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EDMONTON ALBERTA

ENVIRONMENTAL IMPACT ASSESSMENT OF THE PROPOSED WHITECOURT NEWSPRINT MILL

SUPPLEMENTAL

Alberta Newsprint Company Ltd.

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25 July 1988

Mr. 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 - Supplemental

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

This supplemental report addresses questions outlined in correspondence from F.J. Schulte to R.N. Stern dated 15 July 1988. These questions were raised through the review process for the original Environmental Impact Assessment submitted 16 May 1988. This report was prepared by Nystrom, Lee, Kobayashi & Associates with assistance from several specialist consultants (Beak Associates Consulting Ltd., Cirrus Consultants, Associated Engineering Alberta Ltd., & The DPA Group Inc.) Additional correspondence is also provided pertaining to the public consultation process.

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 requests for any additional information will be handled in an expeditious manner.

Yours truly,

ALBERTA NEWSPRINT COMPANY LTD.

R Stern

Ronald N. Stern
Managing Director

RNS/sr

Enclosure

PROJECT 1674
NEWSPRINT MILL

ALBERTA NEWSPRINT COMPANY LTD.
WHITECOURT ALBERTA

DATE: 25 JULY 1988

ENVIRONMENTAL IMPACT ASSESSMENT OF THE PROPOSED WHITECOURT NEWSPRINT MILL - SUPPLEMENTAL

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APPENDICES

SECTION 1

BIOCHEMICAL OXYGEN DEMAND (BOD)/

DISSOLVED OXYGEN (DO)

Question 1

As requested on March 21, 1988 please provide an assessment of the environmental impacts associated with an effluent discharge to the Athabasca River of 5.0 kg of biochemical oxygen demand (BOD_5) per Finished Metric Ton or a lower figure if dissolved levels in the river can not be maintained above 5 mg/L under low flow conditions (7Q10).

Response

Since early in 1988, ANC has worked closely with Alberta Environment to develop models of the Athabasca River capable of assessing the impacts of biochemical oxygen demand (BOD) on dissolved oxygen (DO) levels in the river. In the EIA, a BOD loading of 7.0 kg/FMT was used, and the models predicted that DO values would decline to very close to the 5.0 mg/l water quality DO objective. Subsequent to submission of the EIA, ANC has:

1) Revised anticipated BOD loadings downward from 7.0 kg/FMT to 5.0 kg/FMT, and

2) Participated in a major review and refinement of the models developed for the EIA.

The new modelling results, which assume BOD loadings of 7.0 kg/t from Champion, 7.5 kg/t from Millar Western (MWPL) and 5.0 kg/t from ANC, produce a very similar result to that presented in the EIA. The new models predict a maximum DO reduction under 7Q10 flow conditions to 4.6 mg/l. Based on the results of a number of sensitivity analyses, many of which were discussed with Alberta Environment during the model review process, the new result is not considered to be significantly different from previous predictions.

As a result, it would appear that the assessments of BOD impacts made in the EIA remain valid. In summary, these were:

1) That under very low flow conditions, maximum permitted 30 day average loadings by all three mills will result in dissolved oxygen conditions close to or possibly below the Alberta Surface Water Quality Objective.

2) That exceedances, should they occur, would likely be of very short term and relatively infrequent, and as a result, would not be predicted to result in any significant impact on the fish or other aquatic organisms in the Athabasca River.

The latter conclusion is based on a number of factors. First, the 5.0 mg/l objective is not a lethal level of oxygen to fish, particularly under low temperature conditions when metabolic activity is greatly reduced. The value, in fact, is relatively conservative, and short term exceedances are accepted by agencies such as the US EPA.(1) Second, the occurrence of very low flow conditions is quite predictable with often weeks of daily data indicating that discharge is dropping to a critical level. These data are readily available from Alberta Environment and will be used by ANC to determine periods when the risk of exceedance is greatest. DO monitoring, which is simple and rapid, will also be used by ANC during low flows to further confirm when river conditions are approaching the Alberta Water Quality Objective. As a result, ANC, Alberta Environment and the other sources of BOD on the Athabasca River will have adequate advance opportunity to implement mitigation strategies.

Mitigative Measures

The DO modelling predictions indicate that without mitigation under critical winter low-flow conditions, DO will approach the target value of 5.0 mg/l, with the possibility of breaching the objective under infrequent conditions.

ANC proposes to work with Alberta Environment to ensure that the established minimum DO objective of 5.0 mg/l will not be compromised. The following alternative mitigation measures are presented for consideration.

a) Install a reaeration facility on the Athabasca River near Fort Assiniboine in the vicinity of the confluence with the Freeman River. The reaeration facility would comprise air blowers and a river bottom diffuser to discharge air into the river under the ice cover. Adequate air would be supplied to increase DO sufficiently to maintain DO at the confluence with the Lesser Slave River above 5.0 mg per liter.

b) Install a holding pond at the ANC mill site. Under critical low-flow conditions, ANC would reduce effluent discharges in accordance with requirements established by Alberta Environment. The stored effluent would be discharged when river flows had increased sufficiently to handle the BOD loading.

(1) US EPA Goal Book, 1986.

ANC will propose a schedule and procedure for assessing the above mitigative measures and for implementation, should mitigative action be required. It is anticipated mitigative measures as required by Alberta Environment will be incorporated in Permits and Licenses issued under the Clean Water Act.

Modelling Interpretation

Reliable modelling of the DO profile in a river requires considerable data on site-specific treated effluent characteristics and site-specific BOD decay characteristics in the river. Available data is very limited. Thus, it is considered that the predicted DO profile should be used as a guide for developing a strategy for river basin management rather than as a finite measurement for establishing allowable BOD discharges, and that further reduction in the predicted BOD loadings from the ANC mill cannot be justified based solely on the modelling data currently available. Rather, optimal river protection can be achieved through mitigative measures such as those described above.

Ouestion 2

ANC has calculated 7Q2 and 7Q10 flows of 38.6 m^3/sec and 30.4 m^3/sec respectively. These vary from flows of 36.7 m^3/sec and 29.0 m^3/sec calculated by Alberta Environment ("Athabasca River Basin Low Flows Analysis", 1984). Please explain how the flows on page 5-2 were calculated and why the low flows of Alberta Environment were not used.

Response

The 7Q2 and 7Q10 flows of 38.6 m^3/s and 30.4 m^3/s respectively, were used instead of the flows calculated by Alberta Environment ("Athabasca River Basin Low Flows Analysis", 1984), because of the inclusion of more recent data in the statisticcal analysis. Alberta Environment report used only data up to 1978 for the Windfall Station and up to 1982 for the other stations. BEAK used data to 1985 for its frequency analyses. Although the differences are only 5%, it is suggested that these analyses be revised to include the mose recent data (i.e. winter of 1987-88) to obtain the best estimate possible.

Question 3

Please provide a graph and text comparing the anticipated range in BOD loadings entering the wastewater treatment system with the BOD_5 concentrations in the final effluent discharged. The range should include the worst case conditions as well as those customarily observed in the industry. Discuss what seasonal variation may be expected in effluent quality.

Response

Typical response curves for BOD reduction versus treatment time are shown below. BOD is reduced rapidly at the start of treatment as easily degraded compounds are metabolized. As the effluent becomes more refractory the rate of BOD reduction diminishes.

The predicted raw effluent BOD_5 loading for the ANC plant configuration is 40 kg per FMT. A minimum BOD_5 removal efficiency of 87 percent is predicted to produce a final effluent with a BOD_5 loading not exceeding 5 kg per FMT.

The estimated raw BOD_5 loading of 40 kg per FMT is a conservative estimate based on the planned sodium sulphite treatment of 20 kg per FMT (as specified in the response to Question 20). In the worst case, raw BOD_5 might increase to a maximum of 50 kg per FMT. With a higher BOD loading, however, removal efficiency will be enhanced and treated BOD levels would not increase proportionately. Aeration capacity will be installed with adequate margin to handle maximum BOD loadings.

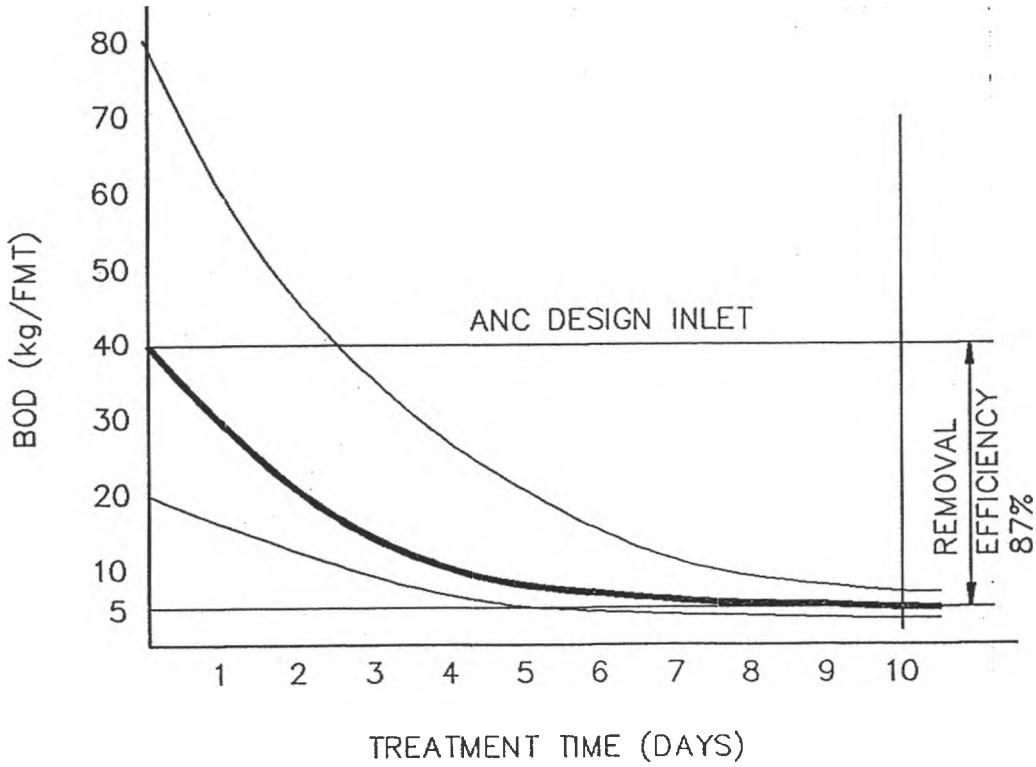
The raw BOD_5 loading at other high-yield pulping installations can be as low as 15 to 20 kg per tonne where chemical application is either omitted or is low. For production of certain bleached grades of CTMP, requiring higher chemical applications, raw BOD_5 may approach 100 kg per tonne.

As raw BOD_5 load decreases the fraction of refractory BOD typically increases. With lower raw BOD values, BOD removal efficiency is typically reduced. Thus, while it is possible to achieve final effluent discharge levels with lower BOD, the treated effluent concentration can not be expected to be proportional to the inlet concentration.

BOD removal efficiency often decreases in winter due to lower effluent temperature in the treatment process. Biological treatment efficiency is most commonly maximized at about 35°C.

The ANC plant and effluent treatment system configuration will allow the first stage of the ASB, a fully back-mixed section with approximately four-days hydraulic retention time, to be

controlled at the optimal temperature of about 35°C irrespective of the prevailing ambient temperature. Thus, the BOD removal efficiency in the first section of the ASB, where it is expected that some 80 percent of the total BOD removal will be accomplished, will not be subject to significant seasonal variance. The second stage of the ASB will operate at reduced average temperatures in winter and thus BOD removal efficiency will be somewhat reduced. However, it is anticipated that removal efficiency will not drop below the required 87 percent under cold weather conditions.



BOD VS. TREATMENT TIME

Question 4

Please explain how the BOD decay rates in Table 4 (in Appendix 1 - page 3-8) were developed and why March sampling data were used to calibrate the model instead of the February data. Provide an update for predicted DO levels under 7Q10 conditions using the February 1988 data.

Response

See response to Question 5.

Ouestion 5

With respect to predictions of DO levels in the river (page 5-7), provide further detail on the model used in the assessment including the sensitivity of the modelling and confidence limits. Discuss the margin of safety under worst case conditions. Please comment on the need to use a higher ultimate BOD than permitted by the model. Comment on the significance of biological enrichment due to the nutrients and biosolids to be discharged from the mill. Provide an estimate and discuss the D O demand caused by this additional enrichment.

Response

Since the time of the EIA report submission, Alberta Environment and ANC have reached an agreement on modelling parameters. The model was calibrated to the February data and validated to the March data. The resulting key modelling parameters are listed as follows:

Decay Constant K1	- 0.36 for 40% of Champion's BOD_u
	- 0.20 for 33% of BOD_u for all other mills
	- 0.04 for 60% of Champion's BOD_u, 0.04 for 66% of BOD_u for all other mills, for all other background and tributaries.
BOD_u/BOD_5	- 2.0 for 'fast' decaying (K1 = 0.36 and 0.20) portions of the effluents,
	- 5.5 for 'slow' decaying (K1 = 0.04) portions of the effluents, and for all background and tributaries.
Reaeration K2	- 10% for open water conditions,
	- 1 to 5% for under ice conditions.

The model was calibrated and validated to the best available data, the February and March field data. The modelling parameters, developed and agreed upon by ANC and Alberta Environment, are based partly on the available data and partly on the best professional experience and intuition of four technical experts in dissolved oxygen river modelling. The effect of these revised parameters was to increase the ultimate BOD over that used in the EIA model.

The decay rates and BOD loadings incorporate the anticipated impacts of biological enrichment.

