site. Peak direct employment will occur in the final year of construction. At full production, the newsprint mill will require a staff of about 190 people. The logging and transportation function is expected to require a labour force of 175 people under contract by 1992. Since the operations of this component will take place much to the west of the Town of Whitecourt, the employment effect on the town would be limited.

The Town of Whitecourt is estimated to have a population of 6,200 at the beginning of 1988. This will likely rise to 6,500 by mid or late 1988, not accounting for the effect of the ANC Newsprint Mill. The ID's population is estimated to reach 3,200 by late 1988. The town has experienced substantial growth in business activities and employment due to the construction of the Millar Western Pulp Mill project since late 1986 and it is expected to be completed by the summer of 1988. When in operation, the mill will employ 80 to 90 people.

During the construction phase, accounting for the multiplier effects, the ANC project is estimated to generate a total income effect of some $250 million to the province of Alberta, of which approximately $50 million will be retained in the Town of Whitecourt, and to a minor degree, the ID. When the mill is in full operation, accounting for the multiplier effects, it will generate a total income of some $120 million to the province, of which $22 million will be retained by the town, and to a minor degree, the ID.

During construction, in addition to the jobs filled by temporary, in-migrant workers, a total of some 1,300 person-year jobs will be created in the Town of Whitecourt, over a 24-month period. Operation of the Mill will create a total of some 600 permanent jobs in the community and its surrounding region. Only 190 of these are direct employment at the mill.

Without the ANC project, the Town of Whitecourt is expected to grow at an average annual rate of 2.9 percent in the next 5 years, so that by 1990, its population will be about 6,900. With the ANC project, the town will grow by an extra 5 percent by the end of 1988, and 13 percent by 1990 to 1993, so that its population will reach 7,800 by 1990 and 8,400 by 1993.

The ANC project is expected to have a minor effect on the ID's population. The population of the ID will probably grow by an extra 3 percent due to the project by 1990.

The Town of Whitecourt is presently experiencing an upsurge in housing demand. While Whitecourt has a healthy supply of serviced lots, construction activities must proceed in a timely manner to avoid a shortage. Including the spin-off demand, the ANC project is expected to generate an additional demand for 100 housing units in 1988, over and above the basic demand associated with the town's natural growth and that generated by the Millar Western project. By 1990, when the ANC mill commences operation, another 300 - 350 units, including the spin-off demand, will likely be required over and above the basic demand resulting from the natural growth of the community.

As a result of the direct and the spin-off effects, the ANC project is expected to increase the school-age population by 80 in 1988 and 1989 for the Town of Whitecourt and by 250 in 1990 and thereafter, over and above the town's natural increase (estimated at 50-55 persons). Both the public and the Catholic school boards have plans to accommodate these new growths. Part of the plan will be an addition of 2 new schools in the community by 1989 or 1990.

The town's water and sewage systems will be able to accommodate much larger growth, although upgrading of the system may be required by 1990 or 1991.

A number of community facilities and/or services will require review, even without the ANC project. These include the library, the fire protection services, the police service, the hospital and a number of social services programs, including the Family and Community Support Services. This assessment will provide information to assist the agencies concerned to plan for program or facility adjustment or expansions. Most of the required adjustment relates to staff, facility or equipment changes, and can be accommodated as part of the review process that the agencies concerned normally undertake on a routine basis.

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 Background and Objectives

This socio-economic impact assessment has been prepared in accordance with the general requirements set out in the Alberta Environment's Environmental Impact Assessment Guidelines (1985), and based upon consultation with Alberta Environment officials and Alberta Newsprint Company Ltd. In fulfilling a specific requirement of Alberta Environment, a key component of this assessment is to consult with local residents, government officials and key representatives of the nearby communities. The main purpose of this consultation is to identify issues and concerns, if any, that they might have related to the proposed project. The impact assessment is to focus on these issues and concerns.

The overall objective of this assessment is to identify the potential effects of the proposed Alberta Newsprint Company Ltd. (ANC) Newsprint Mill project on the social and economic environment of the study region, focussing on specific areas of concerns as identified by local residents. Based on the results of this assessment, Alberta Newsprint will undertake specific actions to mitigate negative impacts or to enhance project induced benefits.

A secondary objective of this assessment is to provide relevant information about the magnitude of the population effect of the project on the study region to assist communities in the region with their planning for future growth.

1.2 APPROACH

This impact assessment is issue-focussed. Thus, not all impact areas receive equal emphasis in terms of depth of research and analysis. Areas which are important to the local government, residents of the region, and the provincial and federal government agencies are addressed with more details than others. Based on discussions with a selected number of key community spokesmen and government officials, a list of areas of concerns emerged. These are briefly described as follows.

Economic Impacts

- The Town of Whitecourt is the single largest community within reasonable commuting distance of the project site. Residents of Whitecourt would like to see local employment maximized and that training opportunities be made available to the local labour force.

- The business community of Whitecourt would also like to see Alberta Newsprint maximize local purchases of goods and services in both the construction and the operations phases of the proposed project.

Impact on Community Infrastructure and Services

- While the Town of Whitecourt is well serviced in most service areas, a number of facilities have reached their serving capacities, or will in the near future. Town officials are concerned that major capital expenditures will soon be required for several major facility expansion projects. Information on the timing and magnitude of population growth related to all potential new project developments in the region will be critical to the town's planning efforts. Areas of concern include the hospital, the library, schools, police services and fire protection services.

Impact on Housing

- The Town of Whitecourt has an ample supply of serviced land for new housing. However, recently, it appears that construction activities cannot keep pace with the recent upsurge in demand for housing in the community.

Impact on Social Services

- While the key social service agencies interviewed felt that the recent increase in economic activities, principally resulting from the new Millar Western Pulp Mill, has instilled a sense of prosperity and well-being in the community, the new economic promises have also attracted transients from outside the region. As a result, demand for social services and assistance has increased substantially as many transients are not employable. It is felt that expectations associated with the proposed newsprint mill would prolong the stay of the transients, and their requirements for social assistance.

Based on these areas of concern, the scope of work for this assessment has been developed and carried out. The basis for the assessment is to forecast the changes that would occur in the study region with, and without the project. The "without the project" scenario represented the "base-case" forecast, and has included a review of the potential effects of other notable future projects or economic activities on the region.

Key social and economic changes that are analyzed include:

- regional employment and income changes
- demographic changes
- demand for housing

- effects on community infrastructure and services (schools, police services, fire protection, recreation services, health care services and social services)

Data sources for the existing socio-economic environment and future trends are drawn from a variety of published government reports, similar studies of other projects in the region, unpublished data from various government offices and interviews with key local informants. Project information, primarily on direct employment and expenditures, is provided by ANC. Secondary and induced economic effects are forecast by applying appropriate economic multipliers. Lists of references and persons contacted for this assessment are provided in Appendices A and B respectively.

1.3 Company Policies

It is the objective of ANC to proceed with the newsprint project in a fashion which will bring maximum benefits and minimize negative effects, if any, to the host region. To this end, the company has developed a list of policies which will guide the development process of the newsprint project. ANC believes that local concerns will be addressed much more effectively through the application of concerted, responsible company policies rather than through after-the-fact corrective measures.

The following summarizes the company's policies in eight specific areas which are felt to be of interest to the host region and the Town of Whitecourt.

RECRUITMENT

Personnel for the nucleus of the operating and maintenance force, to the greatest extent possible, will have previous relevant experience in pulp and newsprint mills. At an intermediate level experience in the pulp and paper industry would be desirable. Preference will be given to local, then district and finally regional residents for intermediate and junior positions, having regard for the experience, skills and education of the applicants.

TRAINING

All junior and intermediate level employees will be given appropriate training prior to plant start-up. When normal operating status has been achieved planned training programs will be instituted so that, for most operating and maintenance positions, employees may progress to the next level.

In general, continuing education in relevant courses of study will be encouraged for all employees. This will assist in developing personnel in the work force for positions of higher responsibility.

After the initial force has been hired, most new employees will be hired from the local labour pool, provided the required educational qualifications and general attributes of the applicants meet the company's standards.

LOCAL PURCHASING

In the construction phase every attempt will be made to encourage local contractors and suppliers to participate on the project.

It will, however, be their responsibility to convince the owner, project manager and prime contractors that they have the required experience and performance record to execute the work in a satisfactory manner, on time and at a competitive price and quality levels.

In the operations phase, every consideration will be given to local merchants and dealers. They must demonstrate that they can deliver quality products in the desired quantity, on time and at competitive price and quality levels.

AFFIRMATIVE ACTION

The company will not discriminate in any way in the hiring of employees. It will require that all applicants have the designated experience, qualifications and attributes to perform the work, and the company reserves the right in its sole judgement to select employees for its work force.

TRANSPORTATION: CREWS AND MATERIAL

Except in cases where company transportation is deemed necessary for certain personnel, all employees will be responsible for arranging or providing their own transportation to the work site.

Product and incoming material and supplies will be moved by rail and road transport. Locally or regionally based truck transport companies will be encouraged to bid on contracts for the provision of transportation services.

HOUSING

No company housing will be provided for employees nor will accommodation be provided for construction workers.

LAND DEVELOPMENT

It is not anticipated that land will be developed nor mortgage assistance programs instituted. An adequate stock of developed land is, or will be, available in Whitecourt and other nearby communities.

COMMUNITY CONTRIBUTION/DEVELOPMENT

The company plans to develop a significant role as a corporate citizen within the community but the exact form of the participation will be developed by local management.

As an example, it is planned to hire local students for vacation relief and summer work programs. Outstanding students will be selected, based on their scholastic record and participation in sport and other school activities, from high schools and those attending or planning to attend technical institutes, junior colleges and universities.

2.0 EXISTING ENVIRONMENT AND FUTURE TRENDS

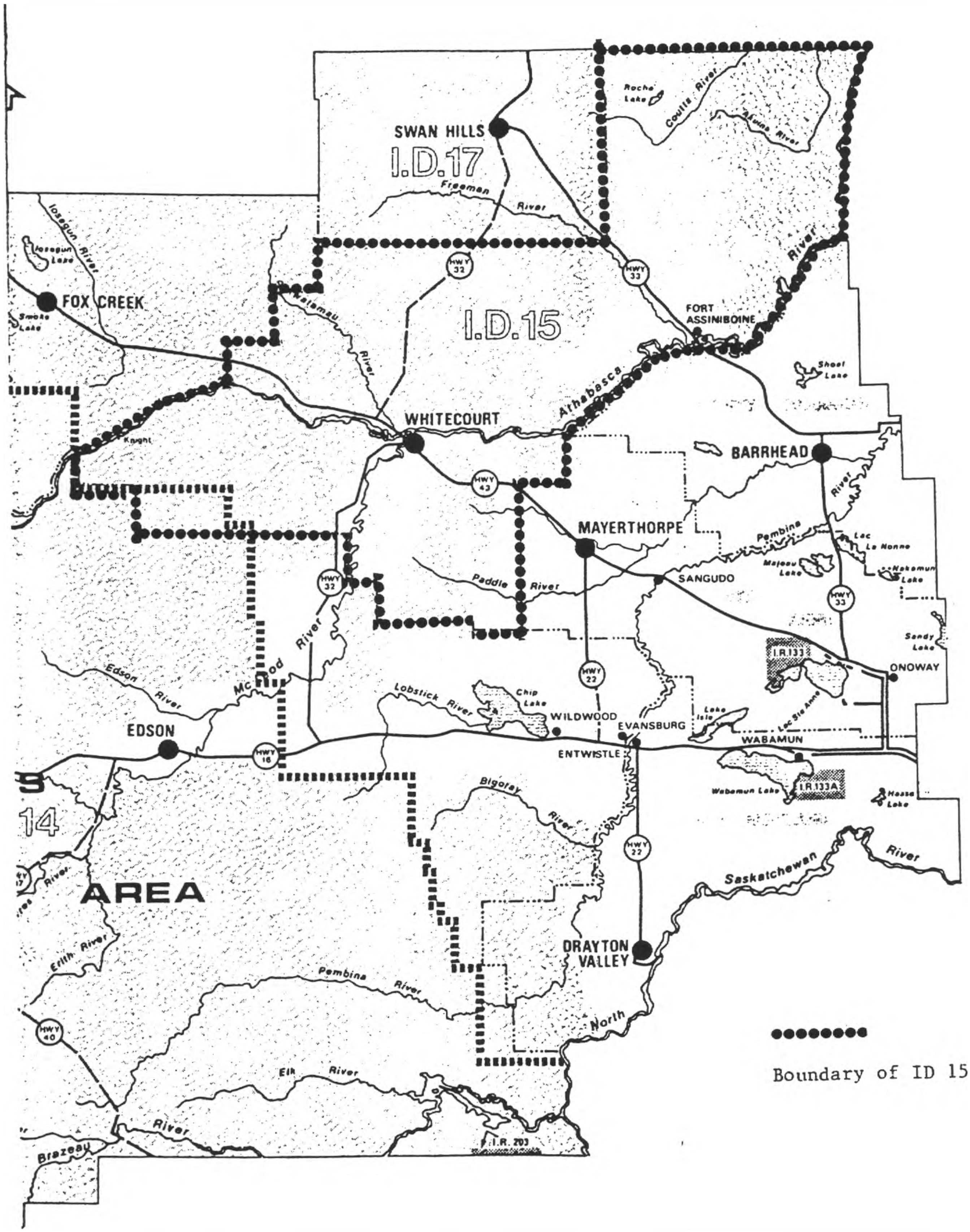
This section of the assessment describes the existing socio-economic conditions of the study region, and examines the future trends of these conditions under the "no project" scenario. This is to provide a background against which net project effects on the socio-economic environment can be assessed.

The discussion will begin with an overview of the geographic setting of the study region, followed by a brief presentation of the demographic characteristics of the region and an examination of its key economic elements, principally the region's economic base and labour force. Description of the main community infrastructure and services in the host community and their capacities for accommodating future growth will conclude this section.

The study region is defined as to include the Town of Whitecourt and its adjacent Improvement District (ID 15). Figure 2-1 shows the general study region and its communities. It is expected that the Town of Whitecourt will be the host community for the majority of the work force resulting from the ANC project, and hence it will experience the greatest demand on its community services and infrastructure associated with any project induced growth. The socio-economic effects of the project on ID 15 will be much less significant. Thus, the emphasis of this assessment will be focussed on the Town of Whitecourt. Employment opportunities could also be provided to the residents of a number of communities which lie outside ID 15. These include the towns of Mayerthorpe and Fox Creek. However, due to long commuting distances between the proposed mill site and these communities, it is not expected that the employment benefits to these communities will be significant. Discussions of potential effects of the proposed project on these communities will be selective.

FIGURE 2-1

Socio-Economic Study Region



2.1 Geographic Setting

The proposed ANC newsprint mill will be located approximately 8 km west of the Town of Whitecourt in the heart of Improvement District 15. The Town is located 176 km or approximately a 2-hour drive northwest of Edmonton. The Town and the ID are part of the Yellowhead Planning Region.

ID 15 covers an area of about 4,800 sq km, comprised of gently rolling hills. The Athabasca River is the largest river system in the area. It flows north-eastward across the entire Improvement District, and is joined by the McLeod River at the Town of Whitecourt. The area is rich with productive forests, particularly along the Athabasca River and in the Blue Ridge and Windfall Creek areas.

The area was historically inhabitted by the Cree Indians. White settlers first arrived in the early 1800's when Fort Assiniboine was established as a trading post. But the major influx of settlers did not occur until the early 1900's when the Hudson's Bay Company chose a location for a trading post at the present site of the Town of Whitecourt. Growth in the area continued, primarily encouraged by the region's vast potential for timber development.

The first major lumber mill started operations at Whitecourt in 1922, a year after the railway was extended to the townsite. Forestry related activity has since been the mainstay of the town's economy, while primary woodland activities provided work opportunities to the surrounding municipal districts.

Discovery of major oil and gas fields in the 1950's further contributed to the growth of the region and diversified its economic base. The population of Whitecourt has increased by almost seven fold, from less than 800 in the mid 1950's to over 6,000 (estimated) now. Today, Whitecourt continues to serve as the major service centre in the Improvement District, with forestry, oil and gas and tourism forming its primary economic base.

2.2 Population Characteristics

According to the 1986 federal census, the total population of the primary study region, i.e. Town of Whitecourt and ID 15 (excluding the Village of Fort Assiniboine), was at 8,595. The majority of the population (5740 people or 67 percent) resided in the Town of Whitecourt, while 1,855 people (33 percent) resided in the Improvement District.

Table 2.1 shows the population changes of the Town of Whitecourt and ID 15 over the period 1976-1986. Population changes of two outlying communities are also shown, namely Fox Creek and Mayerthorpe, which may also be a labour source, though likely small, for the proposed project.

Between 1976 and 1981, the population of the primary study region grew by 36 percent, substantially higher than the province's average of 22 percent. However, between 1981 and 1986, the rate of growth in the region (4 percent) slowed significantly, and was much below that of the provincial average of 6 percent. This pattern of growth typifies resource regions in the province. The extraordinary growth in the region during the mid-1970's to early -1980's period was the result of the economic "boom" brought on by the increased oil and gas activities in the province. Declines in world oil prices since 1983 has caused a recession of the provincial economy. Due to the heavy dependence of the study region on the resource sectors, the economic "boom-bust" phenomenon tended to be more pronounced than in the rest of the province.

TABLE 2.1

Population Change of the Study Region by Municipality
1976, 1981 and 1986

Municipality	Population 1976	1981	1986
Town of Whitecourt	3878	5585	5740
ID 15	2212	2670	2855
Total of Primary Study Region	**6090**	**8255**	**8595**
Town of Fox Creek	1625	1978	2068
Town of Mayerthorpe	1022	1475	1414
Alberta	1,838,000	2,237,725	2,375,278

Source: 1986 Federal Population Census.

During the 1976-1986 period, the rates of population growth for the Town of Whitecourt changed more drastically than the adjoining Improvement District. Between 1976 and 1981, when oil and gas industry activities were at their peak in the region, the Town grew by 44 percent as compared to 21 percent for the Improvement District. Conversely, between 1981 and 1986, the Town's growth rate declined considerably to about 3 percent, when the Improvement District sustained a growth rate of 7 percent. This historic pattern suggests that population migration which is largely influenced by the region's economic conditions, played a major role in the Town's growth.

Table 2.2 presents a selected list of demographic indicators for the Town of Whitecourt and ID 15. Both the Town and the ID have a higher percentage of the very young than the provincial average. In 1986, 31 percent of the population in Whitecourt and 28 percent of the ID population were under the age of 15, as compared to the provincial average of 24 percent.

Both the average household size (3.1) and the average family size (3.4) of Whitecourt were larger than ID's averages (3.0 and 3.3 respectively). The provincial average household size and average family size were 2.8 and 3.2 respectively; both lower than that of the study region.

The study region also had more children per family (1.5 for both Whitecourt and the ID) on the average, as compared to the province (1.3).

The Town of Fox Creek and the Town of Mayerthorpe are both located at a substantial distance away from the project site (approximately 85 km and 50 km respectively). The Town of Fox Creek was incorporated as a new town in 1967, to provide a service centre for oil and gas development. The community grew by 22 percent between

TABLE 2.2

Demographic Characteristics of Study Region, 1986

	Town of Whitecourt	ID 15	Alberta
Number of People Age 0-14 (as % of Total Population)	1,760 (31%)	795 (28%)	561,355 (24%)
Average Number of Persons/Household	3.1	3.0	2.8
Average Number of Persons/Family	3.4	3.3	3.2
Average Number of Persons/Family	1.5	1.5	1.3

Source : 1986 Federal Population Census

1976 and 1981, corresponding to the peak of oil and gas activities. Since 1981, growth of Fox Creek has slowed considerably. There were 2,068 people residing in Fox Creek in 1986, an increase of only 90 people or 5 percent from 1981.

The Town of Mayerthorpe was established primarily as an agricultural service centre. However, recent growth of the community has been much affected by the oil and gas, forestry and to a lesser extent, tourism sectors. The Town had a population of 1,414 in 1986, a decline from 1981 by about 60 people, or 4 percent, a result of the recession in the region. Prior to this period, the town enjoyed a robust growth period in the 1970's, similar to that for the other resource towns in the region. Population increased by 44 percent between 1976 and 1981.

2.3 Regional Economy

2.3.1 Economic Base

Two key basic sectors form the mainstay of the study region's economy. These are forestry and oil and gas. The region also has coal development potential, however, due to unfavourable world market conditions in the past few years, development of the coal resources has not taken place. Activity has been limited to exploration only. In recent years, tourism has also contributed to the diversification of the region's economy.

The first major saw mill was established by Millar Western Industries Ltd. in Whitecourt in 1922. This mill has since played an important role in supporting the economy of the community and the surrounding region. In 1974, activities in the forestry industry increased further when another sawmill was established in Blue Ridge, approximately 21 km from the town. The Blue Ridge mill further expanded its operation in 1986 by opening a medium density fibreboard plant. The plant employs nearly 300 people, half of whom live in Whitecourt. Currently, Millar Western Industries Ltd. is constructing a new pulp mill in Whitecourt. Construction is expected to be completed in the summer of 1988. Over the 1986-1988 construction period, Millar Western employed up to 500 people on site at the peak of activity. When in operation, the pulp mill is expected to require a permanent staff of 80 people, plus about 120 people in the logging component of the operation.

The future outlook of the forestry industry in the region is generally promising. A 1987 Yellowhead Planning Region study concluded that the healthy demand that has existed for sawmill products in the last few years will continue at least for the short-term future. Several forestry development areas exist to the west of the Town of Whitecourt, part of these areas are within the ID. It is estimated that the Berland Timber Development Area alone can provide 24 billion board feet of lumber from its coniferous stands. While the 1987 Yellowhead Planning Region report suggested that the region could sustain another pulp/paper plant, it did not anticipate any further major developments within the ID in the near future.

Discovery of oil fields in the region in the 1950's strengthened the region's economic base. The oil and gas industry has since been an important part of the regional economy, and was responsible for the tremendous growth of the region during the 1970's. Depressed world oil prices caused a significant set back in the industry in the mid 1980's. While a recent step up of activities signifies a move towards recovery of the industry, it is expected that the level of activities will continue to fall much below those in the 1970's, at least for the foreseeable future. Currently, most of the increased production occurs in existing gas processing plants. No new, major processing facilities are expected to be constructed in the near future. A small increase in employment in the exploration (drilling) and processing areas of the industry is expected in the next few years.

2.3.2 Labour Force and Employment

Table 2.3 shows the labour force characteristics of the study region. Both Whitecourt and ID 15 had proportionately fewer people 15 years and older (69% and 72% respectively) as compared to the province as a whole (76%). In terms of the level of labour force participation, Whitecourt had higher rates for both males and females (92.4% and 61.6% respectively) than that of the province (84.7% and 58.2% respectively). The participation rates for ID 15, however, were much lower than that of the province, 62.5% for male and 49.4% for female.

According to the 1981 federal census, the labour force of Whitecourt was more heavily represented by the mines (including milling, quarries and oil wells) and forestry (including fishing and trapping) sectors, when compared to the province. While mines and forestry had a sizeable labour force in ID 15, as well, agriculture had by far the largest labour force, as compared to the province as a whole. The region was under-represented in the services, trade and finance sectors relative to both Whitecourt and the province.

In a 1986 labour force survey, it was found that the Town of Whitecourt's top three employment sectors were accommodation, food, beverage and other personal services; petroleum and natural gas; and logging and forestry, accounting for 25.9 percent, 25.1 percent and 12.8 percent respectively, of the total labour force (Whitecourt Economic Development Committee 1986).

TABLE 2.3

Labour Force Characteristics of Study Region

	Town of Whitecourt	ID 15	Alberta
Population 15 Years + (1986)	3,980	2,060	1,813,923
(as % of Total Population)	(69%)	(72%)	(76%)
Male Participation Rate (1981)	92.4%	62.5%	84.7%
Female Participation Rate (1981)	61.6%	49.4%	58.2%
Unemployment Rate (1981)	5.6%		3.8%
% Distribution of Labour Labour by Industry (1981)			
Agriculture	0.5	20.8	6.7
Forestry, Fishing, Trapping	3.1	4.2	0.3
Mines, Milling, Quarries & Oil Wells	18.3	10.9	6.2
Manufacturing	8.1	11.3	8.7
Construction	9.8	13.2	10.5
Transp, Comm & Other Utilities	11.7	6.0	8.2
Trade (Ratial & Wholesale)	14.4	6.0	16.4
Finance, Insurance & Real Estate	4.0	1.9	5.4
Services	22.5	17.4	27.4
Public Adm & Defense	4.0	2.6	7.1
Other	3.6	5.7	3.0

Source : Federal Census

In another publication, it was estimated that accommodation, food and beverage alone employed 690 people, the petroleum and natural gas industry employed 1584 people and the two lumber mills (Blue Ridge and Millar Western Industries) together employed 678 people (including contractor's employees) in 1986 (Alberta Economic Development and Trade).

No estimates are available on the Town's current unemployment rate. Available statistics from the Canada Employment Centre in Edson show that the number of U.I. Claimants over the past two years has fluctuated little from year to year. The following shows these statistics on a selected basis:

	No. of Claimants
January 1986	354
April 1986	474
July 1986	540
October 1986	479
January 1987	490
April 1987	562
July 1987	552
October 1987	425
January 1988	384

These statistics suggest that construction of the Millar Western project since late 1986 did not appear to effect any notable decline in the number of U.I. recipients. In fact, there appeared to be a slight increase in the statistics at the beginning of the construction period, likely explained by the increase in the number of transients in town looking for work.