Question 6

Decomposition of effluent biosolids in the receiving environment can contribute both carbonaceous and nitrogenous oxygen demand. Please discuss to what extent the latter has been considered in the predicted BOD_5 in Table 4-1.

Response

The predicted BOD_5 in Table 4-1 considers both carbonaceous and nitrogenous oxygen demand. The approach taken in the model was to distribute the effluent into 'fast' and 'slow' decaying portions, simulating both carbonaceous and nitrogenous oxygen demand. In the EIA, the effluent was considered to be 100% 'fast' (i.e. carbonaceous). In subsequent work, the effluent was partitioned as described in response to Questions 4 and 5. Criteria for the decay of biosolids is also discussed in the response to Questions 4 and 5.

Question 7

On page 5-5 and in Table 5-3 information on background BOD levels is provided. Please clarify: (a) at what time of the year background BOD levels of 1.0 mg/l were measured, (b) what the background BOD levels are predicted to be at the 7Q10 flow of 30.4 m^3/sec and at the mean flow of 253 m^3/sec , and (c) what the final BOD concentrations in the river are at the 7Q10 flow and at the mean flow.

Response

a) The background BOD values in the main report were from Hamilton (1985) and collected over the summer (1984) with one sample in the winter (February 1985). Most values remained near one mg/l (Hamilton, 1985), with slightly higher values below Hinton (less than 2.0 mg/l) and a maximum value of 3.7 mg/l at 5 km below Hinton, February 1985. No flow data for Windfall in February, 1985 are available, but the mean monthly flow at Hinton was 25.0 m^3/s, or approximately 155% of the 7Q10 and 105% of the 7Q2.

b) Based on the above analysis, background BOD levels are not predicted to change significantly with changes in flow. This was confirmed by further analysis of the NAQUADAT data set (see Response to Question 5).

c) As BOD decay processes continue, BOD values are predicted to decline towards the original background levels.

SECTION 2

TOTAL SUSPENDED SOLIDS (TSS)

Question 8

Please provide more specific information on the usual values for TSS concentrations of the aeration pond effluent.

Response

TSS concentration of the final effluent will be a function of primary clarifier influent loading and removal efficiency, raw BOD loading, BOD removal efficiency, conversion rate of BOD into biomass and the degree of endogenous decay for the biomass produced in the ASB.

Under normal operating conditions, TSS from the primary clarifier is anticipated to be about 5 kg per FMT. Net biosolids generation in the ASB is predicted to be about 0.4 kg per kg of BOD reduced, or about 14 kg per FMT. Thus, total TSS discharge is predicted at 19 kg per FMT, under normal operation.

The proportional production of biosolids per unit of BOD removal can be subject to relatively wide variation. Typical pulp and paper industry values range from less than 0.2 kg per kg of BOD removal to as high as 0.6. While biosolids discharge can be reduced to a limited degree in the ASB by establishing conditions which favour endogenous decay, it is not practical to control biosolids to tightly defined values.

Question 9

Please clarify the apparent discrepancy between the reference in Appendix 1 to the National Council of the Paper Industry for Air and Stream Improvement Study, i.e. NCASI, 1982 that indicates high BOD decay rates for only 10% of the effluent's total BOD (Appendix 1 page 3-5) and the assumption on page 3-9 of Appendix 1 that suggests most of ANC's effluent's BOD would have a high decay rate.

Response

During the initial calibration runs using Alberta Environment data, it became apparent that the BOD decay rates indicated by modelling were considerably higher than would have been predicted from the available literature. A decision was made to assume a large proportion of the ANC effluent would decay rapidly since this a) fit the available data and allowed model calibration to both months, and b) was a relatively conservative assumption (i.e. afforded additional environmental protection). This issue has subsequently been resolved to the satisfaction of all parties involved in the modelling process, as discussed in the response to Question 5.

Question 10

Please explain at what loading TSS will increase by 7.1 mg/l (Appendix 1, page 5-7, 4th paragraph).

Response

The predicted TSS loading which will increase river solids loading by 7.1 mg/l was 30 kg/FMT or 1250 mg/l of effluent. ANC has recently revised the solids loadings downward to 24 kg/FMT or 1000 mg/l. The predicted solids loading for ANC, for MWPL and for both mills combined is shown in Table 10.1.

Table 10-1

Increases in Athabasca River TSS Concentrations (mg/l) at Decreasing Flows.

Mill	7Q2 Flow	7Q10 Flow	Minimum Recorded Flow
ANC	4.5	5.9	9.0
MWPL	6.0	7.9	12.0
ANC and MWPL	10.5	13.8	21.0

Question 11

On page 4-5 of Appendix 1 it is stated that following final dilution, the ANC and Miller Western Pulp Ltd. (MWPL) TSS loadings would not meet the Canadian Water Quality Objectives for the 7Q10 flow and that the ANC loadings alone would not meet the objectives at extreme low flows. Please provide the justification and supporting evidence for the conclusion that these suspended solid levels will have no impact on the river at winter flows. What mitigative measures does ANC propose to undertake to minimize or eliminate these potential exceedences?

Response

The effects of suspended sediment on aquatic life have been extensively researched and several comprehensive reviews of the literature on this topic have been prepared (e.g. Cordone and Kelley 1961, Shelton and Pollock 1966, Gammon 1970, Sorenson et al. 1977, Langer 1980, Alabaster and Lloyd, 1982, Canada Department of Fisheries and Oceans 1983). The major effects of suspended sediment on aquatic systems are briefly summarized below; the results of some of the more pertinent quantitative studies are presented in Table 11-1

The effects of suspended sediment on aquatic life can be divided into those that occur in the water column and those that occur due to accumulation of sediments in or on the substrate. Both types of effects are of concern in the two main divisions of aquatic life in the Athabasca River: benthic invertebrates and fish.

Increased concentrations of suspended sediments increase the rate of invertebrate drift, thereby contributing to the depopulation of an affected area; if the concentration is high enough, invertebrates can be directly damaged or killed. The desirable species of invertebrates (i.e. those utilized by fish) live in the interstitial spaces in gravel beds, and so they are severely affected or eliminated when sedimentation fills these spaces. Sedimentation can also cause a secondary loss of food supplies for benthic invertebrates by burying organic detritus.

There are four main ways in which an excessive concentration of suspended solids can be harmful to fish (Alabaster and Lloyd 1982, Table 11-1). These are:

1) Reduction of available food. Benthic invertebrate population, a major food source for fish, are adversely affected by high suspended sediment loads.

2) Modification of natural behaviour. High concentrations of suspended solids interfere with feeding. When concentrations become high enough, feeding may cease altogether.

3) Direct action on fish within the water column. At high enough concentrations suspended solids are lethal to fish, the mechanism being gill damage and eventual suffocation. The concentration at which mortality occurs varies with the type of material, with the species of fish, and for at least one species, with the season. Lower concentrations of suspended solids can cause lowered growth rates and increased disease susceptibility.

4) Interference with the successful development of eggs and alevins. Salmonid populations are extremely sensitive to deposition of fine materials (sedimentation) in the gravels they use for spawning. If sedimentation occurs prior to spawning, fish will avoid the affected areas (Stuart 1953, Snyder 1959); if it occurs after spawning, the egg to fry survival ratio can be reduced. Eggs are vulnerable to sedimentation because when the interstitial spaces they occupy are clogged with fine materials, the flow of water and hence the supply of oxygen are reduced or cut off. After any surviving eggs hatch, further mortality will occur if the alevins are trapped by fine sediments and unable to reach the open water column.

Alabaster and Lloyd (1982), on the basis of their comprehensive review of the literature, have concluded that with respect to chemically inert solids such as would be discharged by ANC:

a) There is no evidence that continuous concentrations of suspended solids of less than 25 mg/l have any harmful effects on fisheries.

b) It should usually be possible to maintain good or moderate fisheries in waters which normally contain 25-80 mg/l suspended solids; other factors being equal, however, the yield of fish from such waters might be somewhat lower than from those in category a).

c) Waters normally containing from 80-400 mg/l suspended solids are unlikely to support good freshwater fisheries, although fisheries may sometimes be found at the lower concentrations within this range.

d) At the best, only poor fisheries are likely to be found in waters which normally contain more than 400 mg/l suspended solids.

Solids discharged by ANC are anticipated to be less than one third clarifier solids (wood fibres) with the balance biosolids (cells and cell fragments). Following treatment, the solids released are anticipated to be vertically non-settleable, with relatively low decay rates (Lee et al., 1978). Therefore, this environmental impact will be significantly less than settleable solids, as they will not interfere with benthic (bottom) conditions. Since the anticipated total solids loadings under low flow conditions are well below the guidelines suggested by Alabaster and Lloyd (1982) and since the majority are virtually non-settleable, no impact is predicted on the Athabasca River from the proposed effluent discharge.

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Robertson, M. 1957. The effects of suspended materials on the reproductive rate of Daphnia magna. Publ. Inst. Mar. Sci. Univ. Tex 4: 265-277.

Scullion, J. and R.W. Edwards. 1980. The effects of coal industry pollutants on the macroinvertebrate fauna of a small river in the South Wales coalfield. Freshwater Biology 10: 1241-162.

Shelton, J.M. and R.D. Pollock. 1966. Siltation and egg survival in incubation channels. Trans. Am. Fish Soc. 95: 183-7.

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Stuart, T.A. 1953. Spawning migration, reproduction and young stages of brown trout. Freshw. Salm. Fish. Res. 5.

Table 11-1: EFFECTS OF SUSPENDED SOLIDS ON AQUATIC LIFE

Researchers	Date	Organism	Concentration (mg/l)	Type of Solids	Effects
Le Gore and Des Voigne	1973	coho salmon fry	28,000	harbour sediment	no adverse effects in 4 days
Griffin	1938	salmonid fingerlings	300-750	suspended sediment	3-4 week survival in continuous, periodic exposure
		salmonid fingerlings	2300-65000		
Herbert and Merkens	1961	rainbow trout	5000-300,000	mineral solids	1 week survival: gill damage
Herbert and Wakeford	1962	rainbow trout	4250	gypsum	50% mortality in 3½ weeks
Herbert and Richards	1963	rainbow trout	200	coal washery solids	100% survival over 10 mo.
Herbert et al.	1961	trout	60	mineral solids	normal trout population density
Peters	1957	trout	70	agricultural origin solids	slightly reduced numbers
Scullion and Edwards	1980	brown trout	100	coal industry solids	reduction in population size and condition factors
Noggle	1978	coho salmon fry	100	suspended sediments	45% reduction in feeding
			300	suspended sediments	cessation of feeding
			1200-35,000	suspended sediments	seasonal variation in LC^{50}
			4000	suspended sediments	threshold of avoidance response
Campbell	1954	salmonid eggs	100-2500	suspended sediments	100% mortality
Stephan	1953	invertebrates	300	clay	critical concentration to be harmful
		invertebrates	500	sand and loam	critical concentration to be harmful
Robertson	1957	Daphnia magna	1458	pond sediment	lethal concentration
			102	montimorillite clay	lethal concentration
Herbert et al.	1961	invertebrates	60	mineral solids	no decrease in abundance compared with clear stream
Gammon	1970	aquatic insects	40 over natural	mineral solids	25% increase in insect drift
		aquatic insects	80 over natural	mineral solids	80% increase in insect drift
Lewis	1973	aquatic moss	100	coal dust	severe abrasive leaf damage

SECTION 3

OTHER PARAMETERS

Question 12

Discuss the following and their anticipated influence on water quality; please provide the anticipated concentrations and loadings for total phenolics, metals (manganese and zinc in particular), tannins, and lignins. Consider the influence of low flows when discussing their environmental impacts. Outline, as appropriate plans for mitigation and monitoring.

Response

a) Phenolics

Phenolics includes a broad range of compounds with varying levels of toxicity. No data were found to indicate anticipated loadings of phenolics from CTMP mills, but these compounds are generally not addressed in reviews of pulp mill effluent toxicity, suggesting they are not major constituents.

Chlorinated phenolics have been associated with taint in fish, and in fact, this is the rationale for the very low Canadian Water Quality guideline of 0.001 mg/l. However, ANC will be using no chlorine in their process and so chlorinated phenolics are not an issue. Tainting from non-chlorinated phenolics can occur, but only at levels more than 1000 times greater than for chlorinated compounds. Any toxicity due to phenols will be picked up by either the acute bioassay or the benthic invertebrate survey.

b) Metals

In a major review of effluents from Canadian pulp and paper mills (McLeay, 1987), metals were not discussed, strongly suggesting that they are not a significant environmental issue. Neither manganese or zinc are used in the pulp and paper process proposed by ANC and so their levels are anticipated to be very low. With time, some metals may enter the system due to corrosion, but this source should be small. As with phenols, metal toxicity, if any does occur, would be measured in the routine bioassay.

c) Tannins and Lignins

As with both phenols and metals, no published data of anticipated loadings of tannins and lignins was found. MWPL also appear not to have predicted their likely loadings, and no Canadian Water guidelines specific for tannins and lignins exist.

Both compounds occur naturally in Alberta streams, often in high concentrations in strongly coloured waters. ANC will have to meet Canadian water quality criteria for colour, which is due largely to tannin and lignin lebels in the treated effluent. Low colour levels inherently mean low levels of tannins and lignins as well. ANC colour discharge is predicted to be about 45 kg/FMT, one quarter of that for a modern kraft mill (about 180 kg/). As above, both acute and chronic toxicity testing will establish if the compounds reach toxic levels.

References

McLeay, D. 1987. Aquatic toxicity of pulp and paper mill effluent: a review. Env. Can. EPS 4-PF-1. 191 pp.

Question 13

Please identify the source of the aluminum in the effluent (referred to on 4-2 of Appendix 1). On page 3-22 of the main report it indicates that clarifier sludge will be dewatered and disposed in a landfill.

Response

The reference to alum discharges on pg. 4-12 of Appendix 1 assumed sewering of alum sludge. This will likely not be the case. Alum sludge will most likely be dewatered and landfilled, so effluent aluminum levels based on solubility will be minimal. Further discussion is included in the response to Question 14.

Question 14

Provide further information on alum discharges, their impact on water quality in the mixing zone and downstream (page 4-12). Consider variation in background water quality as well as seasonal variation in effluent quality.

Response

The alum discharges (1.5 t/d) shown in the EIA report represent absolute worst case conditions (i.e. all alum being sewered to the river). However, alum use during low flow periods, such as the 7Q10, will be minimal, as suspended solids in the raw water, which alum is used to remove, will be very low. Therefore, high alum discharge would correspond with high river flows. Since clarifier sludge will be dewatered and landfilled, greatly reducing alum discharge, no impact from alum loadings is predicted. Aluminum toxicity is greatly reduced at relatively neutral pH conditions, such as generally occur in the Athabasca River.

Ouestion 15

In the Process Block Diagram on page 3-14, Diethylene Triamine Penta Acetic Acid is shown as the chelating agent, while in the Appendix, Ethylene Diamine Tetra Acetic Acid is indicated. Please clarify which agent is to be used and elaborate on its environmental significance.

Response

Ethylene diamine tetra acetic acid (EDTA) will be used at ANC, rather than DTPA. ANC will use sodium hydrosulphite ($Na_2S_2O_4$) for pulp brightening and EDTA is more effective with this brightening agent, while DTPA is usually used in conjunction with hydrogen peroxide bleaching. EDTA is a chelating or sequestering agent used to complex heavy metals in the process stream which can contribute to brightness reversion in the pulp. The anticipated dosage of EDTA will be 2.5 kg/BDMT. Some of the EDTA will remain with the pulp and be incorporated in the final product, while much of it will be broken down in the process and biobasins. The remaining EDTA (about 10% of applied dosage) will be discharged with the treated effluent, at a concentration of about 5 ppm (75 kg/day). At the minimum recorded flow, downstream EDTA concentrations due to ANC discharge would be 0.05 mg/l after mixing, and total ANC/MWPL EDTA would be 0.5 mg/l.

EDTA toxicity data are limited. Inhibition of cell multiplication in the bacteria, Pseudomonas putidae, starts at 105 mg/l and in the algae, Microcystis aeruginosa, at 76 mg/l. The LD_{50} for oral ingestion by rats is 2 gms/kg, a relatively high value. EDTA salts are used in pharmaceuticals to prevent excess calcium depletion and to treat lead poisoning.

The available data suggest that EDTA at the projected concentrations will not be toxic, even in the undiluted effluent. Residual EDTA toxicity would also be detected in either the routine bioassays or possibly in the biomonitoring programs.

Question 16

The effluent concentrations for nitrogen and phosphorus in Table 4 (page 4-4) seem high compared to other mills. Provide justification for the values indicated. Discuss how nutrients will be monitored and outline contingency plans to deal with problems associated with excess nutrients.

Response

There is a general lack of information on effluent characteristics for CTMP mills. This also extends to nutrient requirements to maintain optimum BOD_5 removal efficiencies in biological waste treatment systems. The nutrient addition levels for ANC, which were stated in the EIA, are 'typical' values for aerated lagoons, as opposed to specific levels for CTMP waste treatment. The 'typical' dosages used were BOD:N:P of 100:3.0:0.5.

The anticipated BOD_5 load to the biological waste treatment system will be reduced from 50 kg/FMT as stated in the EIA, to about 40 kg/FMT due to deferral of the sulphonated rejects system. This change will result in a reduction in nutrient application such that the projected effluent concentration would be 45 mg/l and 7 mg/l for nitrogen and phosphorous respectively, not the 60 mg/l and 10 mg/l stated in the EIA. These concentrations represent total discharge of each nutrient, dissolved plus particulate (i.e. organic) and assume no change across the aerated stabilization basin.

Reference to limited pilot plant work conducted at Quesnel River Pulp (QRP) suggest optimum nutrient requirements for the QRP CTMP waste would be in the range of 100:1.25:0.9.(1) Should similar numbers be proven valid for ANC, nitrogen levels in the effluent would be reduced to about 20 mg/l and phosphorous increased to approximately 13 mg/l.

ANC nutrient requirements can not be quantified until the mill is in operation and trials can be conducted to optimize waste treatment plant performance.

The treated effluent will be tested monthly for NH_3-N, as well as total phosphorous. Nutrient enrichment effects in the river will be detected during the biomonitoring program.

(1) Servizi, J.A. and R.W. Gordon, Detoxification of TMP and CTMP Effluents Alternating in a Pilot Scale Aerated Lagoon, Pulp and Paper Canada, 87:1, 1986.

In Alberta, development of contingency plans is normally considered a component of the licensing phase, and will be dealt with by ANC at the appropriate time. Possible mitigation measures are discussed in the response to Question 17.(2)

(2) License Requirements in an Action Plan for Environmental Law-Enforcement in Alberta, Alberta Environment, 1987.

Question 17

On page 5-11 it is indicated that effluent discharge will result in total phosphorus (TP) downstream exceeding Alberta Surface Water Quality Objectives. Please discuss potential impacts in more detail including the mitigation measures ANC will undertake if excessive enrichment is identified downstream. Discuss the availability of TP in the effluent versus the naturally-occurring TP in the river.

Response

In fresh water systems, phosphorous is generally the nutrient limiting primary productivity. In oligotrophic streams such as the Athabasca River, small increases in phosphorous can be beneficial, resulting in increases in benthic invertebrates and fish. Large increases can result in excessive enrichment, as occurred below the City of Calgary, causing aesthetic problems, and reducing dissolved oxygen in extreme cases.

At this time, is impossible to estimate the impact of total phosphorous additions to the Athabasca River from the ANC effluents. It is also not possible to distinguish between the availability of effluent and other phosphorous sources. It is informative to note that no Canadian water quality guidelines exist for phosphorous. This is probably because phosphourous, as an essential nutrient, is generally taken up rapidly by organisms in the water. Also, a measurement of total phosphorous rarely gives an accurate measure of the phosphorous actually bioavailable.(1)

Impacts from phosphorous (increased algae growth, benthic invertebrate community growth) will be readily detected in the biomonitoring program. If detected, ANC will undertake to reduce levels of phosphorous addition or if this is not feasable, look to phosphorous removal using either the physical-chemical means (e.g. alum) or biological methods.

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(1) Reynolds, C.S. 1984. The ecology of freshwater phytoplankton. Cambridge University Press, New York, N.Y.

Question 18

Please address the degree of nitrification that might occur in the Aerated Stabilization Basin (ASB). It appears additions of nitrogen and phosphorous are planned at an approximate C:N:P ratio of 88:6:1 to enhance biological activity.

Response

Nitrification is the bacterial oxidation of nitrogenous matter in the effluent. Ammonia (NH_3) is initially converted to nitrite (NO_2^-) and subsequently to nitrate (NO_3^-) by Nitrosomonas and Nitrobacter strains respectively. This process can occur in both aerated biological treatment systems and in receiving water.

Generally speaking, nitrification will not occur until the carbonaceous BOD has been reduced to very low levels. It will be reflected by an increase in NO_2^- and NO_3^- levels in the effluent.

Limited work by Servizi and Gordon(1) on Quesnel River Pulp effluent indicated evidence of nitrification for BOD:N ratios of less than 100 and for treatment times exceeding 6 days. Their findings would suggest that some degree of nitrification could occur in the plug flow section of the ASB proposed for ANC. The degree of nitrification can not be quantified until after the mill is operational and the appropriate studies can be conducted.

(1) Servizi, J.A. and R.W. Gordon, Detoxification of TMP and CTMP Effluents Alternating in a Pilot Scale Aerated Lagoon, Pulp and Paper Canada, 87:1, 1986.

Question 19

Please provide further elaboration on the use of slimicides (page 3-21). Provide flow diagrams with quantities as appropriate. Discuss if slimicides are biodegradable and identify any impacts on the ASB.

Response

Slimicides are chemicals used to impede and control biological growth on process equipment and in piping, usually in warm, moist environments such as the forming and press sections of a paper machine. When applied, the material is usually added to the stock feed to the machine headbox and thereby circulates through the machine white water system. For a newsprint sheet manufactured from 100% fibre with no additives such as starch, slime problems may not develop and slimicides may therefore not be required.

Most slimicides are designed to hydrolize (i.e. decompose) in water in a matter of hours and would thus pose little concern to a waste treatment facility. Some slimicides are FDA approved for use in manufacture of food wrap and other consumer coating materials. The specific product which may be required is a function of the type and location of the growth problem. Dosage requirements, if any, can only be determined once the mill is operational.

Question 20

Please provide the sodium sulphite usage rate and percentage (page 3-19, second last paragraph).

Response

In the EIA, sodium sulphite usage was predicted at 30 kg of Na_2SO_3 (100%) per FMT. As detailed design progressed, ANC revised the process to reduce sulphite application to 20 kg per FMT. This reduces projected annual consumption from 6800 tonnes to 4500 tonnes. Pulp yield will be increased by about one percent to 92 percent and raw effluent BOD reduced from an indicated 50 kg per FMT to 40 kg per FMT.

Question 21

Please provide the justification for the company's confidence to keep sodium levels to the levels anticipated in the effluent (Appendix 1 - page 4-7).

Response

The primary source of sodium to the effluent will be the application of sodium sulphite (Na_2SO_3) in pretreatment of chips prior to refining. The other significant source will be the use of sodium hydrosulphite ($Na_2S_2O_4$) as a pulp brightening agent. The EIA estimated the annual Na_2SO_3 consumption at about 6800 tonnes, or 30 kg/FMT of newsprint. Under these conditions, effluent sodium levels were estimated at about 550 ppm. With the deferral of the sulphonated rejects system, sodium sulphite use has been reduced to 20 kg/FMT, with a predicted resultant effluent sodium level of about 315 ppm.

As ANC is a single product mill, chemical applications will be relatively constant, with little variation in effluent characteristics.

Ouestion 22

In view of the wide discrepancy in colour estimates of Simons and HydroQual, please discuss what range of values may be expected during ANC's actual operation (Appendix 1 - page 4-5). How far, if at all, downstream will these colour values be observed. Consider seasonal variation in effluent discharge and seasonal variation in flow and mixing of the Athabasca River.

Response

There should be little variation in effluent colour, as ANC will be a single product mill with little change in chemical applications and thus, effluent characteristics. Colour discharge will be at a concentration of about 1900 mg/l Pt-Co units and a loading of approximately 45 kg/FMT. A modern kraft mill will discharge about 180 kg/FMT. At full dilution under a 7Q10 flow regime in the Athabasca River, the colour increase above background levels will be about 11 mg/l, well below the ASWQO of +30 mg/l.

Mixing zone analysis (discussed in the response to Question 29), indicates vertical mixing of effluent in the water column within 20-50 m downstream of the diffuser and 100:1 dilution about 20 m downstream in a 7Q10 flow regime. Mixing would be more rapid during higher river flows. Under these conditions, effluent plume visibility should dissipate fairly rapidly downstream of the outfall.

SECTION 4

SEASONAL WATER QUALITY

Question 23

Please confirm whether Table 5-2 (page 5-3) is based on summer data only (May-October). If yes, this is not considered a valid comparison base for low-flow impacts. Please provide data on low winter flow and assess the water quality impacts expected at these low winter flows. With reference to the parameters listed in Table 5-2 on page 5-3, please provide further discussion of the effects of seasonal fluctuations in water quality.

Response

Table 5-2 (p. 5-3) is based on seasonal data reported by Hamilton et al.(1), collected during the summer, fall and winter of 1984-85. The table was presented only to show general Athabasca River water quality guidelines. The impact assessments made by Beak were based on a more extensive data base, and only used data collected during low flow periods.

Seasonal water quality fluctuations in the Athabasca River have been described in detail by Hamilton et al.(1) With respect to the water quality issues associated with the ANC effluent, the 1984-85 seasonal variations at site A_3 (upstream of Whitecourt) were:

Parameter	Mean		Maximum	
Sodium	5	mg/l	11	mg/l
Sulphate	30	mg/l	54	mg/l
TSS	30.5	mg/l	106	mg/l
BOD	1.0	mg/l	1.0	mg/l
Colour	26.6	units	35.2	units
Total phosphorous	0.021	mg/l	0.072	mg/l
Total dissolved phosphorous	0.004	mg/l	0.012	mg/l
Aluminum	0.113	mg/l	0.362	mg/l
Manganese	0.024	mg/l	0.073	mg/l
Zinc	0.008	mg/l	0.018	mg/l

(1) Hamilton, H.R., M.V. Thompson and L. Corkum. 1985. Water quality overview of Athabasca River basin. Prep. for Alta. Env. Planning Division. 117 pp.

Question 24

Provide additional qualitative information on the design and operation of the wastewater treatment system. For example, the measures to be taken to maintain high performance. Discuss how the effects of factors such as seasonal climatic conditions, wood species, and machine furnish have been considered with respect to waste volumes, hydraulic loading and treatment efficiencies.

Response

The first stage of effluent treatment will employ a reactor-clarifier to remove suspended solids. The upflow velocity will be conservatively selected to maintain solids removal efficiency exceeding 80 percent. Side-wall depth will also be conservatively selected to provide adequate sludge storage to facilitate efficient sludge removal.

Secondary biological treatment will be accomplished in an aerated stabilization basin (ASB) with 10 days total hydraulic retention time. An adaption of a computer model developed by the National Council for Air and Stream Improvement (NCASI) has been used for preliminary design of the ASB. Several alternative configurations were modelled and a four-day, well back-mixed section, followed by a six-day plug flow section was selected as the most effective arrangement.