Table 2.4 shows the number of U.I. claimants in the whole Edson CEC (Canadian Employment Centre) area. It appears that the region's largest available labour supply occurs in the

TABLE 2.4

Number of U.I. Claimants by Occupation
in the Edson CEC Area, January 1988

Occupation Group	No. of Claimants
Managerial, Adm	56
Sciences, Engin, etc.	40
Soc. Sci & Rel.	30
Teaching and Rel.	38
Medicine & Health	39
Artistic, Lit, etc.	5
Sport, Rec	22
Clerical and Rel.	485
Sales	130
Services	422
Farming, Hort, etc	24
Forestry, Logging	82
Mining, Quarrying	56
Processing	55
Machining	29
Fabricating, etc.	58
Construction	612
Transport Equip	112
Mat. Handling & Rel	13
Other Crafts Equip	19
Occupns Nec	5
TOTAL	2,332

Source : Edson Canada Employment Centre

construction trade, clerical and secretarial and service occupations. Labour supply is limited in the skilled trade occupations, including processing, machining and fabricating. There are less than 90 unemployed in the logging and forestry occupation group.

2.3.3 Future Trends

As discussed in Section 2.3.1, the growth of the study region in the near future, say the next 5 years, will continue to be influenced largely by the activities in the petroleum and forestry sectors. While the petroleum sector has shown some increase in activities related to known reserves or established facilities in the past year, the employment generation potential of this sector will likely remain low, increasing to moderate in the next five years, as notable increases in oil and gas prices are not anticipated until after 1990. It is estimated that new employment in this sector will probably not be more than 200 jobs over the next five years.

The Millar Western project, when it starts operating in the summer of 1988, will employ about 80 to 90 people in the mill and another 120 people in the logging component of the operation. Thus, total employment would amount to 210 at the maximum. Apart from the Millar Western project and the proposed ANC project, employment growth in the forestry sector is expected to be limited in the next five years.

The construction industry will likely be moderately active in the next five years. Major projects which are not directly related to the residential/community or forestry sectors include paving of Highway 32 between Whitecourt and Swan Hills, the hospital expansion project, small gas processing plants or existing plant expansions or upgrades and small construction projects related to the tourism industry--possible projects such as a forestry interpretive centre and a "Whitecourt pioneer village" (Yellowhead Regional Planning Commission 1987b).

It is difficult to confirm the employment outlook of the basic construction industry, as none of the above-mentioned projects have a definite plan to proceed. However, given the relatively small capital expenditures associated with these possible projects, the direct employment generation effect would likely be small too, probably not more than 100 jobs over the next five years.

Many studies have been carried out on the economic effects of major projects on resource regions in the province. Employment multipliers used in these studies ranged widely. Generally, the more resource-based the economic region, the larger the multiplier would be. Given the relatively underdeveloped service sector of the study region, it is expected that the multiplier effects would be high. Employment multipliers which have been used in relevant studies on the study region generally ranged from 1.8 to 2.2. For the purpose of this assessment, the multiplier of 2.2 is adopted. Table 2.5 shows the growth projection of the study region in the next five years, i.e. 1988-1993, based on the employment assumptions and multiplier assumptions discussed above.

Overall, the study region is expected to grow to about 11,100 by 1993, or by about 280 persons per year on the average in the next five years, without the ANC project. This represents a growth rate of about 2.9% per year, on the average.

In the Town of Whitecourt, without the ANC project, the population is expected to increase to about 6,500 when the Millar Western project begins operations in the summer of 1988. It

TABLE 2.5

Growth Projection of the Study Region[1]
(1988-1993) Without the ANC Project

		1988	1989	1990	1991	1992	1993
A	Population at 1981-1986 Growth Rates[2] (i.e. 0.8%/yr)	8,730	8,800	8,870	8,940	9,020	9,090
B	Basic Employment (Person-Year)						
	Addition to the Region						
	- Petroleum Sector	20	30	65	105	150	200
	- Forestry	210	220	250	250	250	250
	- Construction (excl. residential/community)	60	90	100	100	100	100
	TOTAL	290	340	415	455	500	550
C	Total New Employment (Basic and Non-Basic)[3]	638	748	913	1,001	1,100	1,210
D	.a Population Resulting from New Employment[4]	970	1,140	1,390	1,530	1,680	1,850
	.b accounting for natural growth[5]	970	1,170	1,450	1,620	1,810	2,030
E	Projected Total Population i.e. A + D.b in Region	9,700	9,960	10,320	10,560	10,830	11,120
	- In Whitecourt[6]	6,500	6,680	6,910	7,080	7,260	7,450
	- In ID 15	3,200	3,280	3,410	3,480	3,570	3,670
F	Children Age 5 - 19[7]						
	- Whitecourt	1,760	1,800	1,870	1,910	1,960	2,010
	- ID 15	900	920	950	970	1,000	1,030

1 Including Whitecourt and ID 15.
2 This period represents minimum growth in the region. Base year for the projection is 1986 with census population at 8,595 in the region.
3 Using an employment multiplier of 2.2. Assumes 1/2 of the new jobs are fulled by in-migrants.
4 Assuming an average household size of 3.05 for in-migrant workers.
5 Whitecourt has a natural growth rate of .025 per year (federal census).
6 Assummes Whitecourt's share is 67% of the region's total population, as in 1986.
7 Assuming 27% of total population in Whitecourt is 5-19 years of age, as in 1986. In ID 15, it was 28%.

would continue on a steady growth trend at about 2.9% or 190 persons per year, on the average, until 1993. The ID would increase its population by 90 persons per year on the average.

School-age children (ages 5-19) in Whitecourt are expected to reach to about 1,760 persons this year (1988). This age group would then grow by about 50 persons per year on the average in the following five years. The actual number of children enrolled in school would be less due to early drop-outs of some children in the senior grades. In the ID, the 5-19 age group would likely increase by 25 persons per year on the average over the next five years.

The planning implication of the projected growth in the Town of Whitecourt is that while growth in the next two years will be substantial when compared to the 1981-1986 period, it will be at a steady and manageable rate, and will be much below that experienced in the 1970's. This growth will provide a healthier planning basis for the town to provide some required expansion projects which, in time, will improve the amenities of the community for the benefit of the residents. In terms of local business services, residents will enjoy an expanded range of goods and services. Already, in response to the increased economic activities and an expanded population base in the past two years, the community has witnessed notable growth in new businesses, particularly in the retail trade, personal services and finance areas. Planning of two new shopping malls is underway to accommodate the business sector expansion.

The ID will also experience a greater level of growth when compared to the 1981-1986 period, but at a moderate rate. The moderate new growth (90 persons per year on the average) is expected to be readily accommodated with no stress on the existing infrastructure.

2.4 Community Infrastructure and Services

This section of the report describes the existing infrastructure and services of the Town of Whitecourt. Only Whitecourt's profile is presented, because it will be the primary host community for the proposed ANC project. Impacts on the Improvement District's infrastructure and services are expected to be minimal.

The description will focus on the major infrastructure and service areas, namely housing, schools, municipal infrastructure (sewage and water) and community services (police, health care services, fire protection, library, recreation services and social services). The main purpose of this section is to determine the capacity of these service areas to accommodate future growth of the community. Should it be required, planning actions can be undertaken now to alleviate any potential stress on the existing systems.

2.4.1 Housing

It was estimated that the Town of Whitecourt had a housing stock of about 2,150 units in 1986, of which 52 percent were single detached and duplexes, 28 percent were apartments and single attached and 19 percent were mobile homes (Yellowhead Regional Planning Commission 1987a). The town had a relatively large number of rental units when compared to most other towns in the Yellowhead Region. In 1981, almost 40 percent of the housing stock were rental units. As of July 1987, there were an estimated 524 rental apartments in Whitecourt (Alberta Municipal Affairs 1987).

Both the Town and the private sector hold substantial areas of land which can be readily developed for residential use. As of March 1988, it is estimated that there are about 200 serviced single family housing lots available ready for development. In addition, 30 semi-detached and/or town house lots will be available by the end of 1988. Also several condominium or apartment building sites are available for development, and a 120 stall mobile home park is expected to be ready for occupation in late 1988 or early 1989 (Town of Whitecourt, Memorandum). Furthermore, the town also has a handsome land reserve through its land bank, which can supply another 800 residential lots for future development.

It appears that the supply of serviced lots would be more than adequate to accommodate the expected population growth of the town in the next 5 years. In Section 2.3.3 it was estimated that without the ANC project, the town will grow by about 190 persons per year on the average over the next 5 years. Assuming an average household size of 3.1 persons, the number of households will grow by 60 units per year, on the average. Thus, some 60 housing units will be required per year for the next 5 years, for a total of 300 units. The projected supply of 350 serviced lots by early 1989 (not including the apartment units) would be adequate to meet the projected demand.

While the supply of serviced lots appear adequate in the long run, the current market conditions have led to a tight housing supply (Ames, Pers Comm). Construction of the Millar Western project in the past eighteen months has led to a substantial increase in demand in the housing market, particularly in rental housing. Current rental housing vacancy rate is believed to be zero, as compared to 10.7 percent July of 1987 (Alberta Municipal Affairs 1987). According to a local realtor, a duplex unit rents at $525-625/mo. now as compared to $475-575/mo. a year ago. Hotel and motel units are well used.

Demand for residential housing has witnessed a tremendous increase in the last few months. One realtor reported a tripling of sales in the first three months of 1988 as compared to the same period a year ago. There is a relatively high demand due to trading up of houses by local residents. It is anticipated that under these market conditions, there will be a short-term lag of supply behind demand for the next six months. Virtually all houses listed now are sold immediately. There is a need for immediate construction of new houses to meet this demand. Presently, a typical used three bedroom home would fetch a price of $80,000 - 85,000, while a typical new home of this type would be sold for $95,000 - 100,000, representing an increase of 3-4 percent from last year.

According to one local realtor, construction of new houses is underway in the town. It is estimated that 20-30 new houses can be made available on the market each month at least to the end of 1988. There are proposals before Council to construct two apartment buildings. As well, a new motel will be completed this year adding 40 more temporary housing units in town.

2.4.2 Schools

The Public School Board of the Town of Whitecourt operates two elementary schools and one high school. The total enrollment as of September 1987 was 945 students, an increase of 45 students from September 1986. The School Board projects the 1988-1989 enrollment to be about 1,025. The two elementary schools, with 1987-1988 enrollment at 335 and 190 respectively, are already at capacity. Six portable classrooms were added last year to increase the capacity of the elementary schools. These classrooms are expected to be filled up this year (Danks, Pers Comm). The high school had a 1987-1988 enrollment of 415, which represents 67 percent of the school's capacity.

The Public School Board is planning a $1.5 million modernization project for the high school. When completed in May of 1989, the high school will offer vocational training programs as well. Also, funding has already been approved for a new public school by 1989 or 1990. The public school secretary- treasurer foresaw no difficulty in accommodating the new-incoming students in the near future.

The Catholic School Board of Whitecourt operates two schools, one is an elementary-high school and the other is a Kindergarden - Grade 6 school. The former has a capacity of 525. Its September 1987 enrollment was 367 students. The Catholic School Board has projected an enrollment of 385 for the elementary - high school and 252 for the Kindergarden - Grade 6 school in September 1988 (Heisler, Pers Comm). Portable classrooms will be added to the Kindergarden -Grade 6 school to accommodate the expected overflow. Plans for a new school[1] is underway, and could be completed by 1989.

In total, the public and Catholic school boards have projected an increase of 135 students from the 1987-1988 school year to the 1988-1989 school year. Both school boards have plans to add at least two new schools in total by 1989.

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1 No decision has been made as whether it would be an elementary school or a high school.

2.4.3 Municipal Infrastructure

Whitecourt has a water treatment plant, built in 1981, to serve a nominal population of up to 9,000 (Yellowhead Regional Planning Commission 1987a). However, because of the relatively high level of per capita water consumption, the system could not actually service a population of 9,000 people. While the system is expected to be able to serve the community for the next several years, construction of another treated water reservoir will be required well before the population reaches 9,000 (Yellowhead Regional Planning Commission 1987a).

The sewage treatment facility, built in 1978-1979, was designed to serve a population of about 8,000 people. With upgrading, its capacity can be increased from 2728 m^3/day to 4546 m^3/day, or by 67 percent (Yellowhead Regional Planning Commission 1987a).

2.4.4 Community Services

The town of Whitecourt has a wide range of community services and supporting infrastructure. While most of these services and facilities are well positioned in terms of accommodating future growth of the community in the next several years, a number of service areas may require review.

The town library was built to serve the population of both the Town of Whitecourt and the ID, for a maximum of 6,000 people. With the population of the town and the ID now well over this threshold and predictions of further increases for the foreseeable future, expansion is required (Karlzen, Pers Comm).

The town's fire protection service is provided by a 28-member volunteer unit operating from the town's fire hall. Upgrading of facilities, equipment and manpower is needed to accommodate the town's future growth.

The town's police service is provided by the RCMP, with a police force of seven members. The RCMP has recently submitted a report to Town Council requesting funding increases for acquisition of an additional member to the police force, due to increases in both population and crime rates. While the detachement commanding officer confirmed an increase in alcohol-related crimes during the construction period of the Millar Western project, the overall per capita crime rate of Whitecourt is comparable to the average per capita rate of the province (Anderson, Pers Comm). In accordance to the standard of one policeman to 800 people, the town should have had a police force of eight men. A requirement of at least one more new member to the police force over and above the eight members, and one support staff by 1990 has been estimated. Additional space will be required for the RCMP operation by 1990 as well.

The town's general hospital was originally built to serve a population of between 2,000 and 3,000 people. It has 24 active treatment beds which are continuously at full capacity. In the last several years, the hospital experienced a steady increase in demand in outpatient and therapeutic/rehabilitation services, particularly related to industrial accidents or trauma cases (Edstrom, Pers Comm). The need for a new, expanded hospital is imminent. Planning for the facility is underway. The hospital administrator indicated a requirement for a 50-bed hospital with emphasis on outpatient services, to serve a population of 9,000 people. In addition, the Advanced Life Support Ambulance service would be preferred over the existing Basic Life Support Ambulance Services, due to a high incidence of industrial related uses. The former, however, would cost an additional $50,000 per year over the latter.

The Town of Whitecourt offers a range of statutory and non-statutory social services, including the food bank, youth programs, the homemakers program and social assistance programs under the Family and Community Support Services (FCSS). Alberta Career Development and Employment offers career/job counselling and upgrading. Other services include mental health care counselling and family counselling. Since the beginning of the construction of the Millar Western project, all social services agencies have experienced steady increases in case loads. Clients include both transients migrating to the town looking for work, as well as local residents who have experienced stress in the family or in the work place. One social service agency staff member observed that there has been a definite sense of economic well-being in the community. However, there has also been an associated rise in expectations in terms of improved wages or job opportunities. It is anticipated that in some families and individuals, over-expectations could lead to stress and conflicts. Officials of social services agencies felt that any anticipated case load increases could be manageable, provided sufficient funding would be available to expand current programs or to develop other alternative programs to deal with specific areas of need.

The Town of Whitecourt has a wide range of recreational facilities, programs and parks. The Town Manager and the Recreation Director felt that, generally, the recreational facilities are well positioned to accommodate further increase in population at least for the next several years.

3.0 IMPACT ASSESSMENT AND MITIGATION

In this section, the effects of the ANC project are assessed. In accordance to the approach of this assessment, the focus is on the main areas of impacts which are of concern to the host region and community. These include:

- o income and employment effects
- o population effects
- o effects on community infrastructure and services

Both the construction and operations phases of the project are examined. Direct, indirect and induced impacts are analyzed. Potential stress, if any, on local infrastructure and services will be identified, and mitigation measures will be presented.

3.1 Regional Economic Effects

The proposed ANC newsprint project has an estimated capital cost of $335 million, of which $154 million or 47 percent is expected to be spent in Alberta. The remainder will be spent in the rest of Canada, in the United States or overseas. The project construction period is expected to span from the third quarter of 1988 to the second quarter of 1990, for approximately 24 months. While a small on-site operating staff will be present during the construction period, the mill will not begin full operation until the third quarter of 1990. Annual operating cost of the newsprint mill and associated forestry operations is estimated at $90 million of which about $75 million or 83 percent will be spent in Alberta, while the remainder will be spent in other parts of Canada.

During construction, the project will employ up to 610 persons on-site at the peak of construction activity. When in full production, the mill will employ 190 full-time personnel and provide job opportunities of up to 175 person-year jobs in the logging/transportation component of the operation.

3.1.1 Income Effects

The ANC project is expected to generate a basic construction expenditure of $154 million in the province of Alberta during the construction phase of the project. Of this, $57 million or 37 percent would be on-site labour cost[1]. The remaining $97 million would be spent on material and services.

It is expected that of the total labour cost of $57 million, only $40 million will be for wages, and salaries, and approximately $20 million[2] will be retained within the study region as direct household income.

It is difficult to estimate the proportion of construction expenditures which will be spent locally within the study region, as detailed purchasing requirements for the construction of the newsprint mill are not yet available. Nonetheless, due to a small economic base, the capability of the region to supply the construction needs of the project is limited, likely contributing approximately 10 percent ($10 million) of the goods and services needed for construction.

According to Alberta Bureau of Statistics' Input-Output Model, the construction industry in the province has a household income multiplier of 1.636. Applying this to the analysis of the

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1 This is based on a requirement of 1.4 million Albertan manhours at an average of $40 per hour.

2 It is assumed that 35 percent of the construction jobs will be filled by local residents, and in-migrant construction workers will spend no more than 25 percent of their wages on the region's economy.

income effect of the newsprint project, it is estimated that the total income effect will be about $250 million ($154 million x 1.636) to the province. Of this, approximately $50 million will be retained by the study region, primarily in the Town of Whitecourt.

Table 3.1 summarizes the operating expenditures by main item of purchases for the whole project which includes the newsprint mill and the woodland operations. When the whole project is in full operation by 1990, the annual operating cost will amount to $90 million of which $75 million will be spent within Alberta. For the Alberta portion of the expenditure, 32 percent or $24 million will be spent on labour, and the remainder will be spent on material, goods and services.

It is expected that of the $24 million expenditure on direct and contract labour, $10 million will be spent on the woodland operations. For the newsprint mill operations, it is estimated that $9 million will be retained within the study region. The remainder will be lost through taxes, government transfers and other form of leakages.

Of the $51 million expenditure on Albertan goods and services, it is expected that only a small percentage, probably $5 million or 10 percent, will be spent within the study region, due to the limited capabilities of local businesses in supplying the required goods and services. The type of purchase requirements which will likely benefit the local businesses include raw materials, supplies and transportation. Chemicals will be likely imported from the other parts of the province. Energy for the mill will be supplied by TransAlta and provincial natural gas producers.

TABLE 3.1

ANC Newsprint Project Estimated Annual Operating Expenditures

	$ Millions/Annum		
	Total	Alberta	Canada
Direct Labour	14	14	-
Contract Labour	12	10	2
Transportation	16	15	1
Raw Materials	6	6	-
Energy	23	23	-
Chemicals	5	3	2
Supplies	14	4	10
TOTAL	**90**	**75**	**15**

According to Alberta Bureau of Statistics' Input-Output Model, the wood industries in the province has a household income multiplier effect of 1.613. Thus, by applying this multiplier, the total income effect during operation of the ANC newsprint project will amount to $120 million per year ($75 million x 1.613), on the province of Alberta. Of this, approximately $22.5 million per year will be retained within the study region, primarily in Whitecourt.

3.1.2 Employment Effects

Table 3.2 shows the manpower requirements by skill category by quarter year of the ANC newsprint project over the 24-month construction period. Figure 3.1 graphically presents the same information. Table 3.3 summarizes the manpower requirements in terms of person-year equivalent for each year of construction.

The construction of the ANC project will generate an equivalent of 853 person-year jobs over a 24-month period. The first year will employ an equivalent of 79 person-years; the second year will employ up to 475 person-years; and the third year will require 299 person-years. The largest labour requirement will occur in the structural trade category (248 person-year jobs), followed by general labour, pipefitters and mechanical trades.

During construction of the Millar Western pulp mill project, 80 to 90 local residents were estimated to be employed directly on the job. It is expected that the local capability will improve as individuals upgrade their skills. For the ANC project, it is expected that 100 local residents will be directly employed on the construction of the project. Thus, some 550 person-year jobs will be filled by outside workers in-migrated to the region for the duration of the project. During the peak construction period, some 450 to 500 outside workers would be working

TABLE 3.2

Construction Manpower Requirements
of the ANC Newsprint Project

Manpower Requirement	1988 2nd	3rd	4th	1989 1st/89	2nd	3rd	4th	1990 1st/90	2nd	3rd
General Labour	0	36	26	60	90	90	77	90	86	0
Structural Trades	0	56	63	168	220	217	143	105	19	0
Mechanical Trades	0	0	0	0	37	90	98	140	130	0
Operating Eng./Teamsters	0	17	15	27	36	37	31	35	27	0
Pipefitters	0	20	17	36	64	27	40	90	225	0
Electricians	0	18	15	26	35	45	37	72	72	0
10% Contingency	0	14	13	31	48	51	39	50	50	0
TOTAL MANPOWER	**0**	**161**	**149**	**348**	**530**	**557**	**465**	**582**	**609**	**0**

FIGURE 3.1

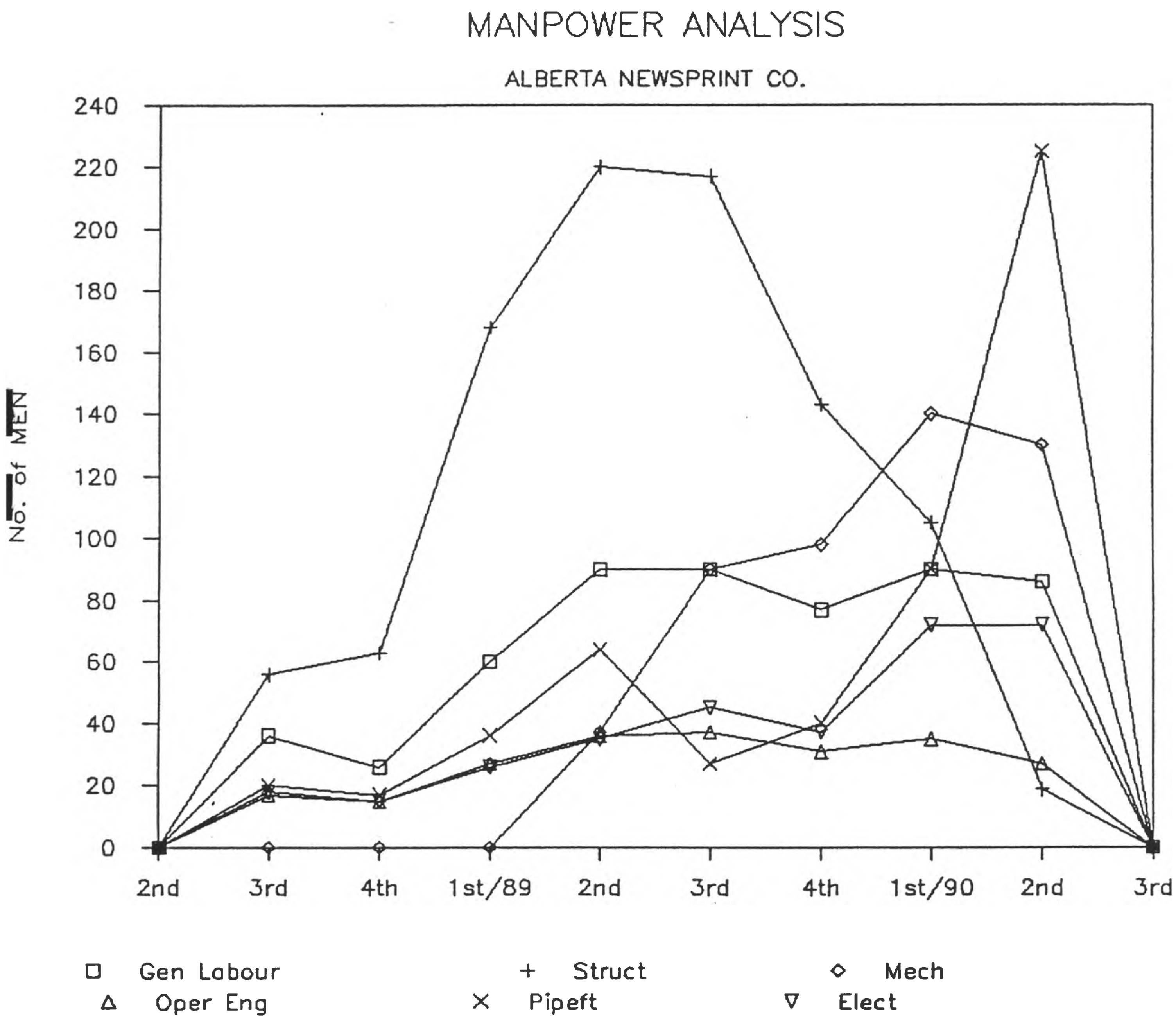
MANPOWER ANALYSIS
ALBERTA NEWSPRINT CO.
No. of MEN
240
220
200
180
160
140
120
100
80
60
40
20
0
2nd
3rd
4th
1st/89
2nd
3rd
4th
1st/90
2nd
3rd
Gen Labour
Struct
Mech
Oper Eng
Pipeft
Elect

TABLE 3.3

Person-Year Manpower Requirements
Construction Phase and Operation Phase

	1988	1989	1990	1991	Total
Construction					
General Labour	16	79	44	-	139
Structural Trades	30	187	31	-	248
Mechanical Trades	0	56	68	-	124
Operating Eng./Teamsters	8	33	16	-	57
Pipefitters	9	42	79	-	130
Electricians	8	36	36	-	80
10% Contingency	8	42	25	-	75
TOTAL CONSTRUCTION	**79**	**475**	**299**	**-**	**853**
Newsprint Mill Operations					
Process & Utility Operators			102	102	
Maintenance Trades					
- Mechanical /Pipefitters			20	20	
- Electrical/Instrumentation			10	10	
- General			8	8	
Supervision & Support Staff	10	30			
- Plant Management			6	6	
- Operations Supervisors			16	16	
- Technical Eng.			9	9	
- Accounting, Purchasing, Industrial Relations			15	15	
- Sales & Shipping			4	4	
TOTAL OPERATION	**10**	**30**	**190**	**190**	

on-site. Some of these could come from Fox Creek, Mayerthorpe and other outlying communities.

In Section 3.1.1, the construction of the ANC project is estimated to generate an indirect and induced income of $30 million in the study region. This, in turn, will create employment in the other manufacturing and service sectors in the region. It is estimated this effect will amount to 1,000 jobs[3]. Thus, the total regional employment effect during the construction phase of the project will be 1,300 person-year jobs, not accounting for jobs filled by temporary, in-migrant workers.

Operation of the newsprint mill will generate 200 direct jobs of which 10 (corporate positions) will be in Edmonton. The woodland component will employ up to 175 people by 1992. The operation of the newsprint mill will create an annual indirect and induced income of $13.5 million in the region (see Section 3.1.1). This would in turn, create employment in the other manufacturing and service sectors of the regional economy. This employment effect is estimated at 450 jobs. Thus, the total long-term employment effect of the ANC project on the region is estimated at 640 jobs, excluding the woodland operations.

The woodland operation will employ 30 people in 1989, increasing to 140 by 1991 and 175 by 1992 and thereafter. The employment effect associated with the woodland operations on the Town and the ID may be small because of the substantial distance between the forestry supply area and the Town of Whitecourt and the ID. Fox Creek and other communities to the west of the ID may benefit more from the woodland operations, due to their proximity to the forestry supply area.

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3 Assuming an average annual wage rate of $30,000 per job.

3.2 Population Changes

Employment resulting from the ANC newsprint project as well as the indirect and induced employment associated with the project will provide opportunities to local residents. While ANC has a policy to maximize local employment, provided qualifications are met, not all positions will be capable of being filled by local labour. Similarly, while most jobs created in the service sectors would likely be filled by existing local residents, some positions would be filled by outside workers. People who in-migrate to the study region or Whitecourt to fill these positions, and their families, will become part of the total population of the region. The following provides an estimate of the level of in-migration that might occur and the effect of such on the total population of the ID and Whitecourt.

During the construction period, it is expected that approximately 100 local permanent residents will fill the construction positions. Due to seasonal fluctuations of labour requirements, the level of temporary in-migrant workers will change. Based on the labour requirements presented in Table 3.2, it is estimated that the level of temporary in-migrants who will stay in Whitecourt for the duration of the construction period (1988-1990) will vary from a low of 50 at the fourth quarter of the construction phase, rising to 460 in the third quarter of 1989 and peak at 500 near the conclusion of the construction phase. It is expected that some construction workers who had worked on the Millar Western project could stay on and fill these new construction positions.

The construction of the ANC project will create spin-off employment effects in the secondary and service industries, amounting to 1,000 jobs over the 3 year construction period or about 330 jobs per year. It is expected that most of these jobs can be filled by existing local residents, either from Whitecourt or from the ID. Construction of the Millar Western project has already resulted in additional jobs in the service industries in Whitecourt; it is expected that in-migration of workers to the community to fill the new service industry positions would have already occurred in the past two years, and that these people will likely stay on for the duration of the construction of the ANC project and possibly longer into the project's operating stage. Nonetheless, there will likely be further in-migration of workers to fill the new secondary and service industry jobs, probably in the neighbourhood of 100 families or 340 people.

When operation of the newsprint mill begins in 1990, it is expected that only a small portion, about 50, of the required personnel can be recruited from within the study region, due to the specific skill demands for most of the positions. Thus, up to 140 workers will likely be recruited from outside. In the secondary and service industry sectors, up to 450 new jobs will be created as a spin-off effect of the newsprint mill. It is expected that 300 of these positions can be filled by local residents or in-migrants' spouses, thus 150 jobs will be filled by another group of in-migrants. The total in-migrant level will reach 290 families or 1,000 people.

Table 3.4 presents the population changes and the resultant total population with the ANC project in the study region. The ANC project will increase the population of Whitecourt by 5 percent or 310 people in the initial year of its construction (not including temporary in-migrant construction workers) assuming 90% of all in-migrants live in Whitecourt, with the remaining 10% living in the ID. By 1990, when the project commences operation, the population will increase by 13 percent or about 900 people as compared to that without the ANC

TABLE 3.4

Population of the Study Region with the ANC Project

	1988	1989	1990	1991	1992	1993
Population Without ANC[1]	9,700	9,960	10,320	10,560	10,830	11,120
- in Whitecourt	6,500	6,680	6,910	7,080	7,260	7,450
- in ID 15	3,200	3,280	3,410	3,480	3,570	3,670
Number of Temporary In-migrant workers associated with ANC Construction (Peak Only)	60	460	500	-	-	-
Number of Permanent In-migrant workers associated with ANC	100	100	290	290	290	290
Permanent In-migrants associated with ANC	340	340	1,000	1,000	1,000	1,000
- accounting for natural growth[2]	340	350	1,010	1,030	1,060	1,085
Total Population with the ANC Project[3]	10,040	10,310	11,310	11,580	11,880	12,180
- in Whitecourt	6,810	7,000	7,800	8,000	8,200	8,400
- in ID 15	3,230	3,310	3,510	3,580	3,680	3,780
Children Age 5-19[4]						
- Whitecourt	1,840	1,890	2,100	2,140	2,200	2,270
- ID 15	900	925	980	1,000	1,030	1,060
Children Age 5-19 due to ANC						
- Whitecourt	80	90	250	250	250	260
- ID 15	0	5	30	30	30	30

[1] from Table 2.5
[2] Whitecourt has a natural growth rate of .025 per year (federal census)
[3] Not including temporary in-migrants. Whitecourt's share of in-migrant population is assumed at 90 percent.
[4] see footnote 7 of Table 2.5

project. By 1993, three years after the mill commences operation, the town will continue to be 13 percent (or 950 people) larger in population than as if the ANC project did not take place. Thus, with the ANC project, the town will grow to about 8,000 people by 1991, as compared to about 7,100 without the project.

The population effect of the project on the ID is less significant. At the maximum, it will increase the ID population by 3 percent or 100 people when it commences operations in 1990.

3.3 Infrastructure and Service Requirements

The population change as a result of the ANC project will create additional demand on the community's infrastructure and services. Depending on their existing capacities and capability, adjustment and expansion may be required. This section reviews the major areas of the community's infrastructure and services, based on the data presented in Section 2.4.4, against the population projections presented in Section 3.2. The focus of the discussion is on the Town of Whitecourt, as the population effect of the project on the ID is minor.

3.3.1 Housing

It was discussed in Section 2.4.1 that although the Town of Whitecourt has a good supply of serviced lots (estimated at 350 by the end of 1988) and a large land reserve (for at least another 800 lots) for further development, the current speed of residential construction appears to lag behind demand somewhat. With the construction of the ANC project beginning the summer of 1988, the demand will continue to escalate above the level observed in the spring of this year. Already, local realtors have witnessed a dramatic increase in housing sales. It is expected that the operation of the Millar Western project and the Town's natural growth will create a demand for some 100 dwelling units. Another 100 units will be required to accommodate the demand associated with the ANC project by the fall of 1988, over and above the demand on rental accommodation for the temporary in-migrant construction workers.

It is expected that some 150-200 of the 350 planned subdivision/ mobile park units will be taken up by the end of 1988. Construction activities should be encouraged to proceed as quickly as possible to avoid shortages. Rental housing should also be encouraged to proceed in a timely manner, although the level of demand will be less acute. Should the supply of residential housing fall behind demand, pressure will shift on to rental housing.

By 1990, when the ANC project commences operation, the demand for housing will increase again. In addition to the basic demand of 50-60 units, the ANC project is expected to increase the town's population by 900-1,000, hence a demand for 300-350 dwelling units.

3.3.2 Schools

It was noted in Section 2.4.2 that the public and Catholic school boards of Whitecourt have projected a combined increase of enrollment of 135 students for the 1988-1989 school year. This coincides with the projections of this assessment. The base line school-age population projections as presented in Table 2.5 indicate an increase of school-age population by 50-55 persons per year, without the ANC project. With the ANC project, the increase will be 130-140 in 1988, and 300-320 by

1990 and thereafter. Thus, the ANC project will generate a school-age population of 80-90 in 1988 and 1989 increasing to 250 in 1990 and thereafter.

Both school boards have plans to accommodate the immediate growth, and have long term plans for two new schools in total. It is, therefore, expected that the school system will accommodate the new growth with little difficulty.

3.3.3 Municipal Infrastructure

It was indicated in Section 2.4.3 that the water system of Whitecourt was built for a nominal population of 9,000, although improvement is required if the system were to realize its potential. The sewage system can accommodate up to 8,000 and have the potential to increase its capacity by 67 percent with upgrading.

With the ANC project, the population of Whitecourt will reach 8,000 by 1991, and exceed that by 1992. Without the project the population will be 900 people less, and it will not reach the 8,000 population level until 1995 or 1996.

With the target of 8,000 people several years away, the community has ample time to plan for its sewage and water systems' upgrading.

3.3.4 Community Services

It was discussed in Section 2.4.4 that several community services areas require review, even without the project. These include the library, the fire protection service, the police service, the hospital, the ambulance service and the various social services programs. With an anticipated population increase of up to 900-1,000 people resulting from the ANC project, there is definite requirement for further expansion or review of current services and programs. The population projections of this assessment will assist various service agencies in their planning efforts for this work. As each agency has its own guidelines, policies and procedures to follow, details of the requirements are expected to be developed by individual agencies concerned.

Most of the requirements for expansion are related to staff, facilities and/or equipment. These can be readily accommodated in the regular program/service review as normally undertaken by the concerned agencies.

APPENDIX A

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APPENDIX B

List of Personal Contacts

LIST OF PERSONAL CONTACTS

Ames, Brian. Realtor, Canada Trust. Whitecourt, Alberta.

Anderson, Ben (Sgt.). The RCMP, Whitecourt, Alberta.

Berget, John. Realtor, Century 21 Noram Realty Ltd. Whitecourt, Alberta.

Danks, David. Secretary-Treasurer. Whitecourt Public School District. Whitecourt, Alberta.

Davis, Sheila. Office Assistance. Whitecourt Employment Outreach Office. Whitecourt, Alberta.

Edstrom, Alvin. Hospital Administrator. Whitecourt General Hospital. Whitecourt, Alberta.

Goettel, Rudy. Improvement District No. 15 Manager. Whitecourt, Alberta.

Granley, Jay. Director of Recreation Department. Town of Whitecourt. Whitecourt, Alberta.

Heisler, Dorathy. Secretary-Treasurer. Whitecourt Catholic School District. Whitecourt, Alberta.

Kapler, Kevin. Supervisor. Mental Health Clinic, Alberta Mental Health Program. Whitecourt, Alberta.

Karlzen, Irene. Librarian. Town of Whitecourt. Whitecourt, Alberta.

Lambert, Denise. Director of Family Community Support Services. Whitecourt, Alberta.

McPhee, W.N. Director of Development and Work. Town of Whitecourt. Whitecourt, Alberta.

Ross, J.A. Manager of Edson Canada Employment Centre. Edson, Alberta.

Sarnecki, Dan. Assistant Area Supervisor. Alberta Energy Resources Conservation Board. Drayton Valley, Alberta.

Sondergard, Harvey. Assistant Area Supervisor. Alberta Energy Resources Conservation Board. Edmonton, Alberta

Surman, Dennis. Fire Chief. Town of Whitecourt. Whitecourt, Alberta.

Winger, W.L. Municipal Manager. Town of Whitecourt. Whitecourt, Alberta.

Zelinski, Leo. Realtor, Century 21 Noram Realty Ltd. Whitecourt, Alberta.

APPENDIX 5

MEETINGS WITH MUNICIPALITIES

APPENDIX 5

CONTENTS

WHITECOURT PUBLIC MEETING

Alberta Newsprint Company Ltd.

PUBLIC MEETING

MINUTES OF MEETING

21 April 1988, 7:00 P.M.

Whitecourt Community Centre

Purpose of Meeting: To address the nature of the proposed newsprint mill, and the impact associated with its construction and operation.

Chairman: Mr. Elmer Berlie, Environmental Co-ordinator - Alberta Newsprint Company Ltd.

First Speaker: Mr. Ron Stern, Managing Director - Alberta Newsprint Company Ltd.

Mr. Stern stated that Alberta Newsprint company's (ANC) plans are to build a world class newsprint mill, which, when in operation, will employ one hundred and ninety people. The aim and desire of the ANC is to have a successful and environmentally safe mill. The policies of the ANC include the responsible use of resources; with no waste of wood fibre, or pollution of air. The impact will be beneficial to the community. ANC's priorities include good training programs and a stimulating environment for workers.

Second Speaker: Mr. Doug Fromson, Project Co-ordinator - Nystrom, Lee, Kobayashi & Associates (N.L.K.).

Mr. Fromson spoke about the location of the mill, which will be on Highway 43, 10 km west of Whitecourt and 1 km west of Highway 32 junction to Swan Hills A new rail spur will be constructed from near Whitecourt. The water supply will

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come from the Athabasca River and treated mill effluent will be returned to the river. The mill will produce newsprint only, and will be the first of its kind in Alberta. No pulp will be sold separately.

Chemi-thermomechanical (cTMP) pulp will be produced in slurry form as feed for the newsprint machine. The process uses a mild chemical treatment, heat and mechanical energy to produce the wood fibre for the slurry. One grade of pulp will be produced.

Third Speaker: Mr. Harry Thompson, Vice-President of Operations - Alberta Newsprint Company Ltd.

Mr. Thompson described the working of the paper machine, and discussed the mechanical aspects of the paper making process. The paper will be produced in thirty (30) foot widths, at five thousand (5,000) feet per minute. A ten thousand (10,000) ton working inventory will be kept on hand. The mill will have a warehouse, and the company will sell its own products.

Fourth Speaker: Mr. Neil Desaulniers, Director - Alberta Newsprint Company Ltd.

Mr. Desaulniers discussed the Forest Management Agreement (FMA), and the areas under reserve: W1, W8, E7, E6, W2-deciduous, and W6 for future expansion. The mill will consume 600,000 cubic meters of wood chips per year. It will use Aspen for twenty percent of the fibre supply. ANC will buy chips as they are available. Ultimately, the mill will be a two machine operation.

Fifth Speaker: Mr. Peter Sagert, Environmental Co-ordinator - Nystrom, Lee, Kobayashi & Associates.

Mr. Sagert spoke about the Environmental Impact Assessment which involves compiling a document of assessment of the environment including the socio-economic implications, as well as impacts on air and water quality. This document will be submitted next month for review by Alberta Environment. A copy will be sent to the Whitecourt Library for the public's information. He went on to disuss the effluent treatment plan that will be implemented. He concluded that the residual impact would be minimal.

Sixth Speaker: Mr. Brian Bietz, Ph.D., Environmental Consultant - Beak & Associates Consulting Ltd.

Mr. Bietz talked about the environmental concerns affecting the river. ANC's goal is to make sure that the mill effluent does not have a negative impact on the river. A study was done based on winter low flow conditions, in a worst case scenario, including the Champion mill at Hinton, the Millar Western mill and the proposed ANC mill, to make sure that the predictions were realistic and conservative. The primary concern is the BOD imposed on the river. The study showed that the river was capable of handling the added load without serious negative impact on water quality.

Seventh Speaker: Ms Laun Au Yeung, Socio-economic Consultant - D.A.P. Group, Subsidiary of Monenco Consultants Ltd.

Ms. Au Yeung discussed a preliminary study that has been done to look at the proposed newsprint mill's impact on the community's income, infro-structure, population and community services. The capital cost of the mill is estimated to be ninety million dollars per year. At the peak of construction six hundred people will be on site. When, completed there will be one hundred and ninety people on staff and one hundred and seventy-five people in the logging sector, although this latter segment may affect Fox Creek more than Whitecourt.

In the construction phase, forty-nine million dollars will go to Whitecourt area, and two hundred and fifty million dollars to the Province. Under full operation one hundred and five million dollars will flow to the Province, and twenty-two million dollars to Whitecourt. She projected that there will be six hundred additional jobs to the community, direct and indirect, through operation of the mill. The projected growth for the community above natural growth will be five per cent for 1988, eight per cent by

1990, (7,800 pop.), and thirteen per cent by 1999. Based on consultation with the Municipal Planning Commission, three hundred and fifty serviced lots could be made available in 1988. Additional housing requirements are one hundred units.

Projected figures for school age children will be eighty during construction phase to two hundred and fifty under full operation; again, this is over and above natural growth rates. The community has two years to plan ahead for additional community services; library firehall etc... Based on the planning that has taken place and the economic turndown in the oil and gas industry in 1985, Whitecourt will be able to absorb this added growth without serious negative impact.

Mr. Berlie opened the meeting for questions.

Norm Long	Q:	Will this be a union or non-union job:
Ron Stern	A:	It will be open shop.
Don Orwill	Q:	What about reforestation?
Neil Desaulniers	A:	Under the terms of a Forest Management Agreement you must meet certain levels of reforestation. There is also the possibility of a nursery in the Whitecourt area to meet the added demand for seedlings.
Brad Robinson	Q:	Will the mill provide transportation for workers?
Ron Stern	A:	No, the short travel distance is one of the reasons that this location was chosen.

George Vanderburg — Q: Will there be a camp, and will this be detrimental to the hotels and motels in this community?

Ron Stern — A: No, ANC has no plans for a camp.

Gary Newman — Q: How many more large trucks and rail cars will be needed, and will this cause a problem with congestion?

Neil Desaulniers — A: There will be a slight increase. Approximately 25% to 30% of the production will be shipped by truck. This is roughly 6 to 7 trucks daily, and 10 rail cars per day. This should pose no problem with congestion, as there will be a spur line from the site to Whitecourt.

Citizen — Q: What about Fire Prevention?

A: The mill will have adequate fire fighting equipment. There is also excellent training of the staff members on shift in the use of the equipment and their duties in case of a fire.

Ellmer Berlie — A: There will be no shortage of fire prevention measures, since the mill could not get insurance without meeting stringent standards.

Mr. Arnie Olexan, Deputy Mayor for the Town of Whitecourt.

Mr. Olexan stated that there has been no difficulty with ANC to date, and that they have had excellent cooperation from them. Mr. Olexan also said that in the town's expansion it can easily accommodate four thousand people. Future recreations needs are also being considered.

Mr. Werner Messerschmidt, Improvement District Representative - ED 15.

Mr. Messerschmidt thanked the ANC for choosing ID 15 as the site for the new mill, and assured the audience that there are plenty of acreages and farm land available for those who wish to settle outside the community.

The meeting recessed for coffee and refreshments at 8:15 P.M. During this period, those present were encouraged to ask questions of the speakers. The meeting closed at 9:30 P.M.

WHITECOURT PUBLIC MEETING ATTENDEES

APRIL 21, 1988

NAME	REPRESENTING	COMMUNITY
Frank Benco	C.N.R.	Whitecourt
Mark Kryczka	Associated Eng.	Edmonton
John McCutcheon	Associated Eng.	Edmonton
Lloyd Remus		Whitecourt
Bill McPhee	Town of Whitecourt Economic Development	Whitecourt
Leo Zelinski	Century 21 Real Estate	Whitecourt
Bud Winger	Town of Whitecourt Municipal Manager	Whitecourt
Kerry Miller		Edmonton
Jay Granley	Town of Whitecourt Recreation Director	Whitecourt
Eric Berlie	Blue Ridge Lumber	Whitecourt
Mary Berlie	Canada Trust Wilcox & Wilcox	Whitecourt
Tony Olthof	Canada Employment & Immigration	Edson
Arnie Olexan	Town of Whitecourt Deputy Mayor	Whitecourt
Bruce Milne	Alberta Environment	Whitecourt
Bill Eberhardt	Eberhardt greenhouse	Whitecourt
Braden Robinson	Diversified Trans.	Edson
Brian Davies	Blue Ridge Lumber	Whitecourt
Mike L. Roszko	Mijay Const. Ltd.	Mayerthorpe
Werner Messerschmidt	ID 15	Whitecourt
David Kolbuc	Principal Hilltop High School	Whitecourt

NAME	REPRESENTING	COMMUNITY
Fritz Gajetzki		Whitecourt
Geoff Brewer	Spartan Controls	Edmonton
Carl G. Tocksch	Redwood Enterprise	Whitecourt
Marlaine Ward	Whitecourt Star	Whitecourt
Rudy P. Goettel	Alberta Municipal Affairs	Whitecourt
Jack Demler	Millar Western	Whitecourt
Gary Newann		Whiteocurt
Dennis Surman	Town of Whitecourt Fire Chief	Whitecourt
Boris Makowecki		Whitecourt
Allan Gray	Jack Pine Motel	Whitecourt
Donald Smith	Bank of Montreal	Whiteoourt
George Vanderburg	Town Councillor	Whitecourt
Elmer Harke	Town Councillor	Whitecourt
Jim Riddle		Whitecourt
Peter Rippon		Whitecourt
Al Nikiforuk		Whitecourt
Archie Jacobs		Whitecourt
Trev Wakelin	Millar Western	Whitecourt
Keith Murray	Millar Western	Whitecourt
Norm Long		Edmonton
Guenter K. Salchert	Millar Western	Whitecourt
Esmeralda Cabral	Alberta Environment	Edmonton

Note: There were a few attendees who did not sign and some who came late. This number is estimated at about 10 persons.

Minutes recorded by Michelle Elder

Alberta Newsprint Company Ltd.

2130 West 12th Avenue
Vancouver, B.C.
V6K 2N3

Telephone: (604) 733-0344
Telefax: (604) 734-4316

30 March 1988

Miss Frankie Thornhill
Managing Editor
Whitecourt Star
Whitecourt, Alberta

Dear Miss Thornhill:

Subject: Display Ad - Public Meeting

Further to our telephone conversation of today, attached hereto is the display ad discussed with Judy Deans of your staff.

It is to be approximately 6" x 10" in dimension with a prominent, but appropriate, solid border.

The ad is to be inserted in your 6 April and 13 April issues. In preparing your invoice, please refer to this letter and use ANC-Job. No. 1674.

Please phone me if you have any questions.

Yours truly,

ALBERTA NEWSPRINT COMPANY

Elmer M. Berlie, P. Eng.

EMB/jr

Attachment

cc: R. Stern, ANC
V.N. Desaulniers, ANC
W. Nystrom, NLK
T. Kobayashi, NLK
D.A. Fromson, NLK
P. Sagert, NLK

Alberta Newsprint Company Ltd.

PUBLIC MEETING

Alberta Newsprint Company extends an invitiation to the citizens of Whitecourt and district to attend a public meeting. The meeting will address the nature of the proposed newsprint mill to be located 10 km west of Whitecourt on Highway 43 and the impacts associated with its construction and operation.

DATE: Thursday, 21 April 1988

LOCATION: Whitecourt Community Centre

TIME: 7:00 p.m.

Alberta Newsprint representatives will be present at the meeting to address your questions.

Alberta Newsprint

IMPROVEMENT DISTRICT 15

Alberta Newsprint Company Ltd.

PUBLIC CONSULTATION PROGRAM

MEETING WITH: Improvement District 15

DATE & TIME: April 22, 1988 9:00 a.m. - 10:45 a.m.

ATTENDEES: Werner Messerschmidt, Chairman I.D. Council
Roy Merrifield - Councillor, Whitecourt
Rudy Goettel, Manager

ANC REPRESENTATIVES: Ron Stern
Neil Desaulniers
Harry Thompson
Doug Fromson
Peter Sagert
Brian Bietz
Elmer Berlie

QUESTIONS AND RESPONSES:

Q: What is the Development Permit Process?

A: Application is referred by Council to the Municipal Planning Commission (MPC). The MPC considers the application to ensure that it meets the land use and zoning requirements. If MPC recommends approval, and Council accepts it, the application is advertised in the local paper. Residents have up to 14 days to appeal. If an appeal is filed, it is heard before the Development Appeal Board (DAB).

Appropriate plans for the development must accompany the application.

Presentation: A brief statement was made about the process and treatment of the effluent.

Q: What is the pond?

A: It is an aerated stabilization basin with 10 days' retention time. In the pond, wood sugars are biologically degraded. The pond will have an impervious lining.

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Q: What happens to the effluent?

A: About 95 per cent of the intake water is returned as treated effluent.

Q: What is the temperature?

A: 35 degrees celsius, maximum.

Q: What is the color of the effluent?

A: Light chocolate brown but this will dissipate rapidly in the river after it leaves the diffuser.

Q: What are the effluents discharged to the air? There is a unique valley effect; sometimes it is totally clouded in.

A: (By Sagert) Main effluent is water vapour. There will be some oxides of nitrogen from the boilers and particulate matter from the incinerator. Data shows that on average there are 39 days where fog occurs at the airport. A cooling effect in the valley causes the fog, some 2 to 3 days of the year. Due to the location and elevation of the mill an adverse effect is not expected at either the airport or in the Town.

Q: We are concerned about the amount of sludge and the effect on our land fill site. A new regional land fill site will be ready, east of Whitecourt, in September. This is jointly administered by the Town and the I.D.

A: (By Fromson) There are two types of sludge; that from the effluent clarifier which can be burned, and that from the water treating area, if silt is precipitated by alum treatment. This material will need to be landfilled.