As indicated in the response to Question 3, the effluent discharge temperature from the mill will be controlled to maintain the temperature in the back-mixed section of the ASB near 35^{o}C. In winter, the temperature of the effluent entering the ASB will be controlled at about 45^{o}C. The temperature differential between the influent and the ASB will compensate for the heat loss from the ASB. Immediate dispersion of the influent in the back-mixed section of the ASB will allow the temperature of the influent to be maintained at 45^{o}C, well above the usual temperature to support biological activity.

In the mill, process effluent released at 40^{o}C to 60^{o}C, will be cooled by heat exchange with the fresh water supply. In winter, the fresh water flow through the effluent heat exchangers will be reduced to increase the final effluent temperature to the desired 45^{o}C. In summer, the full fresh water flow will pass through the exchangers to limit the effluent discharge temperature to about 35^{o}C.

Again, as indicated in the response to Question 3, approximately 80 percent of the BOD removal will be accomplished in the 4-day back-mixed section under controlled temperature conditions. The performance of this portion of the ASB will not be significantly affected by seasonal temperature variations. Temperatures, in

the second stage of the ASB, the 6-day plug flow section, will however be influenced by ambient temperatures. In winter, it is anticipated that the final effluent discharge temperature will be reduced from 35°C to 30°C. The reduced temperature in the plug-flow section may result in some decrease in BOD removal efficiency. However, the decrease is not anticipated to be substantial. In this 30°C to about 35°C range, temperature variation has very limited impact on BOD removal efficiency and biosolids production.(1)

During the first year of operation up to 15 percent semi-bleached kraft pulp will be used to enhance paper strength and aid paper machine operation. The use of kraft pulp will be phased out as rapidly as possible and newsprint will be manufactured from 100 percent CTMP. It is anticipated that the wood furnish will be a consistent mix of 20 percent aspen and 80 percent softwood. The wood and machine furnish composition will be consistent and thus not significantly affect effluent treatment performance and quality.

Process systems will be designed to accommodate fluctuations in water temperatures without varying water usage rates. It is expected that water consumption will not vary substantially on a seasonal basis.

(1) Amberg, H.R. and Bochman, D.F., Seasonal Effects upon Nutrient Requirements and Total Suspended Solids Production in an Aerated Stabilisation Basin, 1981 TAPPI Environmental Conferences.

Question 25

Elaborate on the seasonal variation expected in effluent quality and compare this with the seasonal variation anticipated in the Athabasca River. Consider the parameters listed in Table 5-2 (page 5-3) and those listed in Question 12.

Response

As discussed in the responses to Questions 3 and 24, it is expected that final effluent quality will not vary significantly on a seasonal basis.

Question 26

Please clarify whether data in Table 1, Appendix 1, are from the February or March sampling progran and what assumptions were used in estimating ice free zones below the pulp mills.

Response

See response to question 27.

Question 27

The open water reach measured below Champion in February 1988 was 9 km. Explain the rationale for the 15 km lead referenced in discussion of Champion on page 3-11 of Appendix 1. Comment on whether 15 km is typical of open water reaches in that area during periods of extremely low temperatures. Also provide some additional explanation of the procedures used to calculate the open water reaeration rate.

Response

The modelling assumptions listed in Table 1 of Appendix 1 were used in the production runs. The hydrology was obtained through a statistical analysis of the most recent data sets (see the response to Question 2). The background DO and BOD_5 values have been based on an analysis of available data. The analysis considered the mean and median values (choosing the more conservative) of data from the NAQUADAT data base, the EMA field program, measurements by Beak Associates Consulting Ltd., and information from the Champion Forest Products EIA.

The open water zones were determined based on the estimates made by Hydroqual Consultants Inc. using a heat balance computer model which considered atmospheric conditions, and river and effluent flow rates and temperatures. The 15 km open water lead downstream of Champion is considered typical for the 7Q10 flow conditions.

Open water reaeration rates used in the EIA were determined based on the calibration (March) and validation (February) runs. Knowing the open water lead length, the river flow, the BOD loading and decay, the reaeration rates were adjusted to allow the computer model to match the measured dissolved oxygen levels.

Question 28

The effluent temperature is anticipated to be between 30-35°C. No seasonal variation was given. Please clarify.

Response

As discussed in the Response to Question 24, normal final effluent temperature will be approximately 35°C. In winter, the final effluent temperature may drop to a low of about 30°C

Question 29

Provide further details on: (1) the effluent diffuser, and (2) the characteristics of the mixing zone. Provide quantitative estimates of the length of the mixing zone for a full range of river flows under open water and ice conditions. Describe how the estimates were calculated including assumptions made. Consider the effects that river morphology, notably the number of islands and side channels in the river below the site, will have on the size and shape of the mixing zone.

Response

Effluent Diffuser

The proposed effluent diffuser design will be similar to that used by Millar Western. The effluent will be discharged through a buried exfiltration gallery. The gallery pipe was initially proposed to be 60 m in length, but this may need to be reduced as additional data on channel hydraulics are determined.

The final design will cover approximately 50% of the channel width at low flows (7Q10). The gallery pipe will be buried below the thalweg and provided with a series of ports along its length. The exfiltration gallery will be approximately 3.0 m deep, with the pipe buried to a depth of 2.5 m to prevent ice scour. Coarse backfill (1.5 m) and cobble surface armour (0.5 m) will be placed over the bed material into which the pipe will be set.

Mixing Zone Analysis

In the reach between the ANC mill and Whitecourt, the Athabasca River has a sinuous and split channel configuration. The channel(s) have numerous side-channel and mid-channel bars and several mid-channel islands.

A review of aerial photographs dated 31 May 1977 (651 m^3/s at Windfall) and 29 May 1983 (318 m^3/s at Windfall) indicates that downstream of the ANC site, the river occupies a split channel at high river flows (the mean monthly flows during May through September exceed 300 m^3/s). Starting about 1 km downstream of ANC, the Athabasca River occupies two 6 km long sub-channels.

At low flows, the river tends to flow in a single channel although minor amounts of water would also be conveyed in the sub-channels. During these conditions the flow remains in the north sub-channel down to and past the McLeod River confluence, the Millar Western Pulp Mill outfall and the Sakwatamau River confluence. This was confirmed by aerial photographs dated 14 October 1987 (125 m^3/s at Windfall). Thus, for typical low flow conditions during the open water season (i.e. early spring and

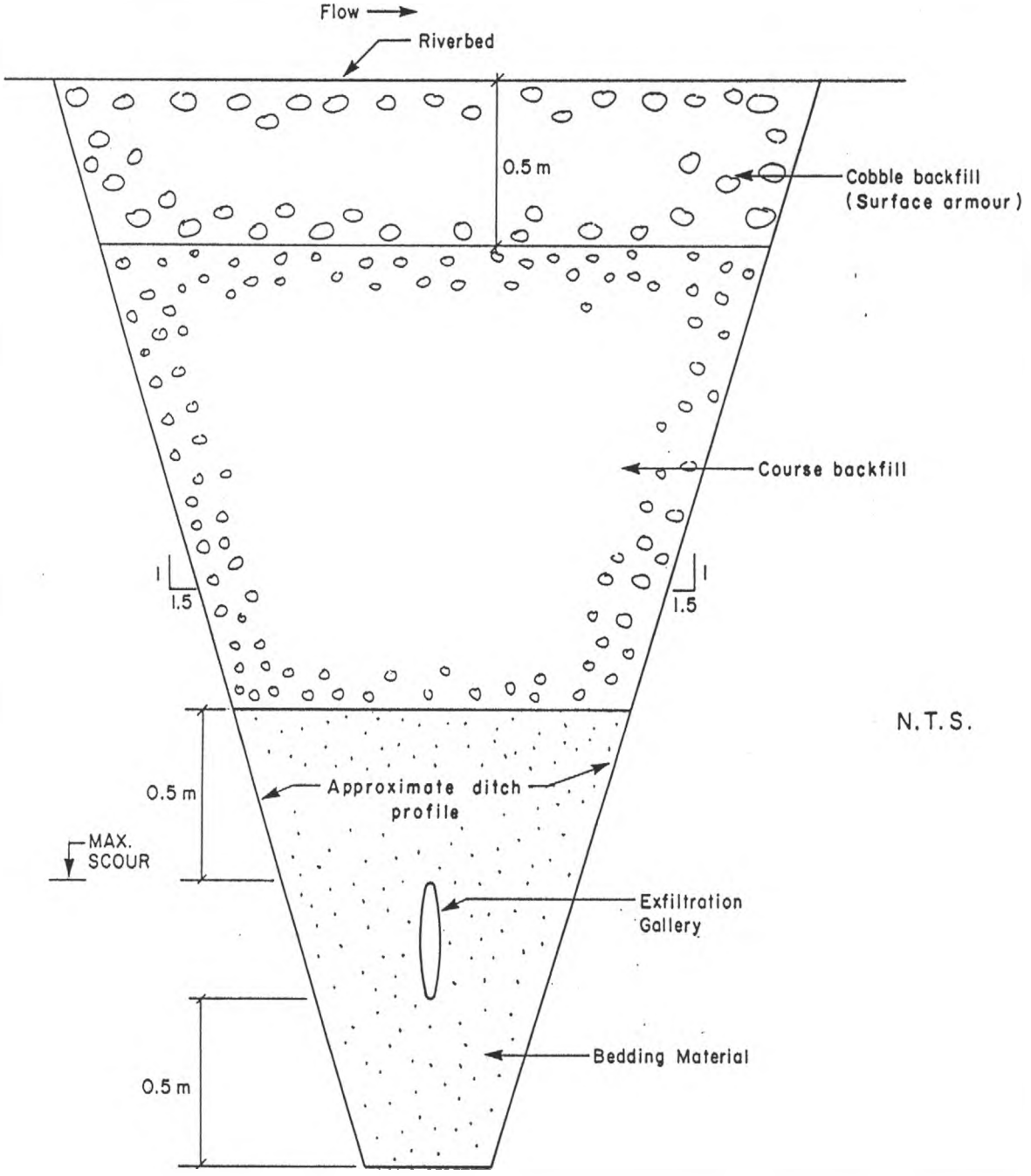
late fall) the Athabasca River can be considered a single channel river in this reach.

Calculations indicated that an ice-cover flow rate of about 78 m^3/s corresponds to an open water flow rate of 125 m^3/s (in terms of river width and depth). Thus, for typical ice cover conditions, the Athabasca River can again be considered a single channel river.

Mixing lengths for the ANC diffuser outfall have been estimated using methods outlined in Transverse Mixing in Natural Streams (Beltaos, 1978) and A Review of Analytical Equations for Two Dimensional Dispersion (Hodgson, 1986). For single channel flow conditions (i.e. flows less than 125 m^3/s) a diffuser which extends to midstream (such as ANC's) has the following mixing lengths:

Condition	Flow (m^3/s)	Mixing Length (km)
ice cover 7Q10	33.6	22
ice cover	78	33
open water	125	19

These estimates are based on single channel conditions. As the flow increases and occupies multiple channels, the mixing lengths will increase. However, due to the much higher flows, the amount of dilution achieved is superior even before compete mixing occurs. Complete vertical mixing is estimated to occur within 50 m downstream of the diffuser at the 7Q10. A dilution of 100:1 will be achieved at 20 m downstream at the 7Q10 flow.



Notes:

- Backfill section to be extended at least 5 m beyond beginning of perforated pipe
- Ditch sideslopes assumed

N.T.S.

DITCH SECTION - EXFILTRATION GALLERY (DIFFUSER)

SECTION 5

FISHERIES

Question 30

Provide further information on the effect of the effluent diffuser on fish. Will the channel diffuser be placed in the main river channel or a secondary side channel? Discuss the quality of the effluent in the mixing zone during plant operation and its impact on fish. Consider seasonal variation in river flows and effluent quality. Address the extent and duration of the area of fish avoidance. Indicate the area and percentage of the river width affected. Consider the influence of both the ANC and Millar Western diffusers. Refer to the modelling studies of ANC and Millar Western as appropriate. Outline ANC's plans to verify the results of modelling including a proposed schedule.

Response

During high flows, the Athabasca River has a split flow below the ANC site; at low flows only a single channel exists. The diffuser will be placed in the single low flow channel.

The diffuser will spread the effluent over approximately 50% of the width of the low flow channel, leaving the remaining channel as a zone of passage for fish. Complete vertical mixing of the effluent will occur within 50 m of the outfall and at low flows (7Q10) a 100:1 dilution will be achieved within 20 m. At higher flows, dilution will be even greater.

The effluent before discharge will be "non-toxic" (i.e. less than 50% mortality of rainbow trout fry, 96 hours exposure to 100% effluent). The very rapid dilution will reduce acute toxicity to zero virtually instantaneously.

No data on chronic toxicity of CTMP effluents are available, but it is assumed that chronic toxic effects, if any occur, would be detected during the biomonitoring program. This test would be quite conservative since:

a) Many benthic invertebrates are more sensitive than fish, and,

b) Benthic invertebrates are much less mobile than fish and will be continuously exposed to the effluent.

It is not possible to predict whether fish will be attracted to or avoid the effluent plume. This response is extremely variable between species, river systems, and types of effluent.

The combined effect of the two diffusers cannot be determined at this time. Millar Western will be monitoring actual effluent dispersion patterns this fall, so that the proposed ANC modelling can be verified during the winter of 1988-89. Again, however, given the relatively low effluent volumes from each mill (0.5% of 7Q10 flows), and the rapid dilution rates, the cumulative effects of both mills will be very small.