Q: Because of the limited number of land fill sites available in the area we are concerned about the amount and nature of the sludge. What are they going to be?

A: (By Stern) This will be finalized as soon as possible and a letter will be sent tot he I.D. and to the Town.

Q: What do you have to do to the water to recycle it?

A: (By Fromson) Cannot recycle it because the dissolved solids keep building up. That technology is not used anywhere in the world.

Q: What about the effects of sodium?

A: (By Fromson) The concentration of sodium will be very low.

Q: You talked about the forestry haul road starting at Grande Cache. How would it get to the plant site?

A: (By Desaulniers) It would cross the river at Knight and continue eastward to Windfall where it would join the Windfall road. It would then continue north and east and cross the river at Hurdy, turn east and run parallel to Highway 43, entering the mill site on the west boundary.

Q: (ANC) What are the fiscal arrangements within the I.D.?

A: (By Goettel) About 15% of revenue goes to road construction in the I.D. The general assessment is being revised this year. About 90% of the revenue comes from industry.

An Industrial Transfer Tax (ITT) is used to share tax revenue between the I.D. and the Towns of Fox Creek and Whitecourt. it is a surtax based currently at $60 per head of family employed at the plants. The tax hasn't been levied in the past four years because of the depressed state of the industrial sector. In this period payments to the towns was made from over-collections in previous years.

I.D. total revenue is about five million dollars including school taxes. Currently the two school boards in Whitecourt are applying to have the mill rate applied to their tax base as opposed to Northland School District.

Mr. Winger and Mr. McPhee from the Town of Whitecourt joined the meeting at 10:15 A.M. to discuss regional aspects such as water supply and landfill.

Q: (ANC) What are the possibilities of an arrangement to have the I.D. supply the mill with water from the McLeod River?

A: (By Goettel) We have no customers in the area. The only way would be to form a regional water authority.

(By McPhee) It would not be possible to get funding because any grants are derived form a Municipal Assessment Fund, so funding could not be obtained to supply water to an industry.

(By Goettel) This same situation applies to landfill. Alberta Environment (AE) will not fund landfill sites for industry.

(By McPhee) If a municipality uses its landfill capacity up prematurely to meet industrial needs, AE will not fund a new site.

SUMMARY:

All questions and concerns of both parties were answered in a mutually satisfactory way. The only major concern was landfill volume from the plant. A follow-up letter to the I.D. and the Town giving this information was sent on April 28, 1988. No follow up meetings are required.

REFERENCE:

The ANC brochure on the Whitecourt newsprint mill was handed out to the attendees.

Alberta Newsprint Company Ltd.

c/o 2130 West 12th Avenue
Vancouver, B.C.
V6K 2N3

28 April 1988

Mr. W.L. Winger
Municipal Manager
Town of Whitecourt
P.O. Box 509
Whitecourt, Alberta
TOE 1L0

Dear Mr. Winger:

Reference: Newsprint Mill
Solid Waste Disposal

As requested on 22 April, we are writing to describe our requirements for solid waste disposal.

During construction, we would like to dispose of miscellaneous office and lunch room wastes at the landfill site operated by the Town. The generation of construction wastes will commence in the spring of 1989 and will continue on through mid-1990. At the peak of construction we expect about five apartment size containers per week.

After start-up of the mill, we would like to continue to use the Town landfill site to dispose of office and lunch room wastes. We anticipate a requirement to dispose of three to five apartment size containers per week.

When the mill is in full operation, we will need to dispose of approximately 12,000 tonnes per annum of industrial wastes. This waste will be inorganic material from water treatment and ash from the incinerator. We anticipate that it could be used as cover material for a sanitary landfill.

28 April 1988
Mr. W.L. Winger
Town of Whitecourt

We would appreciate if you would advise us of any applications or permits required for the domestic type wastes. With respect to the 12,000 tonnes per annum of industrial waste, would you please advise if the new landfill site, to be opened this fall, will have adequate capacity.

Yours truly,

ALBERTA NEWSPRINT COMPANY LTD.

FOR.

Ronald N. Stern

RS/fh

cc: Mr. R.P. Goettel
Improvement District Manager
Provincial Building
Whitecourt, Alberta
TOE 2LO

Alberta Newsprint Company Ltd.

May 11, 1988

Mr. Rudy Goettel
Manager
Improvement District 15
WHITECOURT, AB
T0E 2L0

Dear Mr. Goettel:

Thank you very much for arranging the meeting with the I.D. Council on April 22nd and for the information given to me since that time.

Yours very truly,
ALBERTA NEWSPRINT COMPANY LTD.

Elmer M. Berlie, P. Eng.
Environmental Co-ordinator

EMB/lk

xc: Doug Fromson, P. Eng.
Nystrom, Lee, Kobayashi & Associates
Vancouver, BC

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TOWN OF FOX CREEK

Alberta Newsprint Company Ltd.

PUBLIC CONSULTATION PROGRAM

MEETING WITH: Town of Fox Creek

LOCATION: Town Office

DATE & TIME: April 22, 1988 Noon - 1:30 P.M.

ATTENDEES:
Bernie Hornby, Mayor
Bruce Moltzan, Manager
Rene Sawatsky, Councillor
Dennis Foreman, Councillor
Steve Evans, Councillor
Ron Eckdahl, Economic Development Committee (EDC)
Bob Marple, EDC
Norm Walker, EDC

ANC REPRESENTATIVES:
Ron Stern, Managing Director, ANC
Neil Desaulniers, Director, ANC
Harry Thompson, V.P. Operations, ANC
Elmer Berlie, Environmental Coordinator, ANC
Doug Fromson, Project Coordinator Nystrom, Lee, Kobayashi & Associates (NLK)
Peter Sagert, Environmental Coordinator, NLK

QUESTIONS AND RESPONSES:

Q: What are your present plans for the Fox Creek Area?

A: (Stern) Present plans place the Woodland operation at Knight. It might also be the site for maintenance of all woodlands equipment. There are also possibilities that a log merchandizing operation and perhaps a sawmill operation could be located there. No decision has been made on these possible operations. The economics of such moves are being studied. Neil Desaulniers was asked to describe the log merchandizing operation.

A: (Desaulniers) If a sawmill is not operated, a log merchandizing operation provides a means to maximize the value of the log harvest. Logs of good size and

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quality for lumber are selected from the general run of logs and these are traded for chips or pulp logs from sawmill operations. Normally this selection would be done at the millsite to save double handling but, depending on the destination of the sawlogs, it could be economical to develop the merchandizing operation at Knight. This would raise the number of people based in the woodland operations by 10 to 15 people, raising the total complement to 185 to 190 at the Knight base.

Q: What is the location of the site?

A: (Desaulniers) The old BCFP site at Knight.

Q: Could you not consider a site closer to Fox Creek?

A: (Desaulniers) Since the Knight location was a site for a sawmill, it is ideal for our purposes. It is well located in relation to the FMA's and the eastern extension of the haul road will cross the river at this point. We believe the economics favor this site but if you know of other sites that may be attractive we would have a look at them. The final selection would have to be based on the overall economic merit of the site.

Q: What can you do to help us attract people to Fox Creek?

A: (Stern) Our plans are to utilize contract loggers. We will have no control over where their employees will live and it is not planned to dictate where our supervisors and staff will live. We can suggest that Fox Creek has many favorable features but each person will have to make that decision. We will not provide housing and we have no plans to provide housing incentives.

Q: Will you pay travel time?

A: (Stern) No.

Q: Before you finally choose the site would it be fair to ask that you look at other sites?

A: (Desaulniers) Yes, we require 100 acres.

Q: Have you considered using the Amoco Road?

A: (Desaulniers) Yes. In our view the economics are not attractive for such a haul route.

Q: What can be done to encourage people to live in Fox Creek?

A: (Stern) We may consider some form of joint encouragement but we are reluctant to establish different overall policies for employees or contractors that will work in the woodlands.

Q: What about purchasing of supplies, materials and equipment?

A: (Stern) Our policy will be to buy locally and we will encourage contractors to buy out of Fox Creek, but we cannot dictate to them where they will make purchases of goods or services.

Q: What would be the number and type of people included in the log merchandizing operation?

A: (Desaulniers) Front End Loaders - 3 to 4, Grading, Sorting - 3 to 5 plus a supervisor and clerical staff and additional hauling crews, say, 10 to 15 people.

SUMMARY:

(Stern) Let us clarify what we have said today.

a. Regarding Woodland Operation
We are considering the possibility of a log merchandizing operation at Knight. We will evaluate the relative merit of one or more sites, closer to Fox Creek in comparison to Knight. If one of these look good we will

then evaluate the overall economics of such a site on our total cost base.

b. Regarding Housing

We will work with Fox Creek in their effort to make housing and living in Fox Creek attractive. Then jointly we would prepare a package that would have plus features so this could be given to potential employees and contractors that would work in the woodlands operation.

Alberta Newsprint Company Ltd.

April 27, 1988

Mr. Bruce Moltzan
Town Manager
FOX CREEK, AB
TOH 1PO

Dear Mr. Moltzan:

On behalf of Alberta Newsprint Company thank you very much for the assistance rendered to us before and after the meeting on April 22nd and for the fine food that was provided at the luncheon meeting itself.

The meeting with the members of Council and the Economic Development Committee provided an excellent forum for the exchange of information between the Company and the Town officials.

If I may be of assistance to you please do not hesitate to phone me at the Whitecourt office. Questions related to corporate policy and development activity should still be addressed to Mr. Stern at our Vancouver office.

Yours very truly,
ALBERTA NEWSPRINT COMPANY LTD.

Elmer M. Berlie, P. Eng.
Environmental Co-ordinator

EMB/lk

xc: R.N. Stern, ANC, Vancouver
: V.N. Desaulniers, ANC, Vancouver
: D.A. Fromson, NLK, Vancouver

HAMLET OF SMITH

Alberta Newsprint Company Ltd.

PUBLIC CONSULTATION PROGRAM

MEETING WITH: Hamlet of Smith

LOCATION: Smith Firehall

DATE & TIME: April 25, 1988, 2:30 - 3:30 p.m.

ATTENDEES: Ed Yoder, Councillor, I.D. 17E
Maxine Laughy, Resident
Bill Willis, Resident
Verna Willis, Resident
Frank Knahs, Resident
Liz Menard, Resident
Horace Menard, Resident
Daryl La France, Local Merchant
Al Giles, Hotel Owner

ANC REPRESENTATIVES: Elmer Berlie, Environmental Coordinator ANC
Doug Fromson, Project Coordinator for the Project Manager; Nystrom, Lee, Kobayashi and Associates, Consulting Engineers

PRESENTATION:

After explaining that the meeting was called as a part of the public consultation program for the EIA, a brief presentation was made on the newsprint mill. It was also explained that the pulping process to be used would be similar to that used at Millar Western's pulp mill in Whitecourt, except that less chemical per ton of product is used.

The following questions were raised.

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(403) 778-3857

QUESTIONS AND RESPONSES:

Q: Our main concern is the water quality of the river. How is the effluent treated before it is returned to the river?

A: (Fromson) Water is taken from the river at 12m^3 per minute and 95 percent is returned as treated effluent. Five percent is lost to the atmosphere and in the product. The effluent is treated in an aerated stabilization basin.

Q: What will the effluent standard be?

A: (Fromson) This will be specified by Alberta Environment when they issue the license to operate the mill. Their standards are the toughest in Canada. They will also specify testing requirements.

Q: To what extent is the water diluted?

A: (Fromson) About 100 to 200 times at lowest water flows.

Q: What happens to the sulphite used as a brightening agent?

A: (Fromson) The sulphites are converted to sulphates in an aerated stabilization basin.

Q: How much can we trust Alberta Environment to protect the quality of the water in the river? We cannot eat the fish in the river - it states so right on the fishing license.

A: (Berlie) Based on observations made while travelling around the world, the Province of Alberta has had excellent management of its environment and in fact is the leader in many aspects of environmental protection and enforcement.

(Fromson) We cannot explain why high levels of mercury are in the Athabasca unless it is a natural background level. It used to be released from pulp mills that used a mercury cell chlor-alki process to produce chlorine but the Hinton mill did not use such a process.

Q: Will this mill have an odour?

A: Yes, it will smell like a sawmill; not like a kraft mill.

Q: Will the upstream mills contribute to the upgrading of our water treatment system if this becomes necessary?

A: No, but that could depend on the situation. There should be no reason why such an upgrading is required.

Q: What is the proposed timing for a mill in this area? Rather than getting the effluent from mills upstream with no benefits whatsoever, it would be nice to share in some of the benefits other communities like Whitecourt are getting.

A: (Fromson) It is known that several firms are looking at the Slave Lake area but they are only in the investigation stage.

Q: No one will know what your mill and others will do to the river?

A: (Berlie) Not true. We must study what the potential impact of the design effluent levels and that of all other known and proposed plants on the river will be and then when we operate the mill the conditions on our license to operate must be met.

Mr. Yoder closed the meeting by stating that their main concern is the river water quality and it is good that meetings of this type are held to inform the public first hand what is going on in our resource development.

SUMMARY:

All questions and concerns raised by the attendees were answered. The matter of mercury in the river will be investigated further.

REFERENCE:

The ANC brochure on the Whitecourt newsprint mill was handed out to the attendees.

Alberta Newsprint Company Ltd.

April 27, 1988

Mr. Ed Yoder
Councillor I.D. 17E
Box 215
SMITH, ALBERTA
TOG 2B0

Dear Mr. Yoder:

On behalf of Doug Fromson and myself, thank you very much for arranging the meeting held on April 25th that was attended by yourself and several concerned citizens from the Smith community.

This meeting enabled us to discuss the proposed Alberta Newsprint Company mill at Whitecourt and to answer questions about the possible impacts of its operation on the Athabasca River.

Should you have further questions please contact me at the Whitecourt office and they will be addressed.

Yours very truly,
ALBERTA NEWSPRINT COMPANY LTD.

Elmer M. Berlie, P. Eng.
Environmental Co-ordinator

EMB/lk

xc: Doug Fromson
Nystrom, Lee, Kobayashi & Associates
VANCOUVER, BC

: Mr. Bill Willows
Manager, I.D. 17E
SLAVE LAKE, AB

TOWN OF ATHABASCA

COUNTY OF ATHABASCA NO. 12

ATHABASCA HEALTH UNIT

Alberta Newsprint Company Ltd.

PUBLIC CONSULTATION PROGRAM

JOINT MEETING WITH: Town of Athabasca
County of Athabasca #12
Athabasca Health Unit

LOCATION: Civic Building

DATE & TIME: April 25th, 1988 6:30 - 8:20 P.M.

ATTENDEES:
A.J. Schinkinger, Mayor of the Town
Cliff Sawatzky, Municipal Manager
Peter Fedoretz, Town Councillor
Dr. J. M. Brown, Town Councillor
A. N. Werfel, Town Councillor
Jim Woodward, Manager, County of Athabasca #12
Sharon Randle, Councillor, County of Athabasca #12
Terry Smith, Athabasca Health Unit
Lew Skjonsby, Athabasca Health Unit

ANC REPRESENTATIVES:
Elmer Berlie, Environmental Co-ordinator, ANC
Doug Fromson, Project Co-ordinator for the Project Manager, Nystrom, Lee, Kobayashi and Associates Consulting Engineers
Dr. B.F. Bietz, Beak Associates Consulting Ltd.

PRESENTATION:

In the introductory remarks Mr. Berlie explained that the meeting was called as a part of the Public Consultation Program for the EIA.

Mr. Fromson described the scope of the project and the nature of the process to produce pulp for the newsprint paper machine.

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(403) 778-3857

QUESTIONS AND RESPONSES:

Q: (Mayor) We are most concerned about the water quality in the Athabasca River. What is the amount of effluent from the plant?

A: (Fromson) We require 10-12m^3 per minute from the river. About 95 percent of this is returned as treated effluent. This rate corresponds to about 20m^3 of water per ton of pulp produced, just the same as the Millar Western plant that is just being completed at Whitecourt and about 1/6th of that of a kraft mill.

Q: (Dr. Brown) What chemicals are used in the process and how is the effluent treated?

A: (Fromson) Liquid SO_2 is reacted with caustic soda to produce sodium sulphite, the active chemical in the cTMP process.

Sodium hydrosulphite is used as the brightening agent for the pulp. DTPA (Diethylene Triamine Penta Acetic Acid) is added to enhance the brightening treatment.

The effluent is aerated in an aerated stabilization basin with a 10 day retention time.

Before being discharged to the river, the effluent must meet the license requirements set by Alberta Environment to ensure that there are no adverse effects on the environment.

Q: (Mayor) What is the effect on air quality?

A: (Fromson) There is no adverse effect on air quality. The major emission to the air is water vapour. There will be some particulate matter from the incinerator. These emissions will all meet Alberta Environment license requirements.

Q: (Woodward) What is the effluent temperature and what is in the effluent that is not in the river?

A: (Fromson) The temperature is 35^{O} Celcius. The primary suspended solids in the effluent will be less than 10 kg/tonne of paper produced. There will also be trace residual chemicals in ppm levels, such as sulphates and sodium. The dilution will be no less than about 100:1. A toxicity test must be run on the effluent regularly and BOD analysis three times per week.

PRESENTATION:

Dr. Brian Bietz was asked to describe the modelling done by his firm on the assimilative capacity of the Athabasca River to handle the effluent discharged by the mills at Hinton, Millar Western and ANC.

These studies were first done last January and they are now being redone using actual data from water samples in the winter of 87-88. Decay rates were adjusted to conform with this latest test data.

The studies showed that the dissolved oxygen level was above the 5 mg/l acceptable level when using 7Q10 river flows; that is the 7 day average lowest flow that occurs once every 10 years.

Q: (Werfel) What happens to mills like Champion that have recently doubled their capacity, do they have to meet this same requirement?

A: (Skjonsby) Champion has actually decreased their effluent volume and improved the efficiency of their effluent treatment system and their chlorine consumption has been held at the same level as before.

Q: (Dr. Brown) Are these effluent levels acceptable for fish and benthic invertebrates?

A: (Bietz) Yes, the levels are safe for both. Actually, the drinking water standards are less rigid than for aquatic organisms.

We have looked at the dissolved oxygen levels suspended solids, colour, sodium, sulphate and toxicity and have found no adverse impacts.

Q: (Mayor) What about synergestic effects?

A: (Bietz) There are none.

Q: What about mercury?

A: (Fromson) No plants are using the mercury cell chlor-alki process for production of chlorine. Any problem with mercury in the Athabasca must be from background sources. However we are attempting to get more information on mercury levels in the river.

COMMENT:

Lew Skjonsby stated that he has looked into the cTMP process very thoroughly and cannot find any problems with it. It is a very good process.

SUMMARY:

The major concern was the water quality in the Athabasca River. All questions raised were answered. There were no outstanding items.

REFERENCE:

The ANC brochure on the Whitecourt Newsprint mill was handed out to the attendees.

Alberta Newsprint Company Ltd.

5109 - 50th Street, P.O. Box 2098
WHITECOURT, ALBERTA
TOE 2L0 PH: 778-4222

April 21, 1988

Mr. Cliff Sawatzky
Town Manager
Town of Athabasca
P.O. Box 450
ATHABASCA, AB
TOG OBO

DELIVERED VIA LOOMIS

Dear Mr. Sawatzky:

This is to confirm my telephone conversations with you of April 11th indicating that Alberta Newsprint Compnay Ltd. intends to meet with officials of all communities downstream of Whitecourt on the Athabasca River.

As a part of this program we expect to meet with representatives of the Town, the County and the Health Unit at 6:30 p.m. April 25th, in the Civic Building. At that time we will present an introduction to our newsprint mill project and address any concerns you may have.

Yours very truly,
ALBERTA NEWSPRINT COMPANY LTD.

Elmer M. Berlie, P. Eng.

EMB/lk

cc: Brian Bietz
Beak Associates Consulting Ltd.

Doug Fromson, P. Eng.
Nystrom, Lee, Kobayashi & Associates

Alberta Newsprint Company Ltd.

April 27, 1988

Mr. Cliff Sawatzky
Municipal Manager
Town of Athabasca
Box 450
ATHABASCA, AB
TOG OBO

Dear Mr. Sawatzky:

On behalf of Alberta Newsprint Company, thank you very much for arranging the meeting held on April 25th at which we had the opportunity to make a presentation regarding the proposed newsprint mill at Whitecourt to your representatives on your Council, the County Council and the Athabasca Health Unit.

This meeting enabled us to discuss the possible impacts of the mill operation on the Athabasca River and to respond to some very good questions raised by the people in attendance.

Should you have further questions please contact me at the Whitecourt office.

Yours very truly,
ALBERTA NEWSPRINT COMPANY LTD.

Elmer M. Berlie, P. Eng.
Environmental Co-ordinator

EMB/lk

xc: Doug Fromson
Nystrom, Lee, Kobayashi & Associates
Vancouver

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Alberta Newsprint Company Ltd.

April 21, 1988

Mr. Jim Woodward
Town Administrator
County of Athabasca #12
P.O. Box 540
ATHABASCA, AB
TOG OBO

DELIVERED VIA LOOMIS COURIER

Dear Mr. Woodward:

This is to confirm my telephone conversation of April 15th indicating that Alberta Newsprint Company Ltd. intends to meet with officials of all communities downstream of Whitecourt on the Athabasca River.

As a part of this program we expect to meet with representatives of the County at a joint meeting with the Town and the Health Unit at 6:30 p.m. April 25th, in the Civic Building. At that time we will present an introduction to our newsprint mill project and address any concerns you may have.

Yours very truly,
ALBERTA NEWSPRINT COMPANY LTD.

Elmer M. Berlie, P. Eng.

EMB/lk

cc: Brian Bietz
Beak Associates Consulting Ltd.

: Doug Fromson, P. Eng.
Nystrom, Lee, Kobayashi & Associates

Alberta Newsprint Company Ltd.

April 27, 1988

Mr. Jim Woodward
Administrator
County of Athabasca #12
Box 540
ATHABASCA, AB
TOG OBO

Dear Mr. Woodward:

Thank you very much for assisting in the arranging of the April 25th joint meeting, held in the Civic Building, that was attended by representatives of the County Council, the Town Council and Athabasca Health Unit.

This meeting afforded an excellent opportunity for Alberta Newsprint Company to describe the proposed newsprint mill to be built near Whitecourt and to discuss its potential impact on the Athabasca River. Also, we were able to respond to the very challenging questions raised by those in attendance.

Should you have further questions please contact me at the Whitecourt office.

Yours very truly,
ALBERTA NEWSPRINT COMPANY LTD.

Elmer M. Berlie, P. Eng.
Environmental Co-ordinator

EMB/lk

xc: Doug Fromson
Nystrom, Lee, Kobayashi & Associates
Vancouver, BC

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Alberta Newsprint Company Ltd.

April 21, 1988

Ms. Lynn Lennox
Chief Executive Officer
Athabasca Health Unit
Box 1140
3401 - 48th Ave.
ATHABASCA, AB
TOB OBO

DELIVERED VIA LOOMIS COURIER

Dear Ms. Lennox:

This is to confirm my telephone conversation of April 15th with Debbie Nelson of your staff, indicating that Alberta Newsprint Company Ltd. intends to meet with officials of all communities downstream of Whitecourt on the Athabasca River.

As a part of this program and as confirmed on April 20th, we expect to meet with your staff at joint meeting with the Town and County at 6:30 p.m. April 25th, in the Civic Building. At that time we will present an introduction to our newsprint mill project and address any concerns you may have.

Yours very truly,
ALBERTA NEWSPRINT COMPANY LTD.

Elmer M. Berlie, P. Eng.

EMB/lk

cc: Brian Bietz
Beak Associates Consulting Ltd.

: Doug Fromson, P. Eng.
Nystrom, Lee, Kobayashi & Associates

778-4222
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Alberta Newsprint Company Ltd.

April 27, 1988

Ms. Lynn Lennox
Chief Executive Officer
Athabasca Health Unit
Box 1140
ATHABASCA, AB
TOB OBO

Dear Ms. Lennox:

On behalf of the Alberta Newsprint Company presentation team, we would like to thank the Athabasca Health Unit for participating in the joint meeting with the Town and the County that was held in the Civic Building on April 25th.

This meeting gave us an excellent opportunity to describe the proposed newsprint mill to be built near Whitecourt, to discuss its potential impact on the Athabasca River, and to respond to some very challenging questions.

Your representatives, Messrs. Skjonsby and Smith, made a significant contribution to the meeting and their participation was appreciated.

Should they have further questions they can be directed to me at the Whitecourt office.

Yours very truly,
ALBERTA NEWSPRINT COMPANY LTD.

Elmer M. Berlie, P. Eng.
Environmental Co-ordinator

EMB/lk

xc: Doug Fromson
Nystrom, Lee, Kobayashi & Associates
Vancouver, BC

VILLAGE OF FORT ASSINIBOINE

Alberta Newsprint Company Ltd.

PUBLIC CONSULTATION PROGRAM

MEETING WITH: Village of Fort Assiniboine

LOCATION: Village Office

DATE & TIME: April 27, 1988 7:30 - 9:15 P.M.

ATTENDEES: Chris Reddington, Acting Mayor
Roger Pechanic, Councillor
Helen Kluin, Municipal Administrator
Esmeralda Cabral, Alberta Environment

ANC REPRESENTATIVES: Elmer Berlie, Environmental Co-ordinator ANC
Dr. Brian Bietz, Consultant, Beak Associates Consulting Ltd.

PRESENTATION:

In the introduction Mr. Berlie explained that the meeting with Council was asked for as a part of the public consultation program for the EIA. He then described the scope of the Whitecourt Newsprint mill operations and the nature of process to produce pulp. This process is similar to the Millar Western pulp mill that went through a similar public consultation procedure one and a half years earlier.