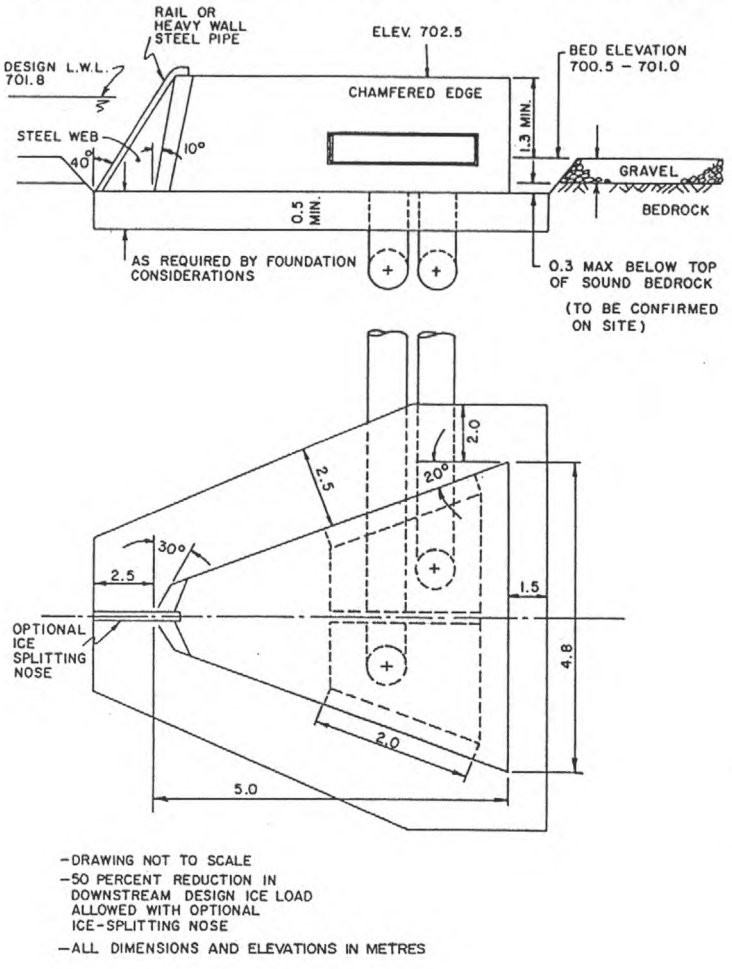
Ouestion 31

Please confirm how the proposed water intake will meet the Alberta Fish and Wildlife Guideline No. 10 for these types of structures.

Response

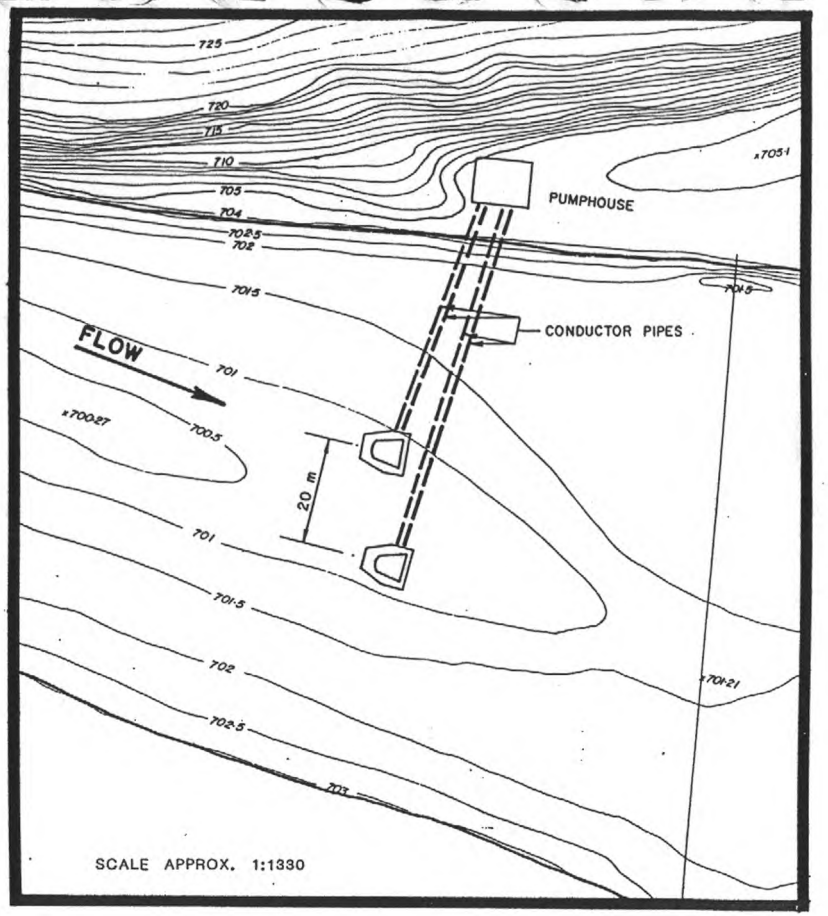
As noted in Section 5.03 - Water Supply, the water supply system "will include a pumphouse on the Athabasca River, with intake pipes running to a submerged intake structure in the river channel."

Associated Engineering commissioned a hydrotechnical assessment for the proposed intake by Northwest Hydraulic Consultants Ltd. Refer to the attached Figure 6 - Conceptual Design Bed Intake for the configuration and alignment of the proposed intake. Each inlet port will be independently connected to the pumphouse by conductor pipes to facilitate conductor pipe backflushing and to allow continued operation should one of the inlet ports become blocked with debris. The intake port dimensions shown in Figure 6 are designed for an average inflow velocity of 0.23 m/s with the facility operating on two ports or 0.46 m/s with the facility operating on a single port, at 0.4 m^3/s (34,500 m^3/day, twice current mill requirements). The intake ports will be covered with screen mesh such that the clear opening of the screen will not exceed 9.5 mm square. The velocity and intake screening requirements, along with other design parameters will be in accordance with Alberta Environment fisheries requirements.



PLAN AND ELEVATION

BED INTAKE STRUCTURE



LOCATION PLAN – INTAKE ALIGNMENT

FIGURE 6

ALBERTA NEWSPRINT CO. LTD.

WHITECOURT PAPER MILL

CONCEPTUAL DESIGN BANK INTAKE

Question 32

Please elaborate on the proposed use of a hot water line to prevent frazil ice problems. Please discuss if this water will have been chlorinated, will contain other chemicals toxic to fish, and if it will be released to the river.

Response

During winter months under ice, the river water temperature will be only marginally above freezing. Under these conditions, 'frazil' ice may form on exposed surfaces of a water intake structure, with the potential for partial or total blockage of the intake ports and conductor lines. A boiler will be provided in the river pump house to heat raw water and return this flow back to the intake structure as required to minimize frazil ice problems. This water will neither be chlorinated, nor contain any additives.

Question 33

Please provide evidence in support of the statement of page 4-6, second last paragraph, that kraft mill effluent is potentially more toxic than CTMP effluent - with particular reference to the 96 hr LC_{50}.

Response

Toxicity of final kraft mill effluent may be associated with black liquor spills which are not completely degraded by the effluent treatment system. In a CTMP mill there are no comparable opportunities for process spills which are likely to cause toxicity excursions.

Given the condition when both kraft and CTMP effluents meet the 96 hr LC_{50} test they would by definition be equally non-toxic.

Question 34

Please identify any potential spawning habitat or other critical habitat in the vicinity of the water intake, effluent diffuser, the mixing zone, and the rail bridge.

Response

General stream habitat in the vicinity of the ANC site and downstream to Whitecourt does not appear to differ significantly from general habitat in the region. Therefore, no critical spawning or other habitat types are expected to occur in the area.

During the benthic invertebrate biomonitoring survey a more detailed evaluation of fish habitat conditions in the area will be made and provided to the government.

SECTION 6

LAND USE/RECLAMATION

Question 35

Elaborate on the extent, nature and volume of commercial quality aggregate on the site, including the quantities that could be sterilized by this development.

Response

Calculations indicate that these are 4.7 million m^3 of useable gravel within the proposed site boundary.

The mill building area of approximately 40 ha including future expansion will sterilize about 2.4 million m^3 of the gravel

About 40% of the site, being the southerly area is composed of gravel and sand and is over till and bedrock. Thickness of sand and gravel is variable and is generally greatest in the areas to the east along the top of the Athabasca River bank and in the remainder to the south and west the thickness of gravel is in the order of 7 m or less. The sand and gravel deposits vary in gradation between 15 to 20 cm down to sand sizes. The grain size analysis of crushed samples indicates that the gradation is coarse.

In 1980, a report called "Sand and Gravel Resources in the Whitecourt Area", by BIV Peterson (open file report No. 80-4 - Alberta Energy and Natural Resources) was prepared. This report indicates that the bulk of the granular resources in the area are associated with the Athabasca and McLeod Rivers. The material is generally coarse gravel to coarse sandy gravel composed of mainly hard durable quartzite clasts.

Most of the 40 million m^3 of granular material above the water table in the Athabasca River terraces is recoverable. The report predicted that if properly used, it could supply the areas needs until the middle of the next century.

Question 36

Please confirm that soils will be salvaged for future use.

Response

Considering the minimal depth and limited distribution area of organic topsoils, the salvage and storage for reuse will be minimal. However, any available salvaged organic topsoils will be stockpiled in a designated area for on-site landscaping.

Granular materials immediately below the plant are not acceptable in the in situ form for foundation and will be excavated to the clay seam, re-engineered and used in site grading. Materials removed for the construction of the aeration stabilization ponds will also be re-engineered and used for site development purposes. No aggregate materials will be wasted.

The volume of structural granular fill required is 150,000 m^3 and general site development fill is 130,000 m^3. Approximately 110,000 m^3 of granular material will be recovered from the excavation for the aerated stabilization basin. Materials will be re-engineered and used for site preparation.

SECTION 7

GROUNDWATER PROTECTION AND SPILLS

Question 37

Discuss the prevention of groundwater contamination as a result of runoff or seepage from the process area and other areas such as wood storage and chip piles. Clarify local groundwater conditions. Briefly summarize mitigative measures and outline a general plan for groundwater monitoring at the mill site.

Response

A geotechnical investigation has been undertaken at the plant site by Klohn Leonoff Ltd. The investigation to date has consisted of a drilling program covering 16 boreholes drilled in depths varying from 19 to 26 metres below existing ground surface. In general the stratigraphy is as follows:

Sublayer 1 - Organic topsoil varying from 0.2 m to 0.3 m in thickness.

Sublayer 2 - Gravel and sand immediately below the organic cover varying from 4 m to 8 m in thickness.

The greater thicknesses are typically associated with areas where the ground surface is higher.

Sublayer 3 - Very stiff to hard clay till immediately below the granular layer varying from less than 1.0 m to 4.5 m in thickness. Immediately below the proposed paper machine the thickness is 1.5 m and increases to 2.5 m toward the south.

Sublayer 4 - Coarse gravel and sand immediately below the clay till layer varying from 3 m to 7 m in thickness,

Sublayer 5 - Dense sand immediately below the coarse gravel and sand with a base varying from 18 m to 22 m below the ground surface.

Sublayer 6 - Laminated sands, silts and clays found in only 2 drill holes immediately below the dense sand layer.

Sublayer 7 - Interlayed sandstone, siltstone and mudstone lying immediately below Sublayers 5 and 6.

Two distinct groundwater tables were encountered, one being a perched water table about 3 to 4 m below ground surface over the clay till layer. The second table was the main groundwater table encountered at depths between 10 m and 14 m below ground surface corresponding to elevations between 718 m and 720 m.

Mitigative measures to prevent groundwater contamination will include a controlled approach to drainage, as discussed in response to Question 39, combined with a groundwater monitoring program described herein. The groundwater monitoring program will consist of a series of groundwater observation wells located at preselected areas on the site. The number and location of the monitoring wells, the frequency of groundwater monitoring and the water quality analyses will be dependent on:

1. The recommendations by the geotechnical subconsultant.

2. The areas on the plant site requiring monitoring.

3. A sound engineering approach. At least one well will be located upgradient from the plant site to provide background water quality information.

Question 38

Identify all chemical storage and operating locations that will be lined to ensure confinement of deleterious substances.

Response

The aerated stabilization basin will be lined with clay and/or a synthetic membrane to specifications as required by Alberta Environment.

Should an industrial landfill facility be developed for some ANC wastes, the site will be designed as required by Alberta Environment regulations.

Chemical storage tanks will be diked where required as described in the response to Question 40.

Question 39

Please provide a conceptual water management and surface drainage plan for the site including the log storage and chip storage areas. Include information on the factors that will be considered in the design of any ponds or drainage structures. Identify pertinent approval processes as appropriate. Address the need to integrate surface drainage with the wastewater treatment system to prevent groundwater contamination or prevent contaminants such as wood resins from entering natural water courses.

Response

Steady State Plant Operation

A site surface drainage plan has been developed to effectively remove surface water from the site. The drainage pattern is outlined in Drawing AO-1674-211-SK0057.

a. Existing Site Drainage Patterns

The 200 acre site topography slopes from an elevation of 790 m at the northwest corner to 730 m at the south east corner. Two shallow drainage courses traverse the property. One running west to east at approximately the mid-point of the property and another running south west to north east at approximately the south quarter point of the property. These two channels join together near the east property line.

Another drainage pattern at the top northeast corner of the site, directs drainage from Highway 43 right-of-way through the northeast corner of the site to the adjacent property on the east side.

In general, all surface drainage generated on site is contained on site and other than the northeast corner, no external drainage enters the property.

b. Design Philosophy

The design philosophy is to control all surface drainage flows generated on the property and direct them to existing natural drainage patterns through control structures. These control structures will prevent any contamination to the surface water being carried onto adjacent property or into the Athabasca River.

The property will be divided into two new drainage areas. Area 1 consists of the north half of the site, the chip dump area and the log storage yard. Area 2 is the mill site, the mill expansion area and the chip storage area.

Drainage from Area 1 will be collected in the east west drainage course. Control structures will be installed at the main access road crossing. The access road will act as a dyke to impound drainage before allowing it to flow through the control structure. No process contamination will occur from the log storage area.

Drainage from Area 2 will be directed in the diagonal drainage course to the south west corner of the main mill block. A dyke will be constructed across this channel at the property line. This will create an impounding basin to control the drainage from Area 2. Chip piles shed water in a manner similar to a shake roof. The water does not percolate down through the pile, therefore runoff would not be contaminated from this portion of Area 2. A control structure will be installed at the dyke. The outlet from the dyke will be through a lined channel and directed down the river bank for discharge on the north shore of the Athabasca River, upstream of the raw water intake structure. The water will be tested prior to release into the river in accordance with the requirements of the license required pursuant to the Alberta Water Resources Act.

c. Design Criteria

All storm drainage will be collected in surface ditches and directed to the containment area. Culverts on short sections of stream sewers will only be used where space modification does not allow for the installation of open ditches and where ditches cross roadways, paved or large graded areas.

Capacity of the sewers and ditches will be calculated using the Manning Formula:

$$Q = \frac{1.486}{n} r^{2/3} s^{1/2} A$$

Where Q = capacity - cubic metres
A = cross-sectional area - square metres
r = hydraulic radius - metres
s = slope or hydraulic gradient - metres per metre
n = coefficient of roughness
n = 0.013 for cast iron, concrete, vitrified clay and steel pipe
n = 0.018 for lined ditches
n = 0.024 for unpaved corrugated metal steel pipe
n = 0.023 for unlined firm clay ditches
n = 0.030 for gravel or shell surfaces

The Rational Formula will be used to calculate run-off from a given area to a ditch or catch basin, based on the design storm loading.

$Q = CIA$

Where Q = Run-off - cubic metres per second
A = Area drained - hectares
I = Rainfall intensity based on the maximum rainfall expected from a design storm having a 10-year frequency and a one-hour duration as determined from information shown in Environment Canada Short Duration Rainfall Intensity-Duration Data. A minimum duration of 15 minutes of the design storm shall be used for design.
C = 1.00 for roof areas
C = 0.90 for paved areas
C = 0.70 for unpaved compacted gravel areas
C = 0.50 for clay areas
C = 0.40 for sand areas and steep undeveloped areas (slope greater than 10 percent)
C = 0.35 for flat undeveloped areas (slope less than 10 percent)

The system capacity will be designed to handle a 1:10-year rainfall of 75 mm/hr based on a design storm of 23 mm/hr, 15 minute time of concentration or a firewater run-off of 13,650 1/min from a given area, whichever is the greater. Based on Environment Canada data, the maximum recorded rainfall was 75 mm/hr.

The site drainage design should minimize the risk of contamination from process streams. There will be no interconnection between the two systems which could possibly allow effluent to enter the containment basin for Area 2, at the southwest corner of the main mill block. Floor trenches within mill buildings will contain and direct any spills to the effluent treatment system.

Other information pertaining to the site drainage plan is provided below.

Area contributing to surface run-off:

Area 1:	123	ha
Area 2:	47.6	ha
Total	170.6	ha

Runoff volume from a 1:10-year storm of 24 hour duration:

Area 1:	19,765	m^3
Area 2:	19,135	m^3
Total	38,900	m^3

Peak run-off flow from a 1:10-year storm of 24 hour duration:

Area 1:	1.6 m^3/s
Area 2:	3.8 m^3/s
Total	5.4 m^3/s

Project Construction Phase

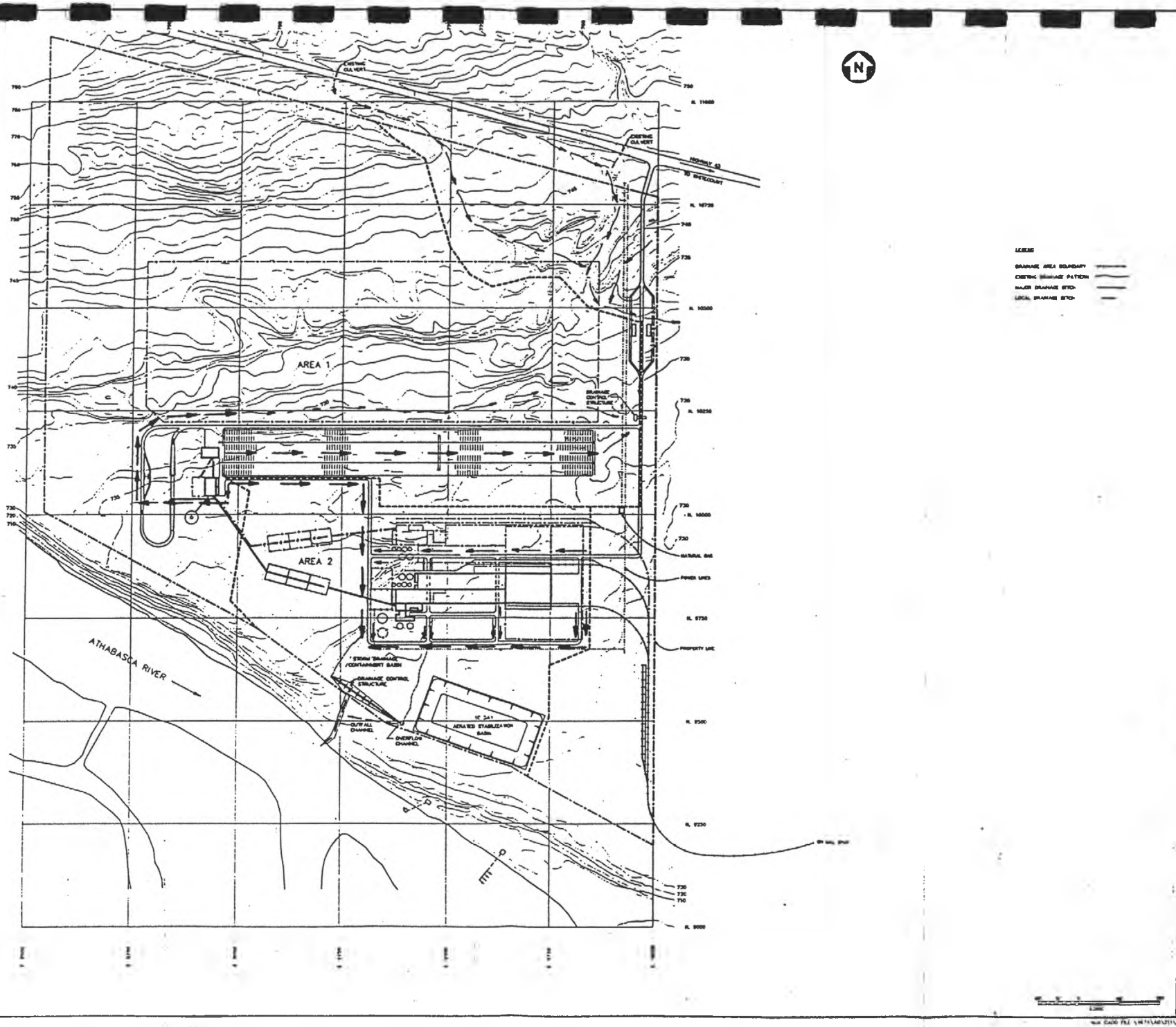
Drainage ditches will be provided during the construction phase of the project to direct surface water to the existing drainage channels.

Permanent features of the drainage system will be installed as site grading and construction progresses.

Approval Processes

Approval of the proposed plan will be pursued in the following manner:

- approval of the concept by Alberta Environment
- a license pursuant to the Alberta Water Resources Act
- approval of the local authority - Improvement District No. 15


AREA 1
AREA 2
ATHABASCA RIVER
EXISTING CULVERT
EXISTING CULVERT
HIGHWAY 63
TO EDMONTON
DRAINAGE CONTROL STRUCTURE
DRAINAGE CONTROL STRUCTURE
STORM DRAINAGE /CONTAINMENT BASIN
OUTFALL CHANNEL
OVERFLOW CHANNEL
AERATED STABILIZATION BASIN
N
LEGEND
DRAINAGE AREA BOUNDARY
EXISTING DRAINAGE PATTERN
MAJOR DRAINAGE DITCH
LOCAL DRAINAGE DITCH
NYSTROM, LEE, KOBAYASHI
CONSULTING ENGINEERS
VANCOUVER EDMONTON MONTREAL
B.C. AL P.Q.
NEWSPRINT MILL
SITE & SITE SERVICES
SITE
STORM DRAINAGE CONCEPT
ALBERTA NEWSPRINT COMPANY LTD
EDMONTON, ALBERTA - CANADA

Question 40

Please provide additional information on the prevention, control and management of chemical and process spills inside and outside of buildings at the mill site. Describe disposal procedures for contained spills.

Response

Process storage tanks (both white water and fibre) will be equipped with high level alarms, which will annunciate on the control panel, to alert the operator of an impending problem. The alarm level will be located such that the operator will have adequate response time prior to an overflow occurring.

Any overflows that do occur will be collected in a floor trench system, be screened for removal of coarse solids and pumped from a central sump to the primary clarifier. Clarifier feed will be equipped with the capability for pH adjustment in order to protect the ASB from fluctuations.

The major BOD_5 source at ANC will be the clear white water stream. The BOD concentration of this stream will be significantly less than that for black liquors in a kraft mill, so the potential for extreme swings in BOD loading at ANC will be minimal.

A broke system will be installed to collect and recycle broke from the couch, press, dry end and winder sections of the paper machine and in conjunction with a save-all system for machine white water will minimize fibre losses to sewer.

In the chemical plant area, storage tanks for strong acids (H_2SO_4, H_3PO_4) and alkalies (NaOH, NH_4OH) will be equipped with high level alarms and diked to contain the tank capacity. The alarm will sound in both the chemical plant and central control room to alert to an impending problem. Any spilled chemical will be either reclaimed with a portable pump or neutralized prior to discharge to the effluent system.

Sulphur dioxide will be stored as a liquid in a vented pressure vessel. Vent gases will be scrubbed with caustic during tank filling prior to release to atmosphere. The Na_2SO_3 storage tank will be equipped with positive ventilation and gases scrubbed with caustic prior to release.

Kerosene will be stored in a underground vessel with surface mounted pumps.

Storages for other less hazardous chemicals (paper dyes, EDTA, felt washing solution, alum, etc.) will be equipped with two independent high level alarm systems. Any spillage from these tanks will be collected in the floor trench system.

SECTION 8

SOLID WASTE MANAGEMENT AND DISPOSAL

Question 41

Provide further details on solid waste handling and disposal. Comment on the general suitability of the proposed mill area for an on-site landfill and the approach that would be followed to protect ground water. Where are the most likely locations for an on-site landfill and/or an off-site landfill?

Response

ANC estimates that raw water treatment sludge (approximately 2200 BD tonnes/annum) and wood waste incinerator ash (approximately 1000 BD tonnes/annum) will require landfill disposal in an appropriate facility. Detailed surficial geology of the proposed mill site has yet to be defined and potential siting for an industrial landfill will be evaluated in the near future. The siting, construction, and use of a suitable facility will meet all Alberta Environment regulations pertaining to design, operation and monitoring for groundwater quality. Discussions on solid waste disposal will be initiated with Alberta Environment officials in early 1989.

Question 42

Provide additonal details on the proposed plans to dispose of dewatered water treatment sludge in the landfill. Please include information on management of sludge dewatering liquid or leachate from the landfill.

Response

Water treatment sludge will consist primarily of silt, indigenous to the Athabasca River, plus small quantities of water treatment chemicals (alum, lime). This sludge will have minimal organic content, and the sludge will be dewatered to about 20% BD consistency prior to landfill disposal. The filtrate from the sludge press will be recycled to the clarifier feed. Construction of an appropriate landfill facility will comply with all Alberta Environment regulations. Management of leachate from such a facility will be consistant with regulatory requirements.

Question 43

The sludge from the effluent clarifier will be incinerated along with rejects from the chip screening (page 4-17). Will incineration be continuous or will the sludge be stored?

Response

Operation of the incinerator will be sequenced with operation of the barking and chipping facilities. Some sludge can be stored in the primary effluent clarifier and operation of the sludge dewatering process will normally be on a batch basis. Dewatered sludge will be trucked to the incinerator feed conveyor. Short duration outside storage will be provided as required.

SECTION 9

AIR QUALITY

Question 44

Provide a windrose and a STAR data summary for the Whitecourt area and discuss their implications for dispersion.

Response

Wind patterns in the vicinity of Whitecourt, as contained in Table 2 of Appendix 2 of the Environmental Impact Assessment Report, were used to prepare the wind rose in Figure 44-1. The wind rose illustrates that westerly winds predominate with secondary maxima from the northwest and the east directions. These directions generally parallel the main topographic features of the Athabasca River Valley.

Based on these wind patterns, air will flow from the mill site toward the Town of Whitecourt (i.e. west to northwest winds) over 40% of the time. However, wind speeds associated with these flows are higher than from other directions leading to increased turbulence and dispersion and thereby reducing potential impacts of the proposed mill on air quality in the vicinity of the Town of Whitecourt.

The "STAR" program is a way of estimating stability classes to predict air pollution potential. The "STAR" concept normally develops six stability classes, designated as A to F, using a solar radiation balance and wind speed. The "STAR" program has been refined to use a solar radiation index which considers solar (sun) elevation and cloud cover (i.e. surface weather measurements). Environment Canada, the U.S. National Climatic Center and others have used this criteria as a general indication of atmospheric stability. A to F stabilities are indications of the type of dispersion in the atmosphere that would occur under different weather conditions.