Mr. Pechanic stated that they didn't want any development that would adversely affect the quality of the river for recreational uses. This was their primary concern because recreation uses provided the benefits they could derive from the river unlike the upstream communities with pulp mills who benefitted from higher levels of direct employment.

Dr Bietz explained that ANC has had their firm carry out extensive modelling studies. First in January of this year and another phase is now being completed using information from samples taken during the winter of 1987-88.

The model used a conservative, realistic approach. Using full effluent loading for three mills, the BOD under 7Q10 conditions still gave a dissolved oxygen

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content above 5.0 mg/l.

The levels of sulphate and sodium have been examined and these are well within the drinking water standards.

QUESTIONS AND RESPONSES:

Q: (Pechanic) Have you looked at foam, colour and odour that could affect the aesthetic quality of the river?

A: No colour will be visible except very near the mill diffuser in the river. The worst time is during low flow in the winter and ice will cover the water at that time except in open leads. Odour will not be detectable after a few miles downstream. This effluent does not contain the sulphur compounds characteristic of a kraft mill.

The matter of foam has not been raised before. The possibility of synergistic effects arising from the mixture of oils, greases and pulp mill effluent is interesting and it will be looked into.

Q: (Pechanic) We are aware of the air quality requirements for gas plants. What are the air emissions at the mill?

A: (Berlie) The major emission is water vapour. Oxides of nitrogen will be released by the gas fired boilers but the level is so low monitoring will not be required. Dust fall measurements will likely be permit requirement for the incinerator where wood wastes are burned.

Q: (Pechanic) What water quality monitoring will be required?

A: (Bietz) These requirements are a condition of the license to operate the mill issued by Alberta Environment. They usually require:

a. Daily routine tests on effluent.
b. Tri-weekly effluent sampling and analysis including BOD.
c. Toxicity tests (96hC_{50}) are done quarterly.
d. Annual or bi-annual benthic surveys for chronic toxicity affecting aquatic invertebrates. ANC and Millar Western will likely do joint

programs on this since their zones of impact will overlap and be additive.

Q: (Pechanic) What is the ownership of ANC?

A: (Berlie) The majority ownership is Canadian.

SUMMARY:

All questions raised by the attendees were answered with the exception of that pertaining to foaming. The potential in the river for foaming will be investigated further including possible synergism with oils and greases.

REFERENCE:

All attendees received the ANC received the ANC brochure on the Whitecourt Newsprint mill.

Alberta Newsprint Company Ltd.

5109 - 50th Street, P.O. Box 2098
WHITECOURT, ALBERTA
TOE 2L0

April 13, 1988

Ms. Helen Kluin
Municipal Administrator
Village of Fort Assiniboine
Box 150
Fort Assiniboine, Alberta
TOG 1A0

Dear Ms. Kluin:

Further to our letter of April 11th, this is to confirm that the meeting originally scheduled on April 13th has now been postponed to 7:30 p.m., April 27th.

If for any reason this date and time needs to be changed you will be advised as early as possible. Otherwise, if you find it necessary to ask for a change in the meeting schedule, please phone me at 778-4222 as early as you can.

Yours very truly,
ALBERTA NEWSPRINT COMPANY LTD.

Elmer M. Berlie, P. Eng.,
Environmental Co-ordinator

EMB/lk

xc: Brian Bietz
Beak Associates Consulting Ltd.
Edmonton, Alberta

: Doug Fromson, P. Eng.
Nystrom, Lee, Kobayashi & Associates
Vancouver, B.C.

Alberta Newsprint Company Ltd.

April 29, 1988

Ms. Helen Kluin
Municipal Administrator
Village of Fort Assiniboine
Box 150
Fort Assiniboine, Alberta
TOG 1A0

Dear Ms. Kluin:

On behalf of Alberta Newsprint Company, thank you very much for arranging the meeting with Council that was held on April 27th.

This meeting enabled us to discuss the proposed newsprint mill to be constructed on the Athabasca River west of Whitecourt and to answer questions about its operation that were of concern to your councillors.

Should any of you have further questions they can be addressed to me at Whitecourt and they will be responded to.

Yours very truly,
ALBERTA NEWSPRINT COMPANY LTD.

L. Kuttek

for: Elmer M. Berlie, P. Eng.
Environmental Co-ordinator

EMB/lk

xc: Doug Fromson, P. Eng.
Nystrom, Lee, Kobayashi & Associates
Vancouver, BC

CITY OF FORT MCMURRAY

IMPROVEMENT DISTRICT NO. 18 (N)

SYNCRUDE CANADA LTD.

Alberta Newsprint Company Ltd.

PUBLIC CONSULTATION PROGRAM

JOINT MEETING WITH:	City of Fort McMurray Improvement District No 18(N) Syncrude Canada Ltd.
LOCATION:	Third Floor Board Room - City Hall
DATE & TIME:	April 29, 1988 9:30 - 10:40 AM
ATTENDEES:	Chuck Knight, Mayor of the City of Fort McMurray Bob Byron, Chief Administration Officer Larry Wright, Supt. Engineering Services R. Wetham, Community Planner D. McLean, Supt of Utilities L.C. Bourassa, Manager, ID 18(N) J. Retallack, Head Environmental Regulations & Monitoring, Syncrude Canada F. Ryan, Senior Environmental Scientist, Syncrude Canada
ANC <u>REPRESENTATIVES</u>:	Ron Stern, Managing Director, ANC Neil Desaulniers, Director, ANC Elmer Berlie, Environmental Co-ordinator, ANC Doug Fromson, Project Co-ordinator, Nystrom, Lee, Kobayashi & Associates, (NLK) Consulting Engineers Dr. Brian Bietz, Senior Environmental Scientist, Beak Associates Consulting Ltd.

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(403) 778-3857

PRESENTATION:

Elmer Berlie opened the meeting with a brief explanation that ANC was fulfilling its commitment under the public consultation program for the EIA. We are required to meet with representatives of all of the downstream communities and licensed users of the Athabasca River water to inform them of the proposed newsprint mill on the river.

Ron Stern stated that ANC plan was to build a world scale newsprint mill at Whitecourt to produce 220,000 tonne per annum. It will employ 190 people when it is in full operation with another 175 being employed in the woodlands. The aim of ANC is to operate a successful and environmentally safe plant. The policies of the company will include responsible use of resources with minimum waste of wood fibre and with minimum impacts on the air and water in the environment.

Doug Fromson then gave a description of the process to be used to produce the pulp stock to feed the newsprint machine. He then described the steps involved in the manufacture of newsprint as the stock moved through the machine at a speed of about a mile per minute.

The water consumption in the process will be about 15,000 m^3 per day and 95 percent is returned to the river as treated effluent. This consumption rate is much lower than for a comparable kraft mill; about 1/6th.

Effluent will be treated in a two stage system. Solids that will settle out are removed in a clarifier. The effluent then flows to an aerated stabilization basin where more than 90 percent of the BOD is removed through the action of oxygen and bacteria. Resin acids and fatty acids, which may be toxic to fish, are broken down. The effluent leaving the mill must pass the $96LC_{50}$ toxicity test and the BOD limit set in the license to operate.

Dilution of the effluent at low flow will be over 100:1.

Brian Bietz then explained the modelling studies that had been conducted for ANC by their firm to investigate the environmental impacts of the effluent on the river. This work was commenced in January of this year and it has been done again using the data obtained by Alberta Environment in the winter of 1987-88.

Using a very conservative modelling approach, that is an ice covered river and the lowest flow condition (7Q10) and with all mills operating at permitted limits, the river is not stressed at any point. The dissolved oxygen level was not reduced below the accepted limit of 50 mg/1.

They also looked at sulphates, sodium, and color and no significant impacts were found. From the perspective of Fort McMurray there will be no change in river quality.

QUESTIONS AND RESPONSES

Q: (Mayor) Where are similar plants located?

A: (Fromson) The most similar mill is located at Amos, Quebec, where they have a primary clarifier but no sescondary effluent treatment.

Q: (Mayor) What will the monitoring program be?

A: (Beitz) It should be similar to the Millar Western license. This requires routine daily tests on effluent properties, tri-weekly effluent sampling and analysis including BOD and quarterly toxicity tests ($96LC_{50}$). In addition bio-monitoring of the benthic invertebrates is required twice per year at eight stations on both sides of the river extending downstream for a distance of about 10 km.

Q: (Mayor) What about major operating problems, would an effluent monitor trigger an alarm?

A: (Fromson) There are several monitoring devices within the plant and on the levels of effluent that could respond to such a situation. Moreover, the total untreated effluent could be discharged to the river and it would not endanger human health.

Q: (McLean) What treatment is being used for sanitary sewage at the mill?

A: (Fromson) A packaged treatment plant.

Q: (McLean) What is the concentration of total suspended solids in the effluent?

A: (Fromson) A maximum of 30 kg/FMT, including biosolids.

Q: (McLean) Are any other chemicals used in the process?

A: (Fromson) DPTA is used as a chelating agent to sequester metal ions and enhance brightness.

Q: (McLean) Will any mercury be released in the process?

A: (Fromson) No This is associated with the older plants that produced chlorine on site using the mercury cell chlor-alki process. No plants on, or proposed for, the river would use this process.

Q: (Wright) Where are your settling ponds located?

A: (Fromson) Well above the flood plane at the top of the river bank.

Q: (Wright) The 7Q10 occurs in the winter time. Last September we had a 100 year low flow.

A: (Beitz) In an ice free condition there is no problem with BOD. In our modelling we assumed only a 10% re-aeration rate with with ice cover, whereas it is 100 percent in the ice free state.

Q: (Wright) What are the heat units in the effluent?

A: (Bietz) The effluent will be 30 - 35^{o} Celsius. This will create an open water lead in the winter time of about one km.

Q: (Bourassa) Is it correct that the monitoring requirement is specified on the license?

A: (Berlie) Yes and in addition the results must be reported to Alberta Environment on a monthly basis. Any violation of permitted omission rates must be reported within 48 hours.

Q: (Wright) You mentioned that Alberta's standards are the toughest in Canada, how do they compare to the U.S.?

A: (Fromson) They are comparable to the toughest in the U.S.

Q: Rotallack) You mentioned that the sulphate and sodium concentration were very low.

A: (Bietz) Yes, the old CWQ standard was 500 ppm for sulphate. At 7Q10 there will be an increase of 10 ppm over the normal 20 to 50 ppm sulphate level observed in the river. Sodium is at a much lower level.

Q: (Mayor) As you can tell from the questions our concern is for water quality. Are any new mills planned?

A: (Stern) We have a second paper machine planned about 1993; other than that nearly all the fibre supply is committed.

A: (Desaulniers) Slave Lake is the newest potential site that is actively talked about.

SUMMARY:

All questions were answered to the satisfaction of the attendees. No further response is required. The major concern was the water quality in the river.

REFERENCE:

The Alberta Newsprint brochure was handed out to all attendees.

Alberta Newsprint Company Ltd.

May 3, 1988

Mr. Leo Bourassa
Manager, I.D. 18
Provincial Building
9915 Franklin Ave.
FORT MCMURRAY, AB
T9H 2K4

DELIVERED VIA COURIER

Dear Mr. Bourassa:

It was a pleasure talking to you at the meeting held with the Town of Fort McMurray on April 29th. On behalf of Alberta Newsprint Company, I thank you for attending and participating in the discussion.

As agreed in our telephone conversations on April 27th, and as confirmed in our discussion on the 29th, we will be making a presentation to the I.D. 18 Council in Fort Chipewyan at 7:30 p.m. on May 17th, 1988.

This public meeting will be held in the Multiplex. You agreed to publicize the meeting so there would be good representation from the community at large.

At the meeting we will present information on our proposed newsprint mill and address any concerns that are expressed.

Yours very truly,
ALBERTA NEWSPRINT COMPANY LTD.

Elmer M. Berlie, P. Eng.
Environmental Co-ordinator

EMB/lk

xc: Mr. Emo Girard
Local Councillor, I.D. 18
Fort Chipewyan, AB

: Mr. Brian Bietz
Beak Associates Consulting Ltd.
Edmonton, AB

By Fax: Mr. Ron Stern, ANC
Shrum, Liddle, Hebenton
Vancouver, BC

: Mr. Neil Desaulniers, ANC
Mr. Doug Fromson, P. Eng.
Mr. Peter Sagert, P. Eng.
Nystrom, Lee, Kobayashi & Associates
Vancouver, BC

FORT MCMURRAY HEALTH UNIT

Alberta Newsprint Company Ltd.

PUBLIC CONSULTATION PROGRAM

MEETING WITH:	Fort McMurray Health Unit
LOCATION:	Fourth Floor Conference Room Provincial Building
DATE & TIME:	April 29, 1988 1:00 - 2:15 PM
ATTENDEES:	Dr. Al Nicholson, Medical Health Officer Caroline Vendrik, Administrative Assistant Nick Skibbings, Senior Health Inspector Ron Popoff, Senior Health Inspector
ANC REPRESENTATIVES:	Ron Stern, Managing Director, ANC Neil Desaulniers, Director, ANC Elmer Berlie, Environmental Co-ordinator, ANC Doug Fromson, Project Co-ordinator, Nystrom, Lee, Kobayashi & Associates, (NLK) Consulting Engineers Dr. Brian Bietz, Senior Environmental Scientist, Beak Associates Consulting Ltd.

PRESENTATION:

Elmer Berlie opened the meeting with a brief explanation that ANC was fulfilling its commitment under the public consultation program for the EIA. We are required to meet with representatives of all of the downstream communities and licensed users of the Athabasca River water to inform them of the proposed newsprint mill on the river.

Ron Stern stated that ANC's plan was to build a world scale newsprint mill at Whitecourt to produce 220,000

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(403) 778-3857

tonnes per annum. It will employ 190 people when it is in full operation with another 175 being employed in the woodlands. The aim of ANC is to operate a successful and environmentally safe plant. The policies of the company will include responsible use of resources with minimum waste of wood fibre and with minimum impact on the air and water in the environment.

Doug Fromson then gave a description of the process to be used to produce the pulp stock to feed the newsprint machine. He then described the steps involved in the manufacture of newsprint as the stock moved through the machine at a speed of about a mile per minute.

The water consumption in the process will be about 15,000 m^3 per day and 95 percent is returned to the river as treated effluent. This consumption rate is much lower than for a comparable kraft mill; about 1/6th.

Effluent will be treated in a two stage system. Solids that will settle out are removed in a clarifier. The effluent then flows to an aerated stabilization basin where more than 90 percent of the BOD is removed through the action of oxygen and bacteria. Resin acids and fatty acids, which may be toxic to fish, are broken down. The effluent leaving the mill must pass the $96LC_{50}$ toxicity test and the BOD limit set in the license to operate.

Dilution of the effluent at low flow will be over 100:1.

Brian Bietz then explained the modelling studies that had been conducted for ANC by their firm to investigate the environmental impacts of the effluent on the river. This work was commenced in January of this year and it was done again using the data obtained by Alberta Environment in the winter of 1987-88.

Using a very conservative modelling approach, that is an ice covered river and the lowest flow condition (7Q10) and with all mills operating at permitted limits, the river is not stressed at any point. The dissolved oxygen level was not reduced below the accepted limit of 50 mg/1.

They also looked at sulphates, sodium, and color and no significant impacts were found. From the perspective of Fort McMurray there will be no change in river quality.

QUESTIONS & RESPONSES:

Q: (Popoff) Is this the first time modelling has been done like this?

A: (Bietz) No. Some limited modelling was done before for the Millar Western EIA. This work uses a model developed for Alberta Environment (AE) and it was calibrated based on this last winter's sampling results provided by AE.

Q: (Skibbings) You stated that the only product is newsprint.

A: (Stern) Only newsprint.

Q: (Skibbings) Are there any expansion plans?

A: (Stern) Yes, we are planning for a second paper machine. It would be the subject of a separate application and likely another EIA.

Q: (Skibbings) Is there any chance of a change in product to a different bleaching method?

A: (Fromson) Not likely. With mechanical pulping chlorine bleaching is not required.

Q: Is your bleaching process the same as Millar Western and what other chemicals are you adding?

A: Millar Western will use hydrogen peroxide to bleach their pulp, and they use two chelating agents, BDTA and DTPA. In our process we will use sodium hydrosulphite as the brightening agent and only DTPA.

Q: (Skibbings) What monitoring will be done?

A: (Beitz) As specified by AE. This usually includes tri-weekly BOD quarterly toxicity tests ($96LC_{50}$) and bio monitoring for benthic invertebrates twice per year.

Q: (Popoff) How does the size compare to Millar Western?

A: (Fromson) About the same, but we use less chemical per FMT.

Q: (Popoff) Are you at the "cutting edge" of technology?

A: (Fromson) No. Many process alternatives are looked at. We have taken a conservative approach to effluent treatment based on the best available technology that is economically viable. The final criteria was that there be no damage to the environment.

Q: (Popoff) From an environmental health viewpoint, what is the big picture on the Athabasca River as greater load is put on it?

A: (Stern) Each industry will have to evaluate the process and meet the assimilative capacity of the river. We have an interest to protect the river in the first place because we will also be drawing from it for a long time to come.

SUMMARY

All questions were answered to the satisfaction of the attendees. No further response is required. The major concern was the water quality in the river.

REFERENCE

The Alberta Newsprint Company Ltd. brochure was handed out to all attendees.

Alberta Newsprint Company Ltd.

April 25, 1988

Dr. Al Nicholson
Ft. McMurray Health Unit
9921 Main Street
FT. MCMURRAY, AB
T9H 4B4

DELIVERED VIA LOOMIS

Dear Dr. Nicholson:

This will confirm my telephone conversation of today with Caroline Vendrik of your staff concerning our planned meeting in Fort McMurray. Apparently I had misunderstood the time and dates as agreed to, since the Health Unit does not wish to attend the joint meeting with the City and others.

It is now agreed that we will meet at 1:00 p.m. on April 29th in your offices in the Provincial Building on the fourth floor.

Yours very truly,
ALBERTA NEWSPRINT COMPANY LTD.

Elmer M. Berlie, P. Eng.

EMB/lk

cc: Brian Bietz
Beak Associates Consulting Ltd.

: Doug Fromson, P. Eng.
Nystrom, Lee, Lobayashi & Associates

FORT MCKAY

Alberta Newsprint Company Ltd.

May 3, 1988

Chief Jim Boucher
Fort McKay Indian Band
P.O. Box 5360
FORT MCMURRAY, AB
T9H 3G4

DELIVERED VIA COURIER

Dear Chief Boucher:

This letter is to confirm our telephone conversation of April 19th indicating that Alberta Newsprint Company Ltd. intends to meet with officials of communities on the Athabasca River, downstream of Whitecourt.

As agreed in our conversation on May 3rd, we expect to meet with you at 1:00 p.m. May 17th, in the Band Office. At that time we will present information on our proposed newsprint mill and address any concerns you may have regarding this issue.

Yours very truly,
ALBERTA NEWSPRINT COMPANY LTD.

Elmer M. Berlie, P. Eng.
Environmental Co-ordinator

EMB/lk

xc: Brian Bietz
Beak Associates Consulting Ltd.
Edmonton, AB

By Fax: Ron Stern, ANC
Shrum, Liddle & Hebenton
Vancouver, BC

Neil Desaulniers, ANC
Doug Fromson, P. Eng.
Peter Sagert, P. Eng.
Nystrom, Lee, Kobayashi & Associates
Vancouver, BC

FORT CHIPEWYAN

MEMO

TO: DOUG FROMSON, P. ENG.

FROM: Elmer M. Berlie, P. Eng.
Environmental Co-ordinator

DATE: May 4, 1988

RE: I.D. 18 Council Meeting, May 17th at 7:30 p.m.
Fort Chipewyan, AB

The attached letter has been sent to the following people in Fort Chipewyan, Alberta:

- Chief Rita Marten
  Cree Band
- Chief Pat Marsel
  Ft. Chipewyan Band
- Mr. Lloyd Flett
  President, Local 124 of Ft. Chipewyan
- Mr. Scott Flett
  Alberta Environment
- Ms. Maureen Clarke
  The Caribou Lodge

lk

Alberta Newsprint Company Ltd.

May 4, 1988

Dear

Alberta Newsprint Company Ltd. has proposed to the Alberta Government that it will construct a newsprint mill on the Athabasca River about 10 km upstream of the Town of Whitecourt. We are in the process of preparing an Environmental Impact Assessment (EIA) statement for submission to the Minister, Alberta Environment as a pre-requisite to making application for a permit to construct under the Clean Air Act and the Clean Water Act.

In the public participation program prescribed for the EIA, we are required to meet with officials and the public of all communities downstream of the proposed mill site on the Athabasca River. As part of this program, we have arranged for a presentation at the I.D. 18 Council meeting to be held in the Multiplex on May 17th at 7:30 p.m.

On behalf of Alberta Newsprint Company I am pleased to extend a special invitation for you to attend this meeting and participate in the proceedings.

Yours very truly,
ALBERTA NEWSPRINT COMPANY LTD.

Elmer M. Berlie, P. Eng.
Environmental Co-ordinator

EMB/lk

xc: Mr. Emo Girard
Local Councillor, I.D. 18
Fort Chipewyan, AB

: Mr. Leo Bourassa
Manager, I.D. 18
Fort McMurray, AB

TOWN OF WHITECOURT COUNCIL

ADMINISTRATIVE STAFF

Alberta Newsprint Company Ltd.

PUBLIC CONSULTATION PROGRAM

MEETING WITH:	Town of Whitecourt Council Administrative Staff Department Heads.
LOCATION:	Lower Banquet Room Whitecourt Motor Inn
DATE & TIME:	May 3, 1988 7:00 - 9:30 P.M.
ATTENDEES:	Helmut Kreiner, Town of Whitecourt, Mayor Bud Winger, Town of Whitecourt, Manager Bill McPhee, Town of Whitecourt, Director of Development and Works. Denise Lambert, Family and Community Support Services (FCSS), Director I. Edgell, Chamber of Commerce, Manager/Secretary Gertraud Kreiner, F.C.S.S., Board Member Rose Pelkey, Sagitawah Employment Services, Senior Employment Counsellor Jan Makowicki, Whitecourt Public School District # 2736, Chairman Leo Zelinski, Parks and Recreation Board Chairman Jay Granley, Parks & Recreation Dept., Director Marlin Sexauer, Economic Development Board, Chairman Ed Najdziak, Stony Plain, Lac St. Anne Health Unit, Inspector Wayne Buck, Alberta Environment, Regional Technology Dennis Surman, Town of Whitecourt, Fire Chief George Vanderburg, Town Councillor Al McFarlene, Whitecourt Chamber of Commerce President G. Buchanan, Yellowhead Regional Planning Commission, Planner B. Anderson, R.C.M.P., O/C Whitecourt Detachment Elmer Harke, Town of Whitecourt, Councillor George J. Kallay, Social Services, District Manager Esmeralda Cabral, Alberta Environment

5109 — 50th Street. P.O. Box 2098. Whitecourt, Alberta T0E 2L0 (403) 778-3857

ANC REPRESENTATIVES: Elmer Berlie, Environmental Co-ordinator,ANC
Lan Au Yeung, Socio-Economic Consultant, DPA Group Inc.

PRESENTATION:

Elmer Berlie stated that the purpose of the meeting was to provide council, staff, department heads and committee chairman with an opportunity to critically review the draft copy of the socio-economic section of the EIA. It is stressed that the report that has been handed out is a working draft subject to amendment by the consultant and review by ANC senior management.

However, it was considered important that all you have an opportunity to look at the draft report so that any changes can be made now rather than find inconsistencies later on when the final report is out.

Lan Au Yeung then reviewed the executive summary of the report discussing in turn the major topics. In wrapping up, it appears that all of the growth related items have been covered by the planning that has been done so well by the administration, their staff, the department heads, and the various Boards over the years. The one critical spot is the hospital which only has facilities to serve a community of 2-3000 people.

QUESTIONS AND RESPONSES:

Q: (Bill McPhee) I am concerned with the multiplier for direct and indirect jobs. We didn't see anything like that effect when Millar Western hired their work force.

A: (Lan) I think it is correct. Many of the indirect jobs will not be "seen". They show up as a half a person here and a half person there. But a major reason you were not aware of the new jobs was the marked slack in the work force created by the oil and gas industry recession. The existing staff wasn't fully utilized but would be kept on in many establishments in anticipation of recovery. It will be much more apparent with the ANC project.

Q: (Harke) The schedule in Table 3.2 seems to be out of phase. It shows 40 people working on construction in Whitecourt in the second quarter of 1988, which wasn't the case.

A: (Berlie) Yes, that table requires correction. For now assume that it has been shifted one quarter to the right. We do want to start up in the 3rd quarter of 1990 so it will be revised.

Q: (Surnam) How do you plan on providing fire protection during the construction phase?

A: (Berlie) I don't know. That would be the responsibility of the construction group. Many grass route projects don't have any fire protection until the fire protection system becomes activated.

<u>COMMENT</u>:

(Surnam) There is a fire protection agreement between the town and the I.D. so our equipment would be sent out. However if this is to be done we will need more equipment and this should be ordered.

A: (Berlie) That can be discussed after the project manager kicks off construction in the field. But I will discuss it with you if you like.

Q: (Harke) What about transportation?

A: (Berlie) It is not a major concern and our project does not have a significant impact on it. It would appear that, in the short term, upgrading of the existing main highway to four lane or four lane divided would help especially during rush hour. At the very least a passing lane is required for the east bound lane so loaded truck movement up the hill does not impede traffic. (An observation since the meeting - at rush hour it appears that a traffic signal is required at the junction of 51st and the Highway to help move traffic out of the downtown core.)

Q: (Harke) What do you see as the impact of the project on truck traffic through the town?