One method of defining stability classes was developed by the U.S. Atomic Energy Commission (US AEC). This method correlated vertical atmospheric temperature profiles with the A to F stability categories. The temperature profiles defined by the U.S. AEC are summarized in Table 44-1.

FIGURE 44-1 **MEAN WIND SPEED AND PERCENT FREQUENCY OCCURRENCE AT WHITECOURT, 1951-80**

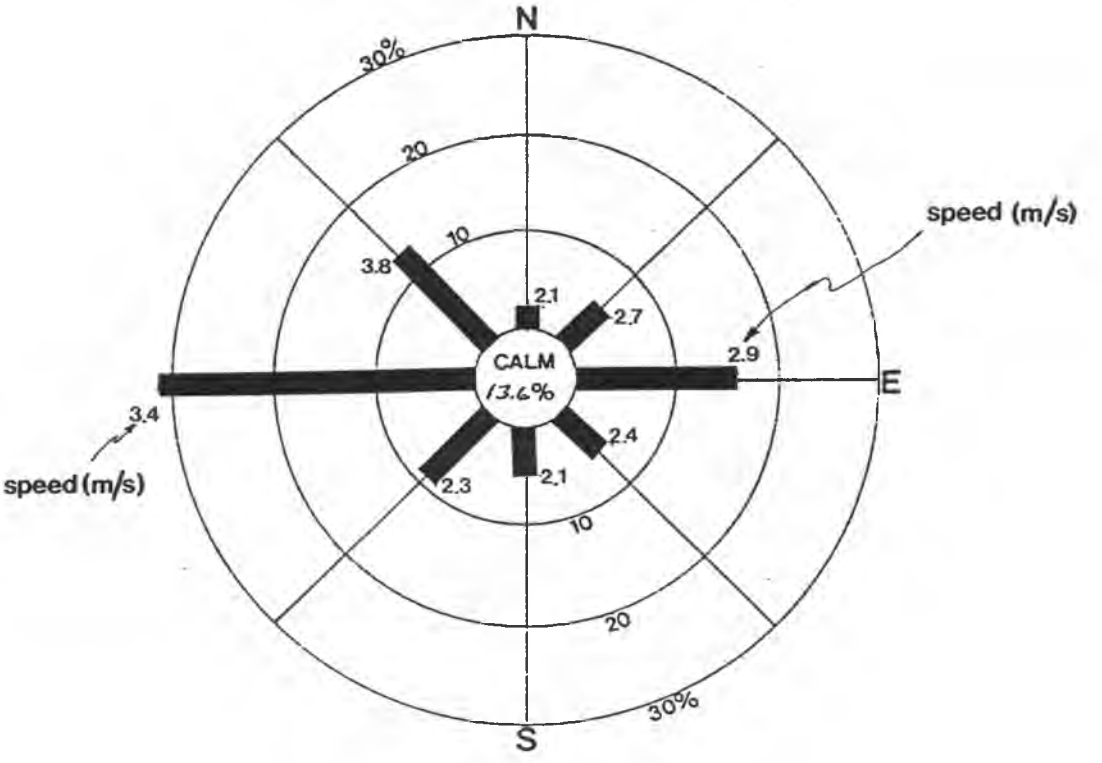


TABLE 44-1 STABILITY CLASSES ACCORDING TO US AEC

Pasquill Stability Class	Average Vertical Temperature Gradient (^{o}C/100m)
A	<-1.9
B	-1.9 to -1.7
C	-1.7 to -1.5
D	-1.5 to -0.5
E	-0.5 to 1.5
F	>1.5

after: Portelli, 1976

The A and B categories are considered to be unstable with average vertical decreases in atmospheric temperature of less than 1.9 and from 1.9 to 1.7^{o}C/100 m respectively. Under these conditions, a looping plume can occur as illustrated in Figure 44-2. If the plume contacts the ground, short term (i.e. few minutes) higher ground level concentrations of pollutants emitted from a stack can occur.

The C and D categories are considered slightly unstable and neutral with temperature decreases ranging from 1.5 to 1.7 and 0.5 to 1.5^{o}C/100m respectively. A coning plume, also illustrated in Figure 44-2, generally results in lower ground ambient concentrations with initial plume contact with the ground a greater distance from the source than for A and B stability.

The E stability is considered to be isothermal (approximately constant temperature with height) whereas the F stability has an increase in temperature with height. Under E stability, a fanning plume or more horizontal dispersion occurs as also illustrated in Figure 44-2.

F stability, which is generally associated with an increase in temperature with height (i.e.: an inversion), has a lofting or trapped plume depending on the height of the inversion top relative to plume height. Generally, maximum ground level concentrations of pollutants occur furthest from the source for E and F stabilities.

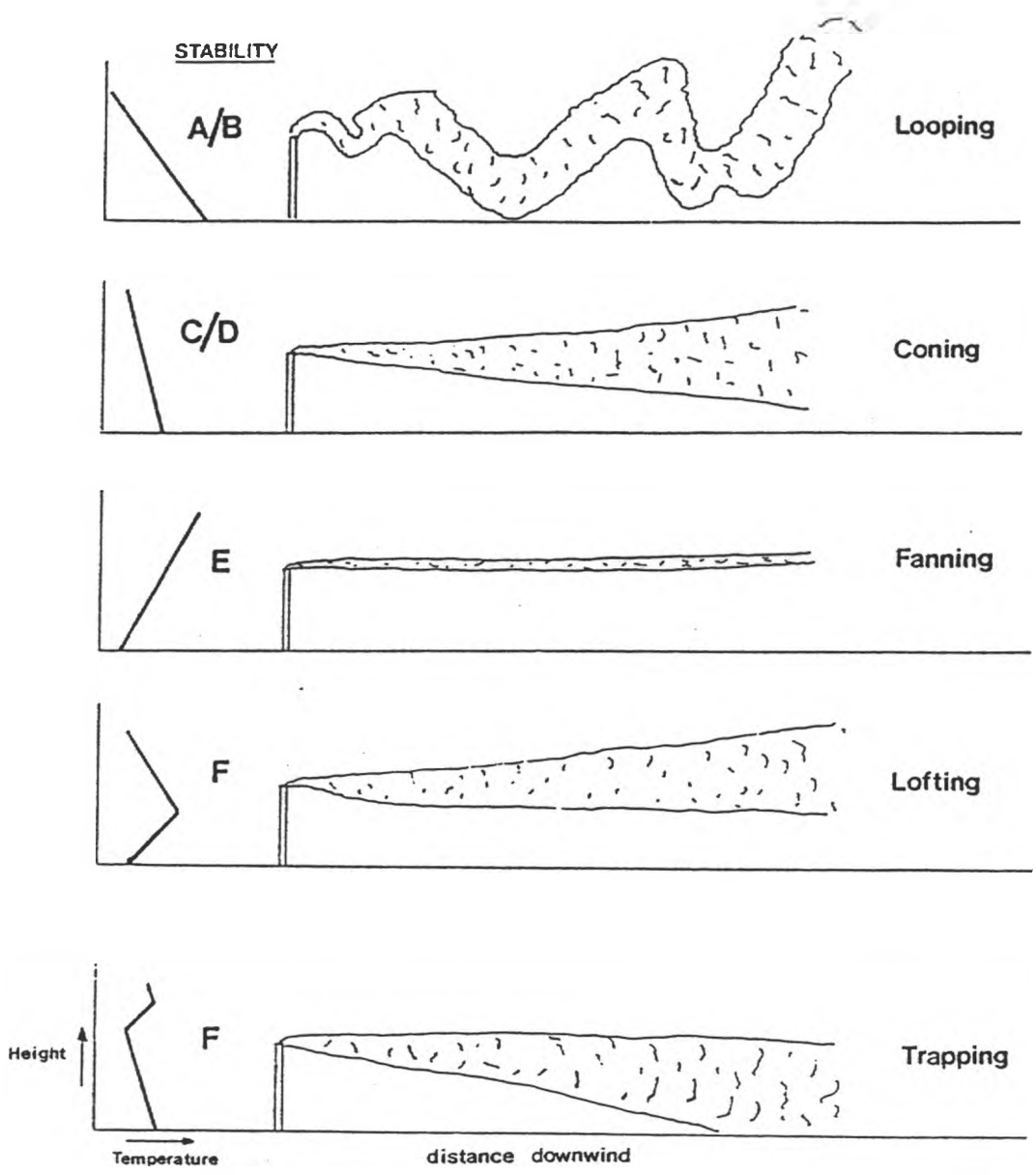


Figure 44-2 Plume Behavior with Variations in Atmospheric Stability

Dispersion modelling calculates the predicted ground level concentrations, as detailed in Appendix 2 of the Environmental Impact Assessment Report. This evaluation of the "STAR" program result considers air pollution potential rather than predicted ambient air quality levels. Therefore, in general:

- A and B stabilities mean possible shorter term higher concentrations near an emission source;
- C and D stability are generally synonymous with good dispersion;
- E stability has more horizontal than vertical dispersion;
- F stability may result in plume trapping particularly for low level sources.

A "STAR" analysis was conducted by Environment Canada on meteorological data from the Town of Whitecourt (1966-1978) and Whitecourt Airport (1978-1986) stations. Since the "STAR" analysis for the Town was very similar to that for the airport, the combined values are used in this analysis and are tabulated in Table 44-2. The Town of Whitecourt is in the valley while the airport is at a higher elevation on the south side of the valley.

Table 44-2 compares "STAR" data from Whitecourt with "STAR" data from other locations in Western Canada. Analysis of this data indicates that conditions in Whitecourt are similar to those experienced at other locations in B.C. and Alberta. In all cases, a large percentage of the occurrences are either neutral (class D) or stable (class F).

The potential therefore exists (based on the "STAR" data) for increased ground level concentrations of pollutants approximately 30% of the time in the vicinity of Whitecourt if emissions were trapped below an inversion (i.e. generally synonymous with F stabilities). F stabilities generally occur under light wind conditions. However, when the wind is blowing toward Whitecourt, it has an increased speed which is generally not conducive to the establishment of F stability conditions. Therefore, it may be rationalized that when F stability conditions occur (and potentially higher ground level concentrations could occur from mill emissions), the plumes would generally not be moving toward the Town of Whitecourt.

TABLE 44-2 PERCENT FREQUENCY OCCURRENCE OF "STAR" STABILITY CLASSES

Site	A	B	C	D	E	F	Comments
Whitecourt, Alta	1	9	13	37	8	32	1966-86
Peace River, Alta	0	6	11	48	8	27	1958-87
Edson, Alta	2	9	13	35	8	33	(1)
Kelowna, B.C.	2	15	18	28	4	33	1974-86
Penticton, B.C.	1	9	14	42	8	26	1974-86

(1) Stanley Associates Engineering Ltd., report on Atmospheric and Air Pollution Control, Champion Forest Products (Alberta) Ltd., EIA Appendix I, Table 1.7, September, 1987

(2) Other data were provided by Environment Canada and the B.C. Ministry of Environment.

Question 45

Building wakes will affect air quality and therefore must be included in the dispersion calculations. Use the SEEC data summary for the Whitecourt area and discuss their implications for dispersion

Response

There are three emission sources at the proposed mill which are associated with SO_2 and NO_x. These sources are the package boiler, glycol/water heater and the wood waste incinerator. The emission factors for these sources were outlined in Table 10, Appendix 2 of the Environmental Impact Asessment Report.

The package boiler and glycol/water heater are located adjacent to the main mill complex. The wood waste incinerator is located away from the main mill block and other structures.

In order to assess downwash and building wake effects, these sources were used in running the recommended Alberta Environment model SEEC. The modelling predictions are presented in Table 45-1 and detailed results are contained in Appendix 3. The three sources were evaluated using both SO_2 and NO_x data, even though emissions of SO_2 have previously been shown to be of minimal concern (i.e., at very low ambient air quality levels compared to the Alberta Environment's 1 hour SO_2 guideline level of 450 ug/m^3).

The package boiler and glycol/water heater were evaluated together due to their close proximity to each other and the mill complex. A total of six computer simulations per pollutant were run to simulate downwash effects due to the six major buildings in the vicinity of the stacks. In all cases, the predicted ambient air quality levels were well below Alberta guideline levels (Table 45-1) and indicate that building wake effects will have minimal impact on discharges from these stacks.

The wood waste burner was tested assuming downwash on the lee side of the structure. The conical shape of the structure, was mathematically converted into a rectangular structure to apply the SEEC model. Based on the results of this modelling, no significant increases in ambient SO_2 and NO_x are expected to occur from downwash.

In general, due to the relatively low concentrations of pollutants in the plumes from these sources, the location of the stacks relative to the buildings and other favorable characteristics, building wake effects are predicted to be minimal.

TABLE 45-1 SUMMARY OF MAXIMUM GROUND LEVEL CONCENTRATIONS USING THE ALBERTA ENVIRONMENT DOWNWASH MODEL "SEEC"

	Max. Conc. (ug/m^3)		Stability	Wind Dir.	Wind Speed (m/s)
Emission Source	SO_2	NO_x			
Alberta guideline for 1 hour	450	400	NA	NA	NA
Package Boiler and Glycol/Water Heater					
CTMP building	1.1	135	F	90	1.0
Offices	0.6	91	E	0	1.0
Shops/Stores	0.6	91	E	0	1.0
Paper Machine building	1.3	156	F	40	1.0
Warehouse	0.6	91	E	0	1.0
Utilities building	1.0	127	F	270	1.0
Wood Waste Incinerator					
No buildings	0.5	4.5	D	320	20.0

Note: NA = not applicable

Question 46

Re-run the dispersion model using the STACKS2 program. The version used has been superceded by STACKS2.