A: (Berlie) This cannot be finalized with any degree of certainty because we don't know where chips will come from. It is assumed that softwood logs will be hauled on forestry roads direct to the plant with no highway traffic involved. Hardwood from Fox Creek will use the Highway. It is most probable that most chips will come down Highway 43 from High Prairie and from Slave Lake on Highway 32. While it could happen, little chip traffic is expected from the east. Other than 6 or 7 loads of paper product per day and other miscellaneous needs, the total traffic related to the ANC project would account for only 11 or 12 trucks per day. On this basis the transportation matter is considered minor and it should be handled as a normal growth related problem.

DISCUSSION:

During the refreshment break several items were discussed and clarified with the various heads and committees.

SUMMARY:

There were no new major items brought out at the meeting and everyone seemed pleased with the draft report. They were asked to advise ANC as soon as possible if more indepth study revealed any soft spots. The hospital is the only major concern in the community as revealed by the study. (No calls were received by Elmer Berlie or Lan Au Yeung).

REFERENCE:

Each attendee (or committee) received a copy of the draft report "ANC Newsprint Mill - Socio - Economic Impact Assessment" May 2, 1988 prepared by the DPA Group, Inc.

Also the ANC brochure on the project was made available to all.

WHITECOURT TRADE FAIR

Alberta Newsprint Company Ltd.

PUBLIC CONSULTATION PROGRAM

PLACE: Whitecourt Trade Fair
May 13, 14 and 15, 1988

LOCATION: ANC Booth in the Curling Rink

DATE & TIME:

May 13	5:00 to 9:30 P.M.
May 14	11:00 A.M. to 5:30 P.M.
May 15	12:00 Noon to 5:00 P.M.

ATTENDANCE:

The following number of signatures were received from people who walked into the booth and asked questions or studied the exhibit:

Date	Signatures
May 13	108
May 14	157
May 15	115
Total	380

It is conservatively estimated that another 120 people carefully studied the exhibit but did not enter into it. This would give an exposure of 500.

NATURE OF THE EXHIBIT:

The exhibit featured Alberta's first Newsprint Paper Machine showing a large photo (32" x 48") of a newsprint machine in color, and a ten foot long cross sectional view of a paper machine.

On both side of the walk in booth were five 16" x 20" color photos showing the raw site location, the pulping process and various views of the newsprint machine ending with the 30 tonne parent roll of newsprint going to the winding area.

Other large drawings showed the woodlands

5109 — 50th Street. P.O. Box 2098, Whitecourt, Alberta T0E 2L0 (403) 778-3857

dedicated to ANC; the relative location of the site and the Town and the rail spur alignment; and the detailed site layout showing the relative location of major items of equipment.

Samples of wood chips and the dry fibre product from the refiners were exhibited in plastic bags.

COMMENTS:

Based on the comments of the people, there is overwhelming public support for the project; only three people were somewhat negative.

One was a guide from the vicinity of Whitecourt who had a business guiding European and American hunters into the wilderness on the Berland River. Another was a hunter who felt that woodland development would negatively impact on his recreation. The third, asked a lot of questions about the air and water pollution from the plant, thinking that it was a kraft mill.

"Glad to see you here in the community."

"This will certainly change the job outlook for our young people."

"This is just what the town needs."

"We will become the Alberta Capital of pulp and paper industry."

"Glad to see you participating in our trade show."

These were just a few of the many, many favourable comments and good wishes.

CONCLUSION:

Participation in the trade fair was a very effective way to inform the public about out project. It was a great success.

CORRESPONDENCE WITH OTHER TOWNS AND AGENCIES

COUNTY OF BARRHEAD NO. 11

BOX 820
BARRHEAD, ALBERTA
TOG OEO

Telephone 674-3331

May 9th, 1988

Alberta Newsprint Co. Ltd
Whitecourt, Alberta
TOE 2LO

ATTENTION: Elmer Berlie, Environmental Coordinator

Dear Sir,

RE: Proposed Plant East of Whitecourt

Further to our telephone conversation of April 25th, please be advised that the County Council at their meeting May 6th approved a resolution indicating that they would have no objection to the plant being located east of Whitecourt as it relates to pollution in the Athabasca River. Please be advised that our Council is not concerned about pollution providing, however, that you do meet all the Provincial and/or Federal Environmental Codes therein associated.

I trust this is the information you require.

Yours truly,

A.W. Charles
County Manager

AWC/lw

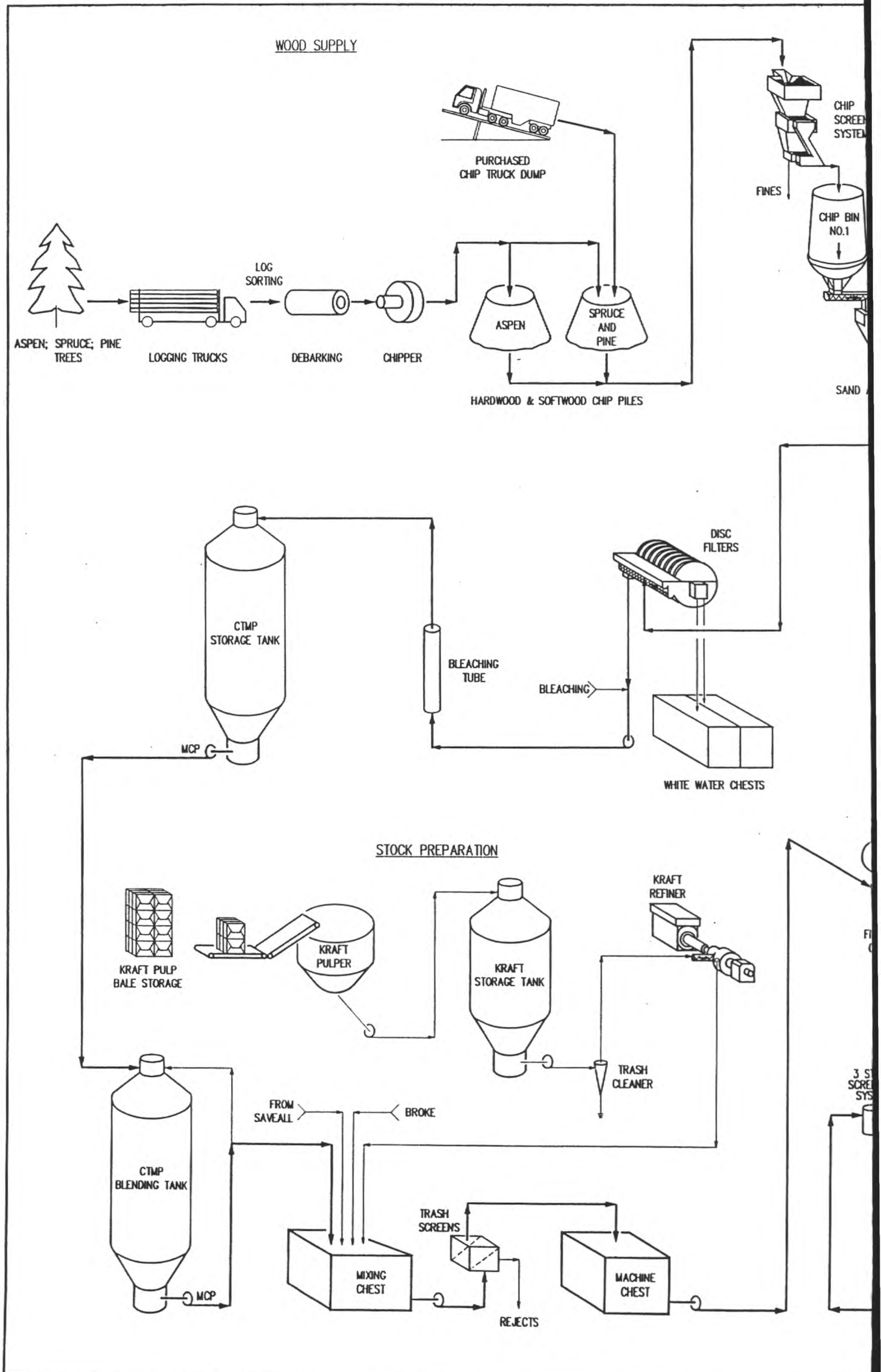
RECEIVED
MAY 11 1988

APPENDIX 6

DRAWINGS AND ILLUSTRATIONS

APPENDIX 6

CONTENTS


WOOD SUPPLY
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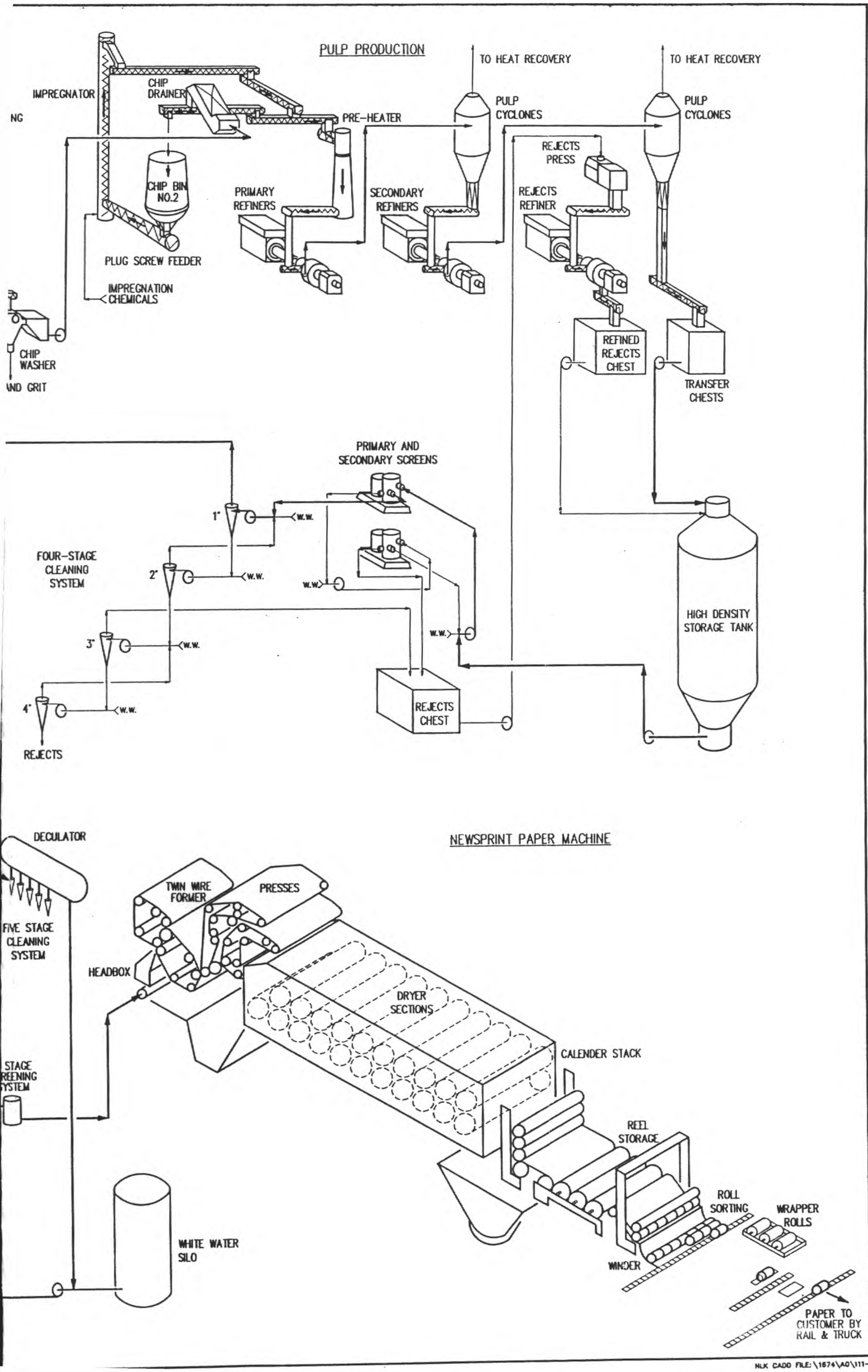
CHIP TRUCK DUMP
CHIP
SCREEN
SYSTEM
FINES
CHIP BIN
NO.1
LOG
SORTING
ASPEN; SPRUCE; PINE
TREES
LOGGING TRUCKS
DEBARKING
CHIPPER
ASPEN
SPRUCE
AND
PINE
HARDWOOD & SOFTWOOD CHIP PILES
SAND
DISC
FILTERS
CTMP
STORAGE TANK
BLEACHING
TUBE
BLEACHING
MCP
WHITE WATER CHESTS
STOCK PREPARATION
KRAFT
REFINER
KRAFT
PULPER
KRAFT
STORAGE TANK
KRAFT PULP
BALE STORAGE
TRASH
CLEANER
FROM
SAVEALL
BROKE
CTMP
BLENDING TANK
TRASH
SCREENS
MIXING
CHEST
MACHINE
CHEST
MCP
REJECTS



REFERENCE DRAWINGS

SERVICES
EFFLUENT TREATMENT
WATER SUPPLY
STEAM SUPPLY
AIR SUPPLY
CHEMICAL SUPPLY

02	16/05/88	ISSUED FOR EIA REPORT	AA	RL	DAF
01	01/03/88	ISSUE FOR PRESS RELEASE	SL	RL	MH
ISSUE NO.	D/M/Y	ISSUE			

CERTIFIED FOR CONSTRUCTION

CLIENT PROJ. MGR. N.L.K. PROJ. MGR.

NYSTROM, LEE, KOBAYASHI

NLK

CONSULTING ENGINEERS

VANCOUVER B.C. SEATTLE WA MONTREAL P.Q.

ALBERTA NEWSPRINT CO. LTD.

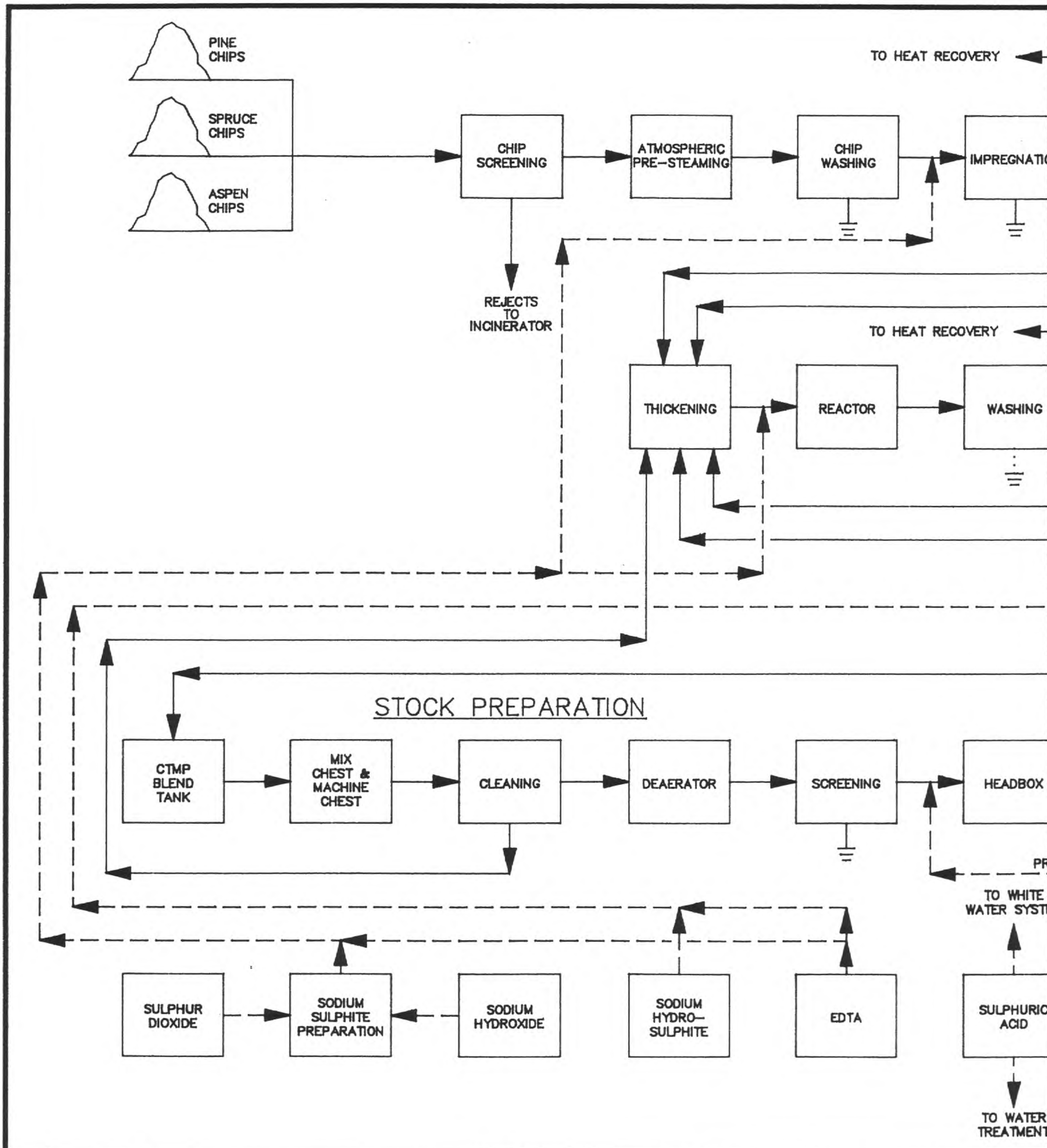
MILL GENERAL PICTORIAL FLOW DIAGRAM

SCALE			D	M	Y
NONE	DSN	W.N.			
	DR	SPC/SL	27	02	88
	CH				
	APP				

N.L.K. DWG. NO. A0-1674-111-2009 ISSUE 02

CLIENT DWG. NO.

NLK CADD FILE: \1674\A0\111-2009.DWG LAST EDIT DATE: Feb. 29, 1988



ISSUE	BY	DATE	DESCRIPTION	APP'D
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01		02/05/88	ISSUED WITH ENVIRONMENTAL IMPACT ASSESSMENT	

LEGEND

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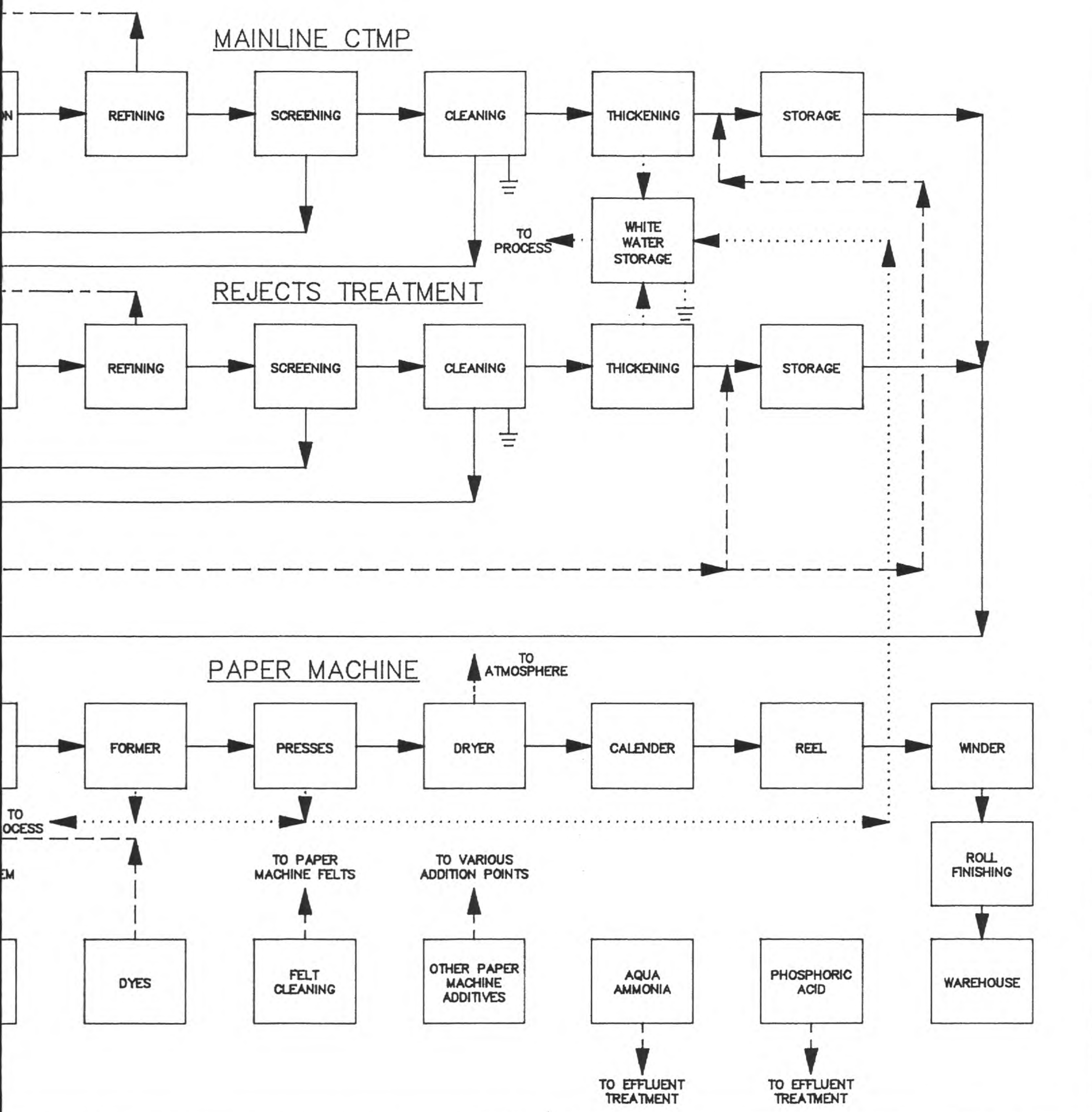
- CHEMICAL STREAM (dashed line)
- WHITE WATER STREAM (dotted line)
- STEAM STREAM (long-short dash line)



		DAY	MO.	YR.
DR'N.	BW/RPL	12	04	88
CH'K'D	JCM	22	04	88
APP'D				
APP'D				

APPROVED

DATE

B–

ALBERTA NEWSPRINT COMPANY
PROCESS BLOCK DIAGRAM
GENERAL MILL

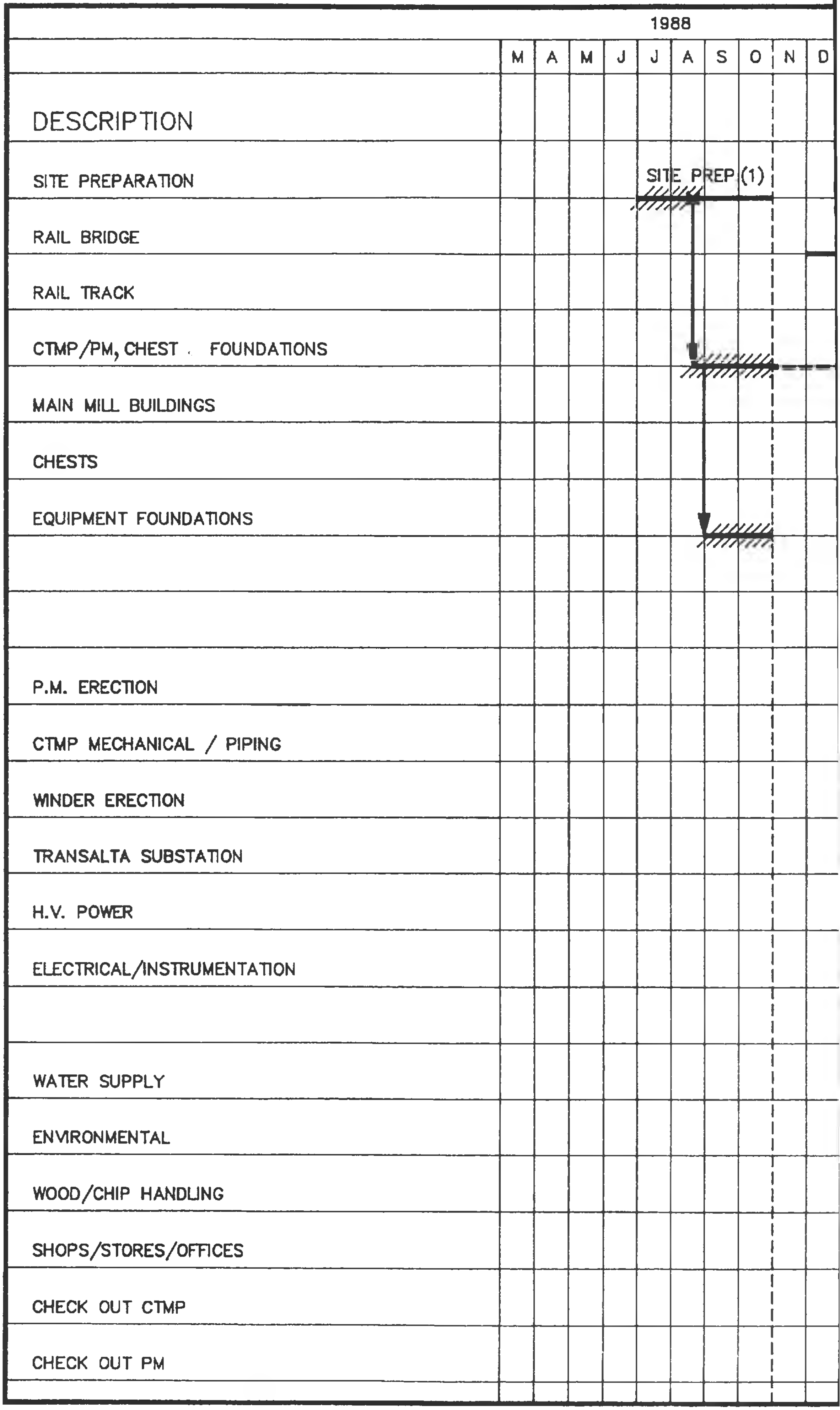
NYSTROM, LEE, KOBAYASHI
NLK
CONSULTING ENGINEERS
VANCOUVER B.C. SEATTLE WA. MONTREAL P.Q.

DWG. NO. B–1674–111–2010

ISSUE 02

LAST EDIT DATE: Apr. 22, 1988

NLK CADD FILE: \1674\B\111-2010.DWG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DESCRIPTION
SITE PREPARATION
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RAIL TRACK
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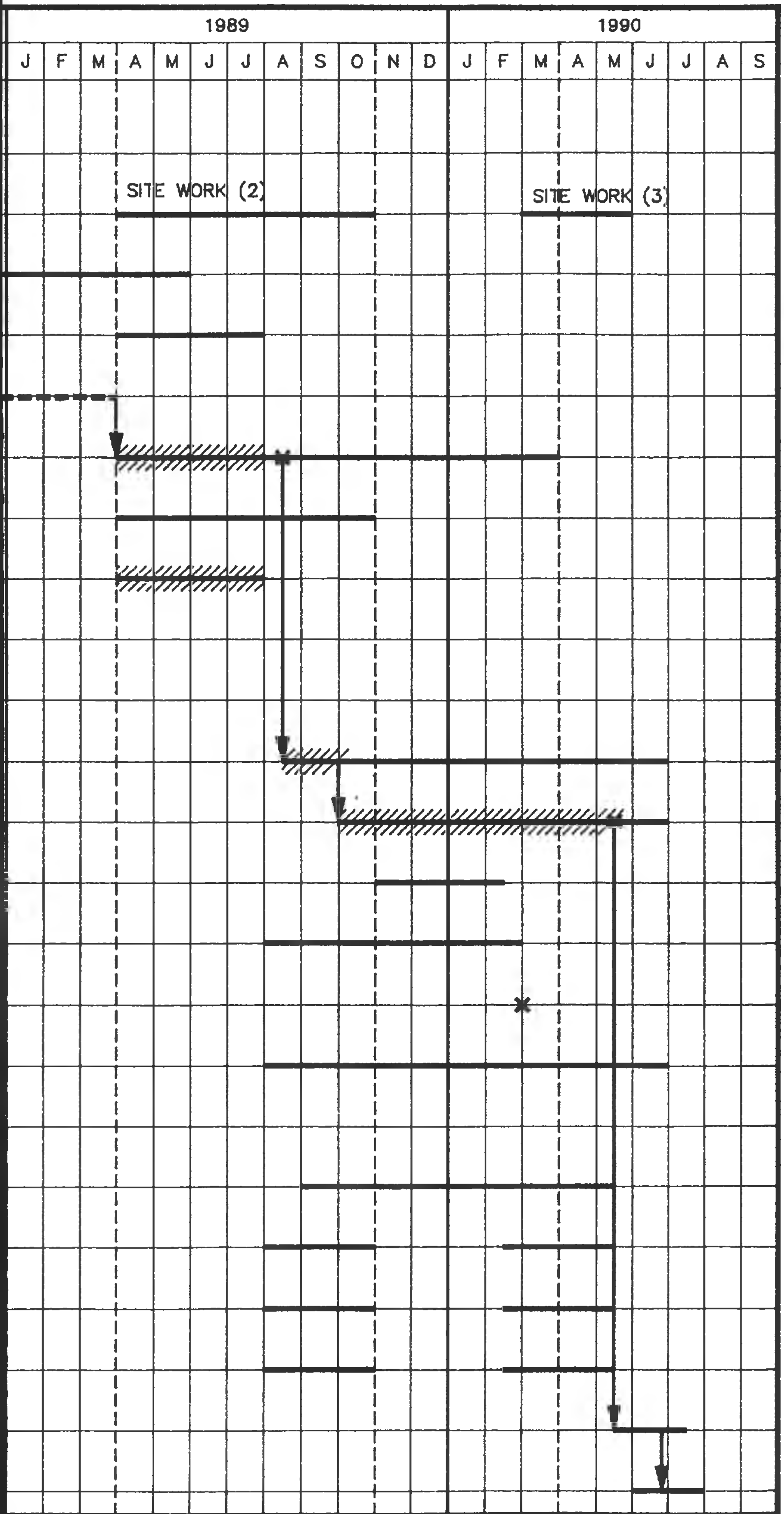
MAIN MILL BUILDINGS
CHESTS
EQUIPMENT FOUNDATIONS
P.M. ERECTION
CTMP MECHANICAL / PIPING
WINDER ERECTION
TRANSALTA SUBSTATION
H.V. POWER
ELECTRICAL/INSTRUMENTATION
WATER SUPPLY
ENVIRONMENTAL
WOOD/CHIP HANDLING
SHOPS/STORES/OFFICES
CHECK OUT CTMP
CHECK OUT PM



REFERENCE DRAWINGS

CRITICAL ACTIVITIES

ISSUE NO.	D/M/Y	ISSUE	DR.	CH.	APP.
02	16/05/88	ISSUED WITH EFA REPORT	TAB		
01	12/05/88	ISSUED FOR INFORMATION AND DISCUSSION	SL	JL	IRC

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CLIENT PROJ. MGR. N.L.K. PROJ. MGR.

NYSTROM, LEE, KOBAYASHI

NLK

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NEWSPRINT MILL

MILL GENERAL

A.N.C. NEWSPRINT MILL

CONSTRUCTION SCHEDULE

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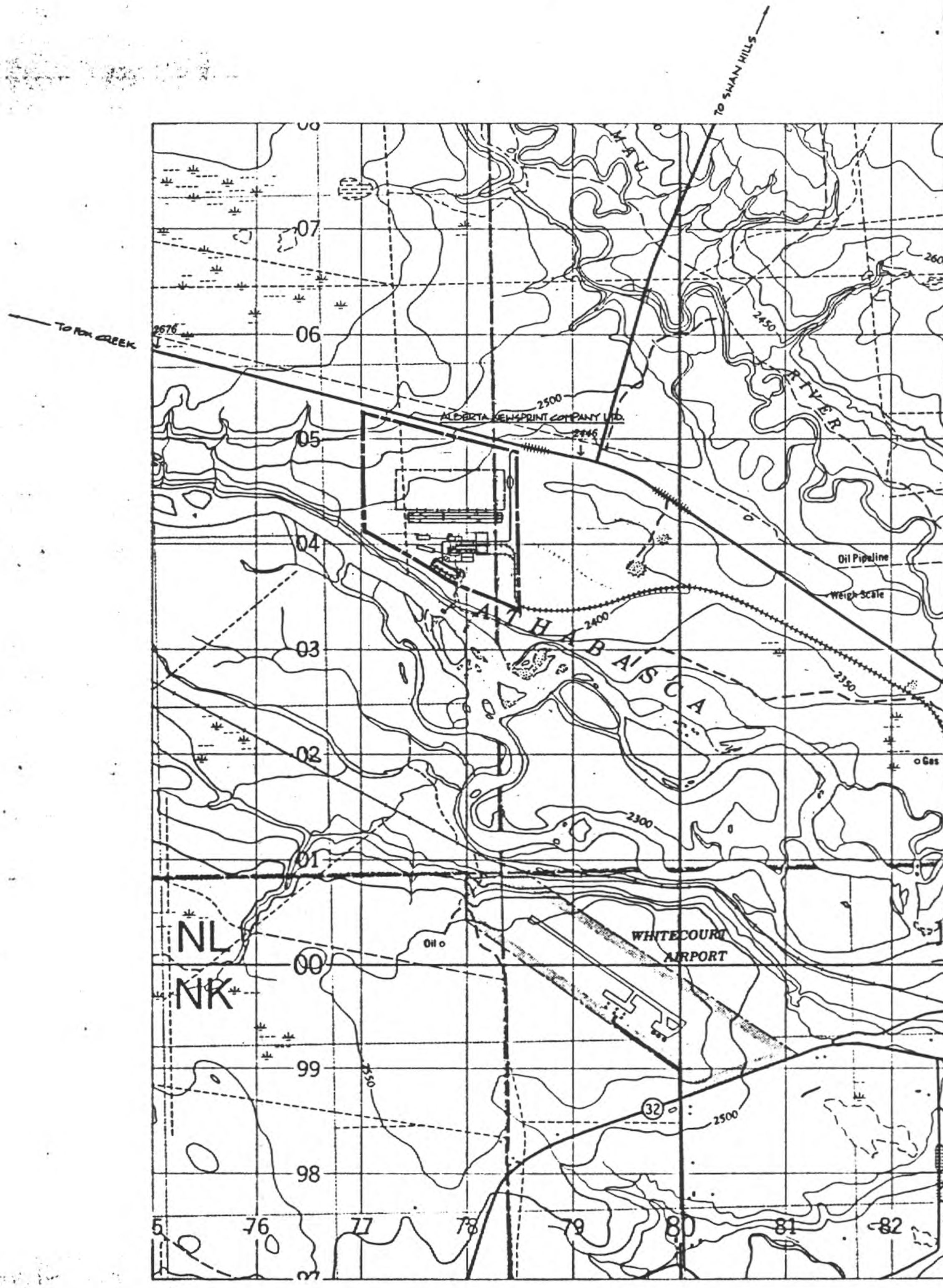
TO SWAN HILLS
TO FOX CREEK
ALBERTA NEWSPRINT COMPANY LTD.
ATHABASCA
RIVER
Oil Pipeline
Weigh Scale
Gas
Oil
WHITECOURT AIRPORT
32
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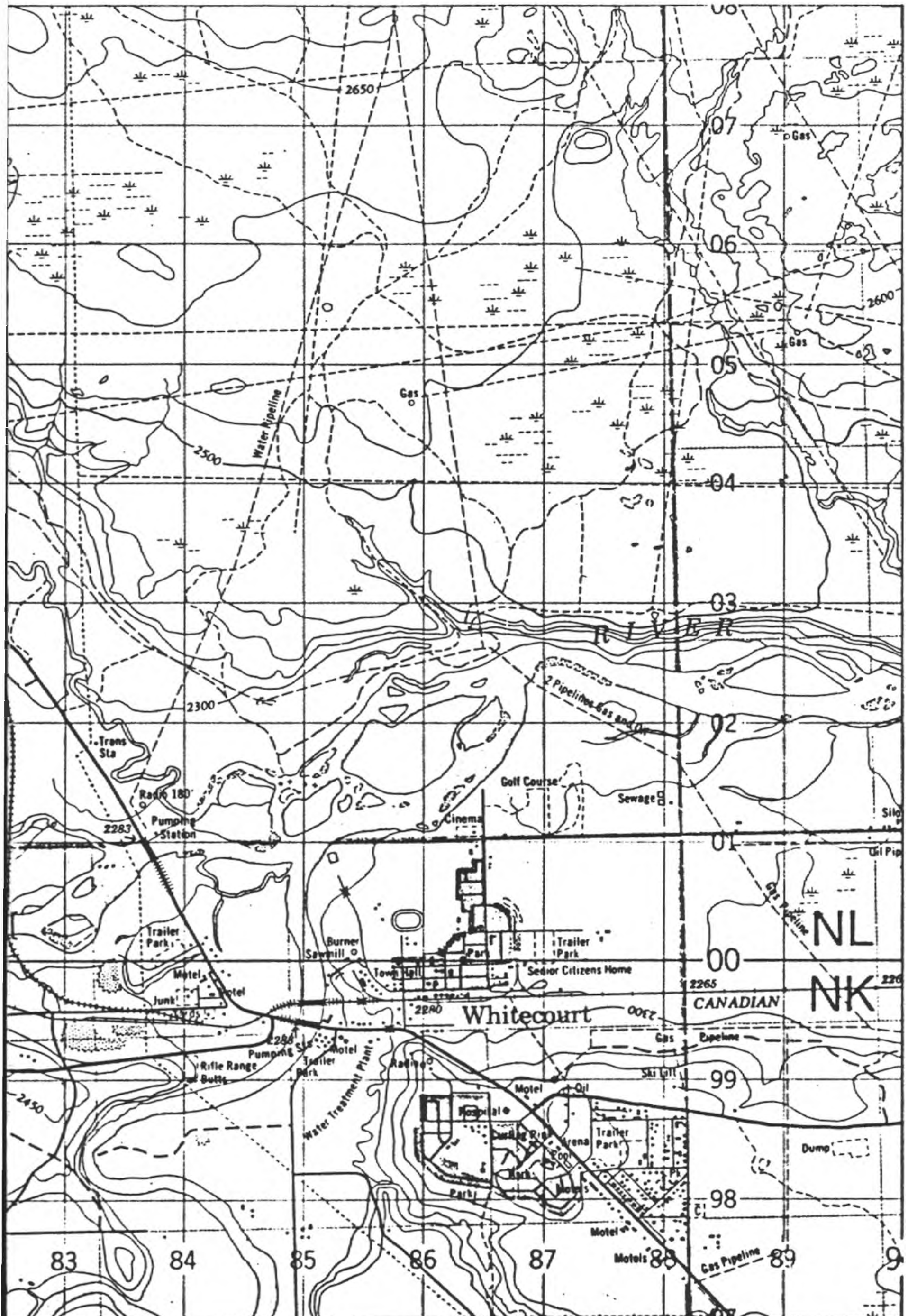

Miles 1 0 1 2 3 Miles

Metres 1000 0 1000 2000 3000 4000 Metres

REFERENCE DRAWINGS

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02	[illegible]	ISSUED FOR EIA REPORT	[illegible]	[illegible]	[illegible]
01	[illegible]	ISSUED FOR CLIENT REVIEW	[illegible]	[illegible]	[illegible]

NYSTROM, LEE, KOBAYASHI

NLK

CONSULTING ENGINEERS

VANCOUVER B.C. SEATTLE WA. MONTREAL P.Q.

NEWSPRINT MILL

SITE & SITE SERVICES

SITE

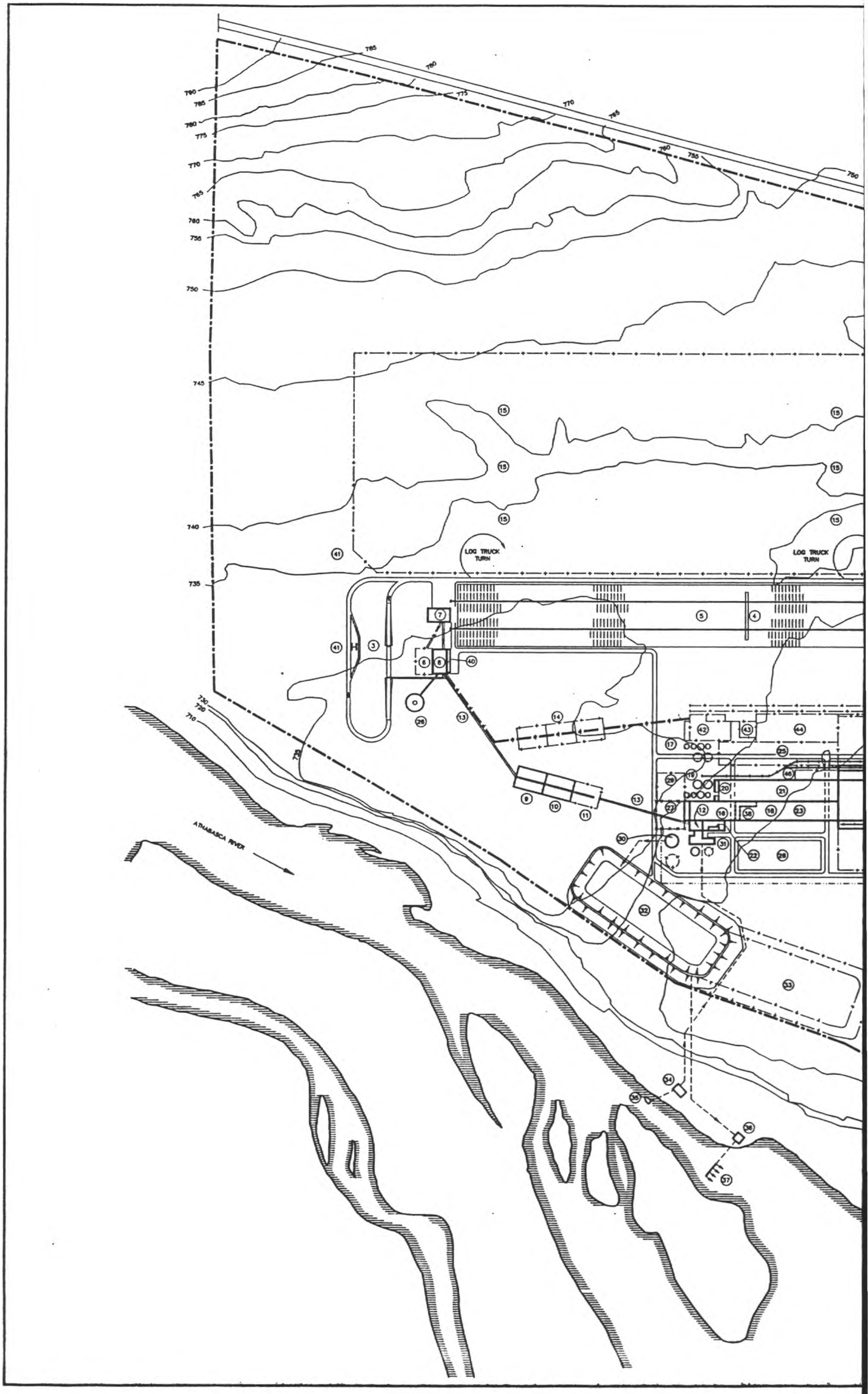
LOCATION PLAN

SCALE 1:20000

AO-1674-211-0001

03

ALBERTA NEWSPRINT COMPANY LTD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765
760
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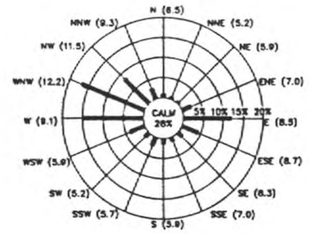
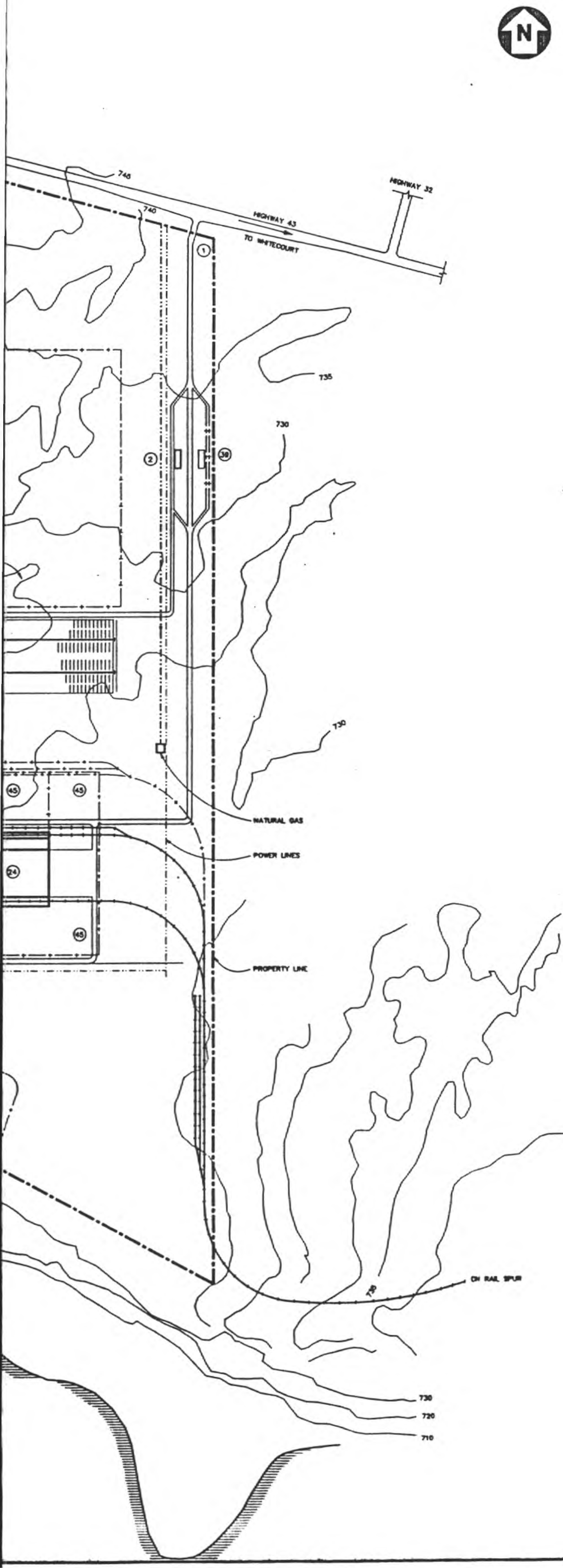
745
740
735
730
720
710
LOG TRUCK TURN
LOG TRUCK TURN
ATHABASCA RIVER

REFERENCE DRAWINGS		
1	SITE LOCATION PLAN	A0-1674-211-0001



WHITECOURT WIND ROSE

(MEAN ANNUAL WIND SPEEDS ARE SHOWN IN kph BESIDE THE DIRECTION, ie. N(8.5))



NOTES:

1. ONLY AREAS FOR MILL SITE, LOG STORAGE, & ACCESS FACILITIES TO BE CLEARED.

LEGEND

(1) MILL ENTRANCE
(2) TRUCK SCALE
(3) CHIP TRUCK DUMPER
(4) PORTAL CRANE
(5) LOG STORAGE
(6) FUTURE WOODROOM & CHIP SCREEN BUILDING
(7) LOG INFEED DECK
(8) WOODROOM
(9) ASPEN CHIP STORAGE & RECLAIM
(10) SPRUCE & PINE CHIP STORAGE & RECLAIM
(11) FUTURE CHIP STORAGE
(12) CHIP SCREEN BUILDING
(13) CHIP FEED CONVEYOR
(14) FUTURE CHIP STORAGE & RECLAIM
(15) SPACE FOR FUTURE LOG STORAGE AREAS
(16) REFINER PLANT (SCREENING & CLEANING)
(17) FUTURE TANK FARM
(18) ENGINEERING / OFFICES
(19) CTMP TANK FARM / STOCK PREPARATION
(20) PAPER MACHINE STOCK PREPARATION
(21) PAPER MACHINE NO.1 & FINISHING
(22) BOILER ROOM
(23) PM MAINTENANCE / SHOPS & STORES & ADDITIVE STORAGE & PREPARATION
(24) PAPER WAREHOUSE / SHIPPING
(25) FUTURE PAPER MACHINE NO.2
(26) INCINERATOR (SMOKELESS)
(27) SWITCHYARD
(28) PARKING
(29) FUTURE SWITCHYARD
(30) EFFLUENT CLARIFIER
(31) WATER & EFFLUENT TREATMENT/CLEARWELL BUILDING
(32) TEN DAY AERATED STABILIZATION BASIN
(33) FUTURE AERATED STABILIZATION BASIN
(34) WATER PUMP HOUSE
(35) WATER PUMP HOUSE INTAKE
(36) EFFLUENT OUTFALL BUILDING
(37) DIFFUSER
(38) CONTROL ROOM (COMBINED)
(39) FUTURE TRUCK SCALE
(40) MAINTENANCE GARAGE
(41) LOGGING TRUCK TRAILER HOIST
(42) FUTURE REFINER PLANT(SCREENING & CLEANING)
(43) FUTURE CONTROL ROOM
(44) FUTURE OFF LINE COATERS
(45) FUTURE WAREHOUSE EXPANSION
(46) FUTURE OFFLINE WINDER BUILDING

100 50 0 100 200
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05	[illegible]	ISSUED FOR EIA REPORT	AA	RL	[illegible]
04	[illegible]	ISSUED FOR EIA REPORT	SC	RL	[illegible]
03	[illegible]	ISSUED FOR CLIENT REVIEW TITLE REVISED	BW	RL	[illegible]
02	[illegible]	FOR MILLAR WESTERN & ALBERTA NEWSPRINT CO. REPORT	SC	RL	[illegible]
01	[illegible]	FOR CLIENT REVIEW	SC	RL	[illegible]
ISSUE NO.	[illegible]	ISSUE	[illegible]	[illegible]	[illegible]

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CONSULTING ENGINEERS

VANCOUVER B.C. SEATTLE WA. MONTREAL P.Q.

NEWSPRINT MILL

SITE & SITE SERVICES
SITE
GENERAL ARRANGEMENT

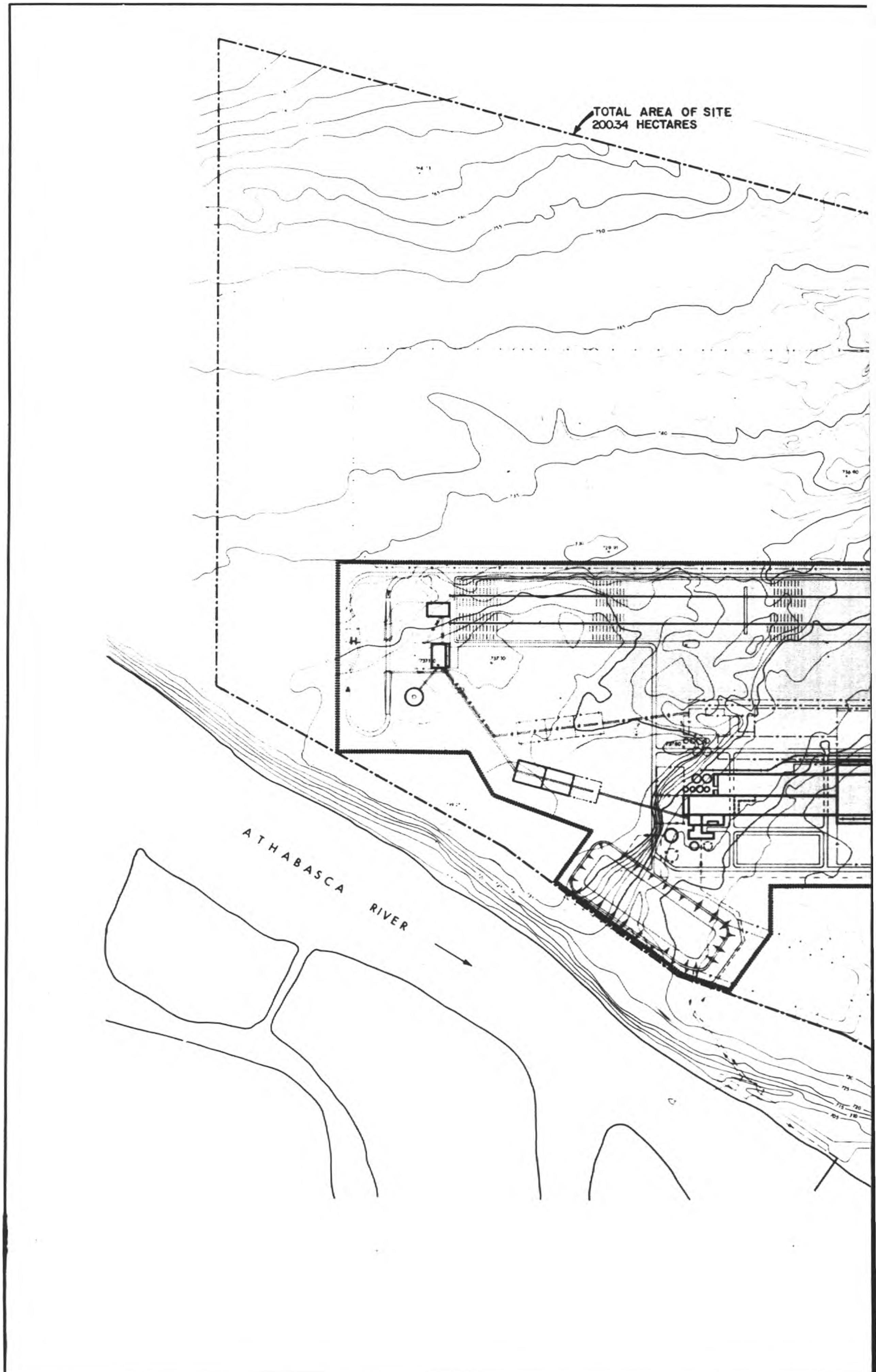
SCALE			D	M	Y
1:3000	DSN	RL			
	DR	SL/DFM/SC/BW	26	08	87
	CH	RL/WN	18	11	87
	APP				

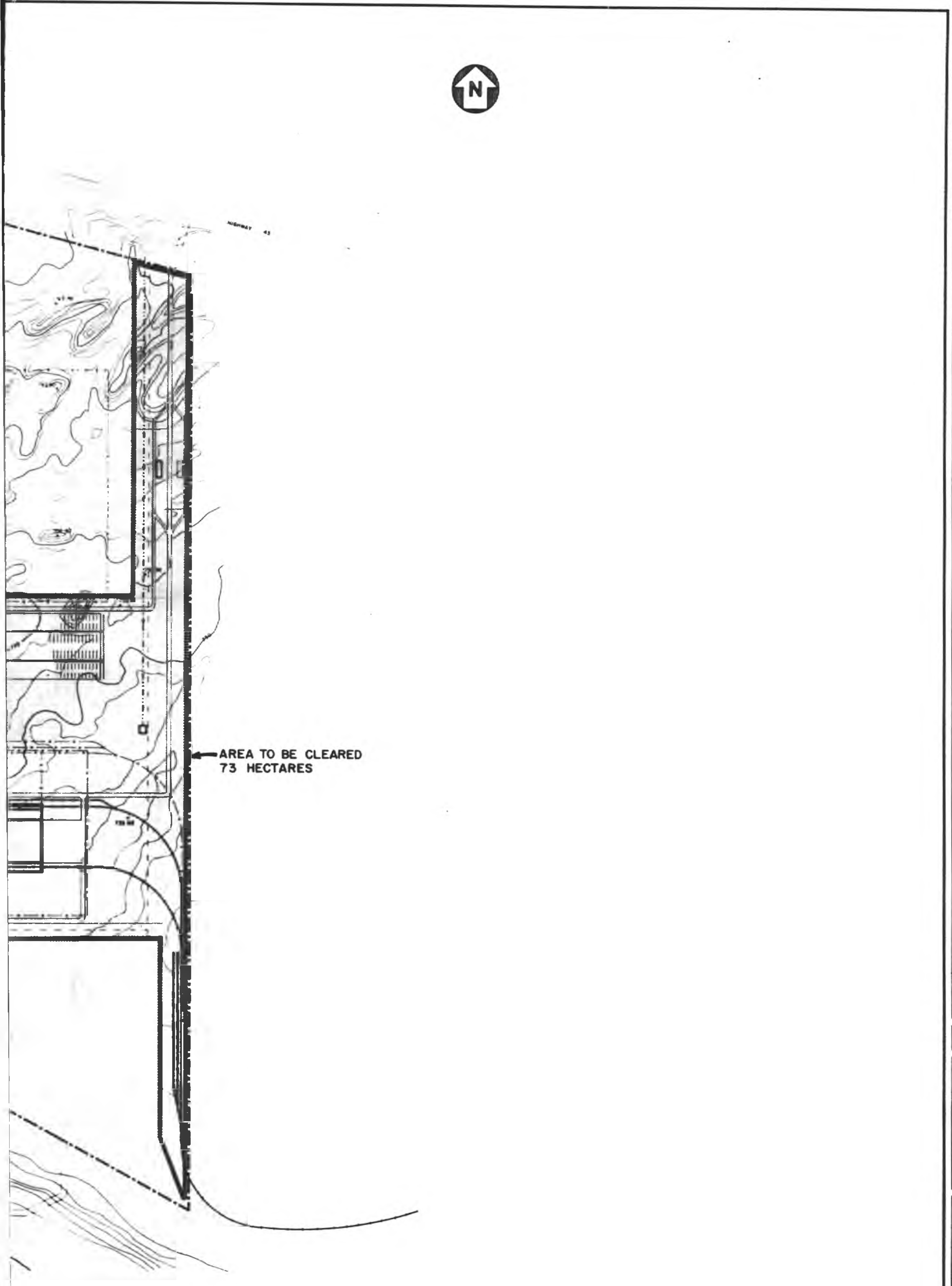
N.L.K. DWG NO. A0-1674-211-0002 ISSUE 05

ALBERTA NEWSPRINT COMPANY LTD.
EDMONTON, ALBERTA - CANADA

CLIENT DWG. NO.

NLK CADD FILE: \1674\A0\211-0002.DWG LAST EDIT DATE: Apr. 20, 1988


TOTAL AREA OF SITE
200.34 HECTARES
ATHABASCA RIVER



REFERENCE DRAWINGS

ISSUE NO	D/M/Y	ISSUE	DR	CH	APP
03	16-5-88	ISSUED FOR EIA REPORT	BM	JR	DF
02	08-05-88	ISSUED FOR PROJECT MEMO No 1674-AEAL-11 / CLIENT REVIEW	A.V	PF	G.L
01	06-05-88	ISSUED WITH DEVELOPMENT PERMIT	A.V	PF	G.L

CERTIFIED FOR CONSTRUCTION

CLIENT PROJ. MGR. N.L.K. PROJ. MGR.

ASSOCIATED ENGINEERING

NYSTROM, LEE, KOBAYASHI

NLK

CONSULTING ENGINEERS

VANCOUVER B C · SEATTLE WA · MONTREAL P Q

NEWSPRINT MILL

SITE & SITE SERVICES

SITE

CLEARING PLAN

SCALE			D	M	Y
1: 3000	DSN	P. FUNSTON	04	05	88
	DR	A. VANDERMEER	04	05	88
	CH	G. LENTO	05	05	88
	APP				

N.L.K. DWG. NO. AO-1674-211-0003 ISSUE 03

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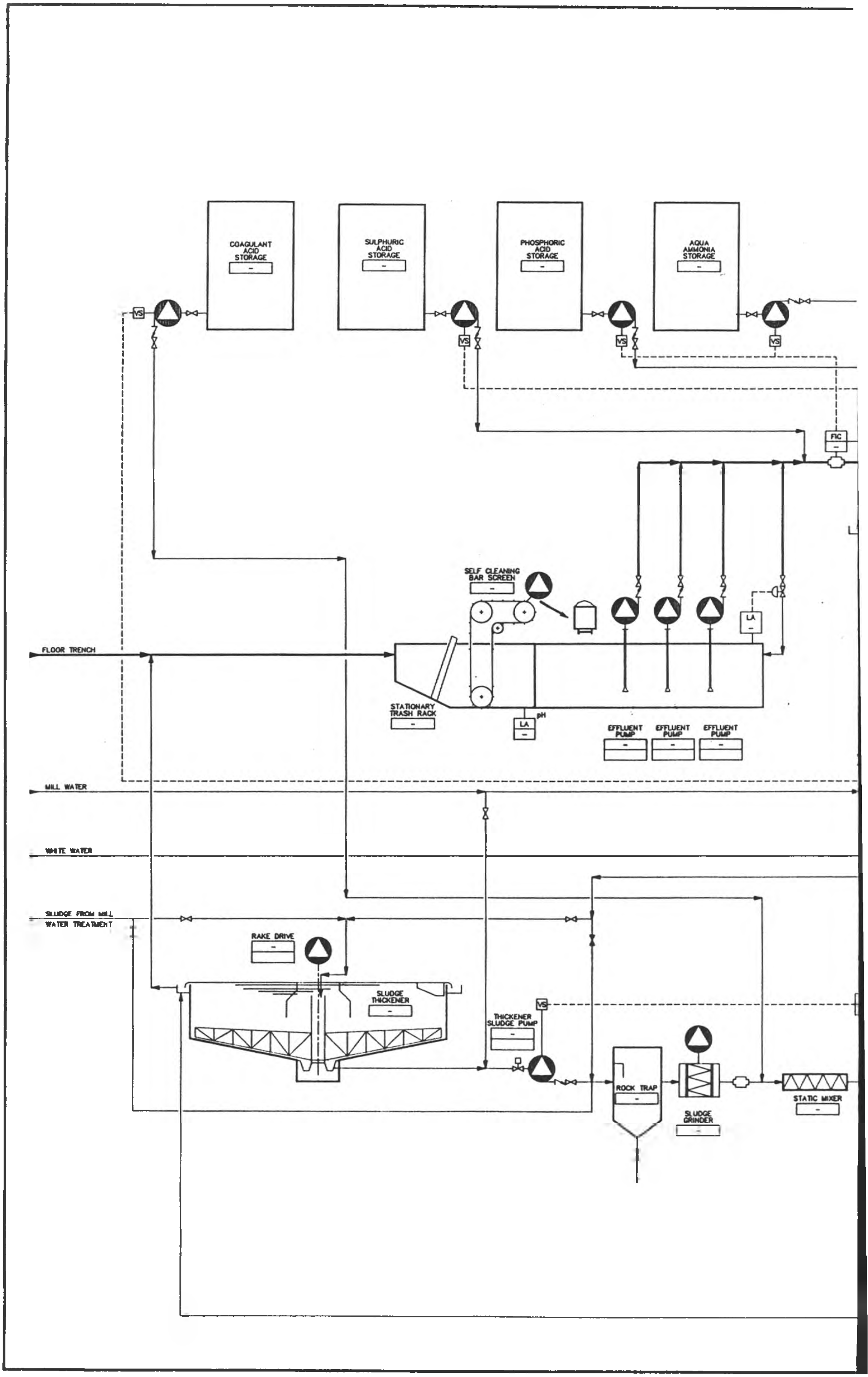
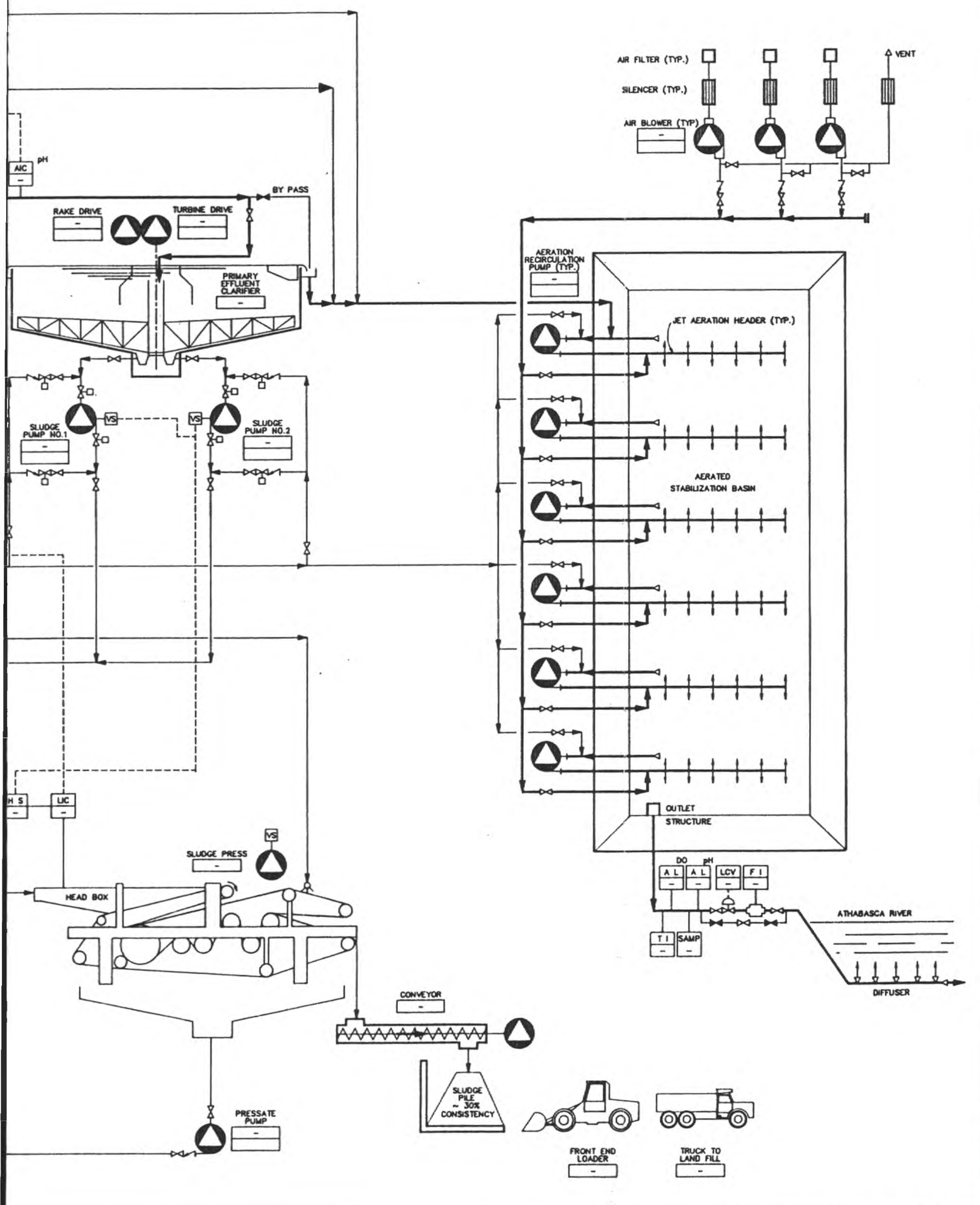
CLIENT DWG. NO.


COAGULANT ACID STORAGE
SULPHURIC ACID STORAGE
PHOSPHORIC ACID STORAGE
AQUA AMMONIA STORAGE
VS
FIC
SELF CLEANING BAR SCREEN
LA
FLOOR TRENCH
STATIONARY TRASH RACK
pH
EFFLUENT PUMP
EFFLUENT PUMP
EFFLUENT PUMP
MILL WATER
WHITE WATER
SLUDGE FROM MILL WATER TREATMENT
RAKE DRIVE
SLUDGE THICKENER
THICKENER SLUDGE PUMP
ROCK TRAP
SLUDGE GRINDER
STATIC MIXER



REFERENCE DRAWINGS

01		ISSUED FOR EIA REPORT			
ISSUE NO.	D/M/Y	ISSUE			

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ENVIRONMENTAL PROTECTION

P & C FLOW DIAGRAM

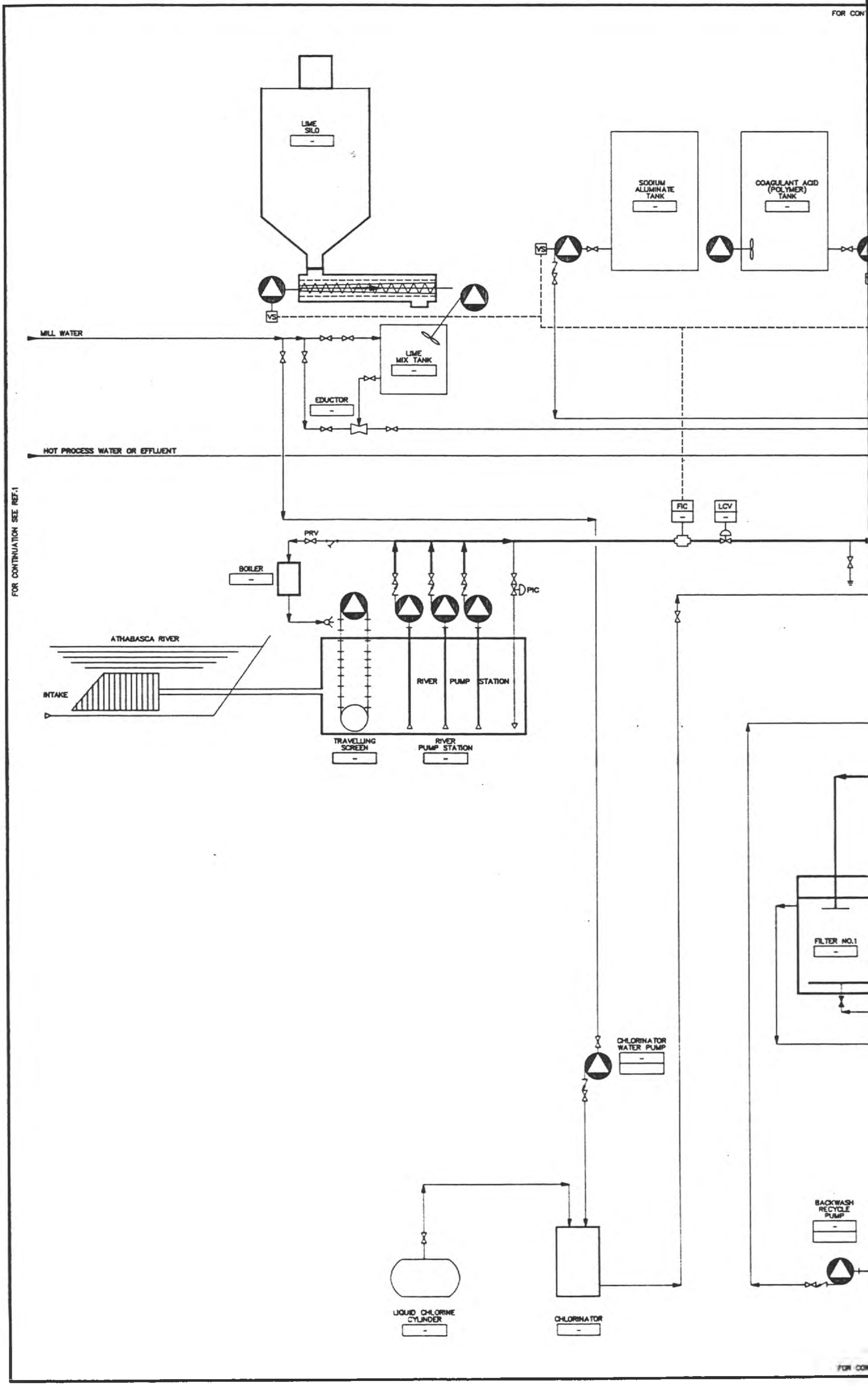
EFFLUENT TREATMENT

SCALE 1:100 | DSN WS | DR TAB/SL | CH | APP | D 12 M 04 Y 88

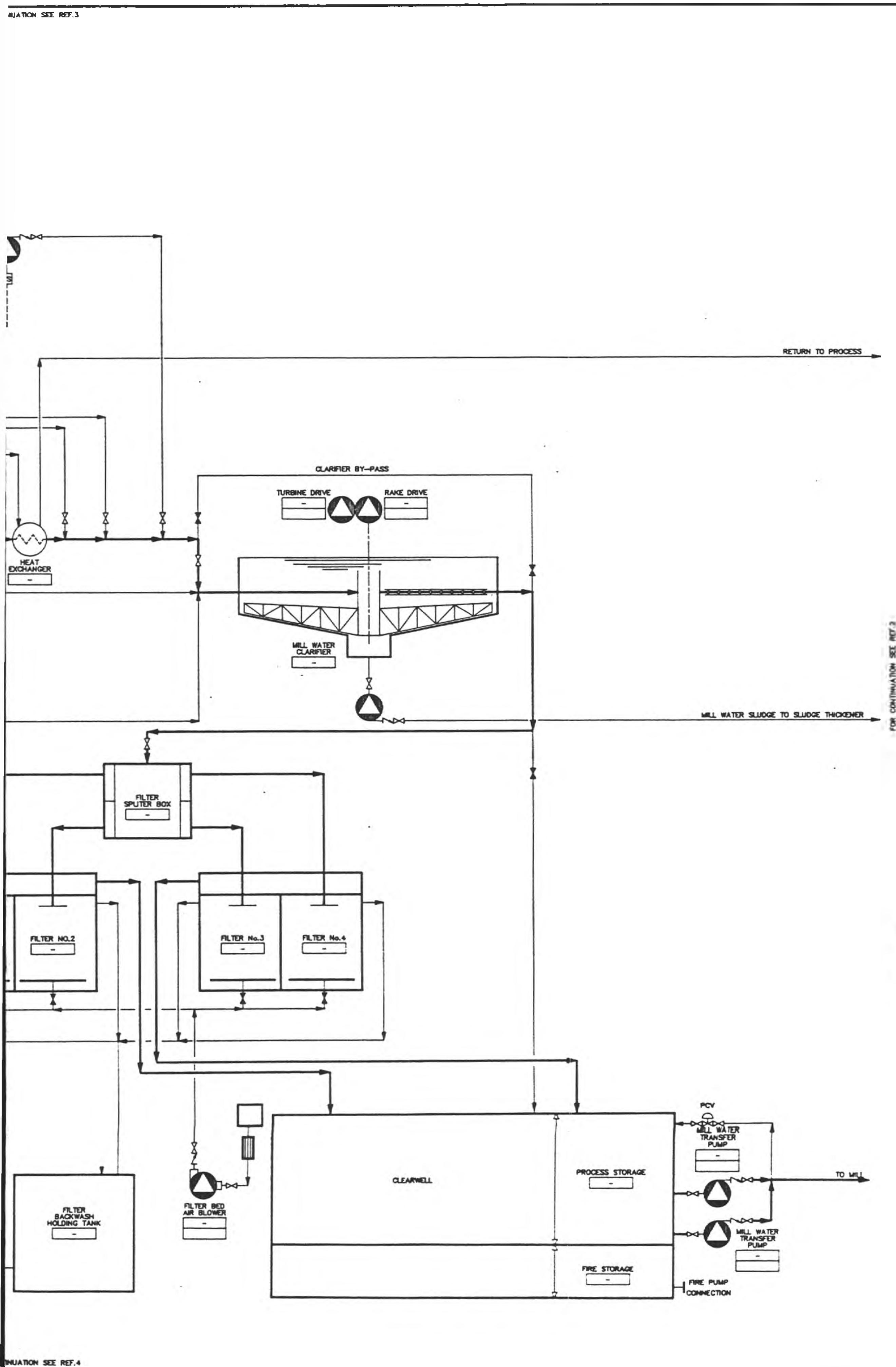
N.L.K. DWG. NO. A0-1674-251-2001 ISSUE 01

CLIENT DWG. NO.

NLK CADD FILE: \1674\A0\251-2001.DWG LAST EDIT DATE: Apr. 20, 1988



LIME SILO
SODIUM ALUMINATE TANK
COAGULANT ACID (POLYMER) TANK
VS
VS
MILL WATER
LIME MIX TANK
EDUCTOR
HOT PROCESS WATER OR EFFLUENT
FOR CONTINUATION SEE REF.1
FIC
LCV
PRV
BOILER
PIC
ATHABASCA RIVER
INTAKE
RIVER PUMP STATION
TRAVELLING SCREEN
RIVER PUMP STATION
FILTER NO.1
CHLORINATOR WATER PUMP
BACKWASH RECYCLE PUMP
LIQUID CHLORINE CYLINDER
CHLORINATOR



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NEWSPRINT MILL

WATER SUPPLY & DISTRIBUTION

P & C FLOW DIAGRAM

MILL WATER SUPPLY

SCALE 1:100

DSN WS

DR TAB/SL

N.L.K. DWG. NO. A0-1674-351-2001 ISSUE 01

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NLK CADD FILE: \1674\A0\351-2001.DWG LAST EDIT DATE: Apr. 20, 1998