Response

Emission data for the proposed facility were re-run using the updated Alberta Environment model "STACKS2". Table 46-1 compares the results of this modelling with previously presented results using "STACKS".

In flat terrain, the use of "STACKS2" did not effect the modelled results. In hilly terrain, "STACKS2" results were higher than results previously modelled but were still below Alberta Environment guideline levels. In addition to an increase in predicted levels, the maxima were generally located closer in to the source (detailed computer listings are contained in Appendix 3).

In addition to the requested re-running of the data, the data used was reviewed and adjusted to conform to new emission criteria for the package boiler. In reviewing the October 1986 amendments to the U.S. EPA document AP-42, new factors for NO_x from package boilers were determined to be applicable. The NO_x emission factor noted decreased from 2800 $kg/10^6$ m^3 to 2240 $kg/10^6$ m^3 while all other emission factors remained as in the Environmental Impact Assessment. The models were run again utilizing this emission factor (Table 46-1) with the detailed computer listings contained in Appendix 3.

TABLE 46-1 COMPARISON OF RESULTS USING "STACKS" AND "STACKS2" PROGRAMS

	"STACKS"			"STACKS2"		
	Max. Conc. (ug/m^3)	Dist. from Source (m)	Critical Wind Speed (m/s)	Max. Conc. (ug/m^3)	Dist. from Source (m)	Critical Wind Speed (m/s)
SO_2						
flat	0.81	437	20	0.80	437	20
hilly	0.90	1000	7.5	1.09	363	20
NO_x						
flat	200*	479	10.5	200*	479	10.5
hilly	217*	1000	4.0	280*	437	9.0
Particulate						
flat	3.3	1445	10.5	3.3	1445	10.5
hilly	3.7	2000	6.0	4.1	525	20

* based on emission factor of 2800 kg/106 m^3

Updated predictions based on revised emission factor for package boiler NO_x

	STACKS	STACKS2	Guideline
flat	165.9	165.9	300
hilly	179.4	232.9	300

Ouestion 47

Stack 3 may have a serious stack aerodynamic downwash problem. Discuss the implications of this in terms of air quality.

Response

The downwash modelling for Stack 3 (modified wood waste burner) was described in the answer to Question 45. That evaluation did not show significant SO_2 and NO_x effects due to the downwash. The only significant concern is particulate emissions.

It is possible that under some meteorological conditions (i.e. A stability) that the wood waste incinerator may be subject to it's plume reaching the ground within a short distance of the "stack" in a manner not considered by the SEEC model. This type of condition might occur, for example, under high wind conditions which would result in increased turbulence in the wake of the burner. However, such conditions occur only infrequently and would be generally short-lived (refer to Question 44 for further reference on A stability occurring about 1% of the time).

Ouestion 48

Please provide information on the expected frequency of conditions where fog formation would occur with fog transport occuring perpendicular to the river valley.

Response

Winds perpendicular to the valley (ie: from the north to northeast and south to southeast sectors) occur only 4.8% and 4.4% of the time respectively. These low frequencies in themselves minimize the potential for fog formation with these wind directions.

For fog (water vapour) to travel from the mill to the airport, the air would have to descend and climb up across the valley slope. Winds with sufficient mechanical energy to achieve this trajectory would also disperse the plumes minimizing the potential for fog formation with wind flows perpendicular to the valley axis.

The hourly meteorological records were ordered in early July and can be used to determine the precise frequency of observed fog with northerly winds during the detailed design phase of the project. However, the "STAR" analysis shows that F stability with northerly winds during the winter is only approximately 5%. This further confirms a very low potential for fog formation with the wind flow perpendicular to the valley axis.

Question 49

Please provide additional information on emissions under upset conditions- such as plant start up/shut down, control equipment failure, and process equipment malfunction. Elaborate on mitigative measures as appropriate.

Response

For each major gaseous emission source, as listed in Table 4-3 of the EIA report, start up, shut down, control equipment failure, and process equipment malfunction are discussed in Table 49-1 on the following page.

TABLE 49-1: GASEOUS EMISSION TRANSIENT CONDITONS

Sources	Start up/Shut down	Upset/Remarks	Mitigation Measures
Heat Recovery Vent	During start up and shut down steam generated by the refiners will be vented directly to the atmosphere.	Heat recovery system will be bypassed on control failure or other upset conditions and refiners will be vented directly to atmosphere.	Discharge elevated above plant roof
Refiner Steam Vent (when heat recovery system not operating)	Active during refiner start up/shut down sequences.	Active on heat recovery system upset, maintenance, or on occasion if recovered steam cannot be used.	As for Heat Recovery Vent
Pulp Thickener Hoods	Low level flash steam and infiltration air, no special conditions during start up and shut down.	On control or fan failure, hood could vent for short period of time into building.	Elevated Discharge
Paper Machine Dryer Hood	Dry air flow constant regardless of paper machine operation, water vapour content proportional to paper machine production rate.	Failure of exhaust or supply fans for hood initiates paper machine shut-down. Increased water vapour emissions, if heat recovery system inoperative	Elevated Discharge
Save All Hoods	As for Pulp Thickener Hoods	As for Pulp Thickener Hoods	Elevated Discharge
Packaged Boiler	Higher O_2 and reduced NO_x during start-up and shut down, with operation at higher excess air levels.	Boiler shut-down immediately on control or process failure.	Elevated Discharge
Glycol/Water Heater	As for Packaged Boiler.	As for Packaged Boiler.	Elevated Discharge
Wood Waste Incinerator	Increased smoke (opacity) and on occasion particulate levels during start-up and shut down.	As for start up and shut down conditions.	If transient emissions prove to be excessive, gas or oil-fired supplementary burners could be installed.

Question 50

Please discuss the variation in emissions, if any, that is anticipated, for example regular day/night variation or seasonal variation.

Response

Gaseous emissions will generally not vary regularly on a day/night or seasonal basis, except for the packaged boiler and glycol/water heater. These units will provide make-up air heating and space heating, and, thus the load will increase as ambient temperatures decrease.

Refiner steam and the paper machine hood vents will vary depending on the operating mode, as noted in the table included with the response for Question 49. The wood waste incinerator will be shut down one day per week or one day every second week as required for ash removal.

Question 51

Please discuss how odour studies and fog studies at Quesnel, B.C. are applicable to this site (presumably there may be different emmission rates, different dispersion characteristics, different terrain and vegetation). Provide copies of any reports referenced.

Response

The odour studies at the town of Quesnel showed that a CTMP mill does not create an ambient odour concern. The pulping process used by ANC will be similar to that which is installed at Quesnel River Pulp Co. and there are no odourous emissions from a paper machine. Odour concerns are normally associated with the kraft pulping process. Kraft pulping is not part of the ANC project.

Fogging questions are addressed with respect to emission rates, dispersion characteristics, distances from the community to the mill and terrain/vegetation effects as follows:

Emission Rates

At Quesnel, for a cooling tower for a thermal power plant, water vapour emission rates were predicted at 75,000 g/s. The ANC emission rate is 9,500 g/s or 13% of the rate used for the Quesnel analysis.

Dispersion Characteristics

Table 51-1 presents a comparison of meteorological conditions at Whitecourt and Quesnel. Relative humidity at both locations is similar. Temperatures at Whitecourt are lower than Quesnel during all times of the year. Wind speeds at Whitecourt are substantially higher varying from twice to three times those recorded at Quesnel. This difference is reflected in the percentage of all winds at both locations varying from 50% calms at Quesnel to only 14% at Whitecourt. In summary, Whitecourt is a colder and more ventilated location than Quesnel.

This marked variation between the two locations is reflected in the percent occurrence of fog conditions. For the purposes of this comparison, it was assumed that each fog episode lasted for up to 12 hours. On this basis fog occurred at Quesnel on approximately 83 days (11.3%) of the time, while fog occurred at Whitecourt on approximately 33 days (4.6%). In addition, the major differences between the two areas are related to geographical and meteorological factors. Geographically Whitecourt is further north than Quesnel and is influenced more by continental air masses. These factors are reflected in differences in meteorological conditions which in turn reflect on

the dispersive capability of the respective air sheds and other related air quality issues.

Distances from the Community to the Mills

The ANC mill is approximately 10 km from Whitecourt. The Cariboo Pulp Mill (a kraft mill) is immediately across the Quesnel River from the Town of Quesnel with residences bordering the mill. The Quesnel River Pulp Mill (QRP) is adjacent to commercial/ industrial facilities at Quesnel.

QRP is also very close to the airport and near the aircraft flight path. The ANC mill is across the Athabasca River from the Whitecourt airport and away from the normal aircraft flight path.

Effects of Terrain and Vegetation

Both QRP and ANC have treed buffers between the mill site and the nearest highway. However, the ANC site will provide a more extensive buffer zone.

The valley terrain is steeper at Quesnel than at Whitecourt, as illustrated in Figures 51-1 and 51-2 respectively.

Fogging Assessment

Quesnel has a greater potential for and occurrence of fog than Whitecourt. Based on unpublished studies at Quesnel, it was calculated that the addition of 75,000 g/s of water vapour would increase the occurrence of fog by 15%. Projected emissions from the ANC mill are approximately 9,500 g/s, substantially less than those projected at the Quesnel location. Based on the lower water volume emissions at the proposed ANC site, actual increases in foggy days may be reasonably predicted at 34 days per year, a 2% increase over the current 33 days. The potential for increased fogging is also reduced by the higher frequency (and intensity) of higher wind speeds (i.e., 66% less calm days) at Whitecourt which would tend to disperse the water vapour emissions more readily.

Based on this analysis, it may be concluded that the water vapour emissions from the proposed ANC mill will have minimal impact on the occurrence of fog in the Whitecourt area.

Figure 51-1 **QUESNEL**

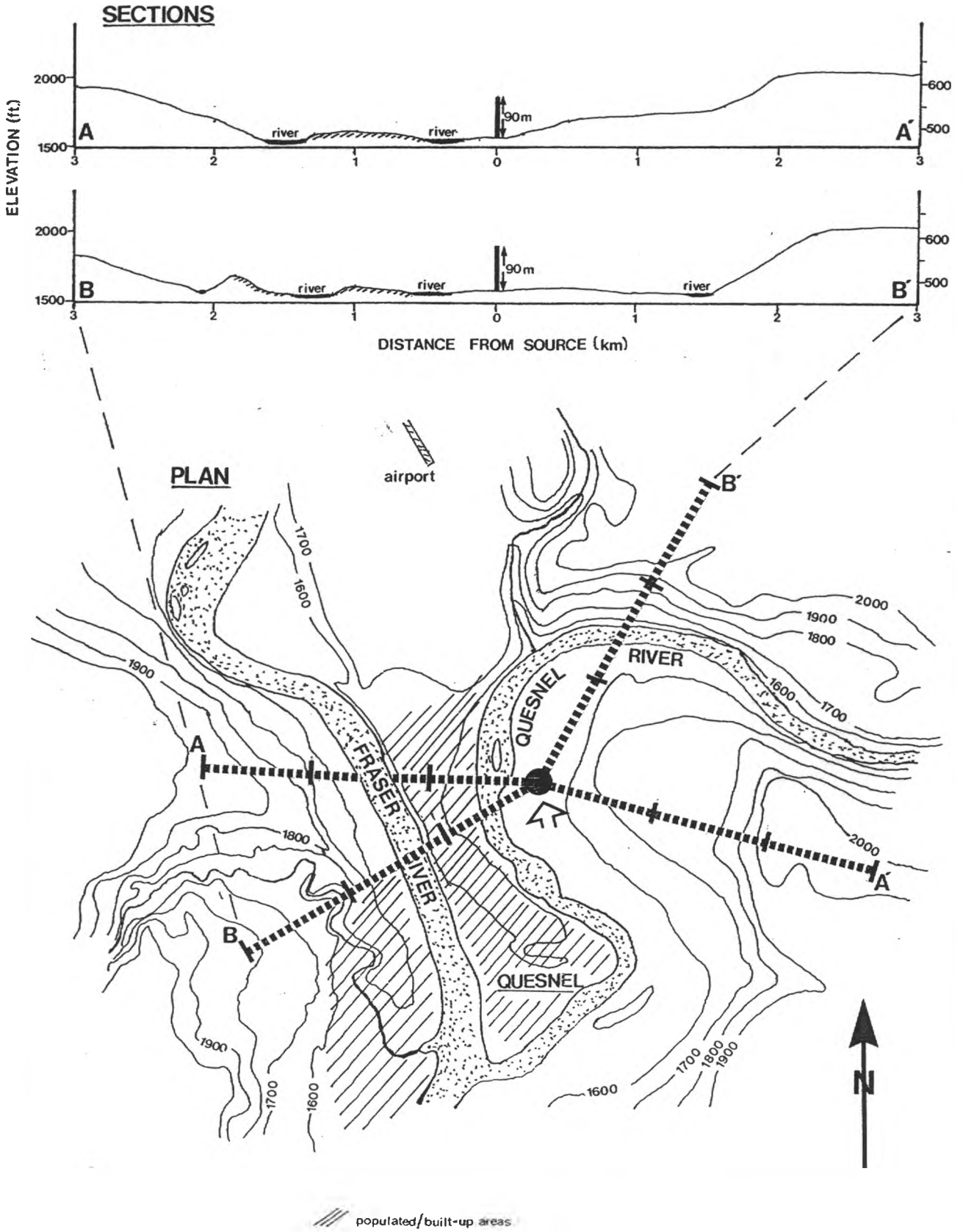


Figure 51-2 **WHITECOURT**

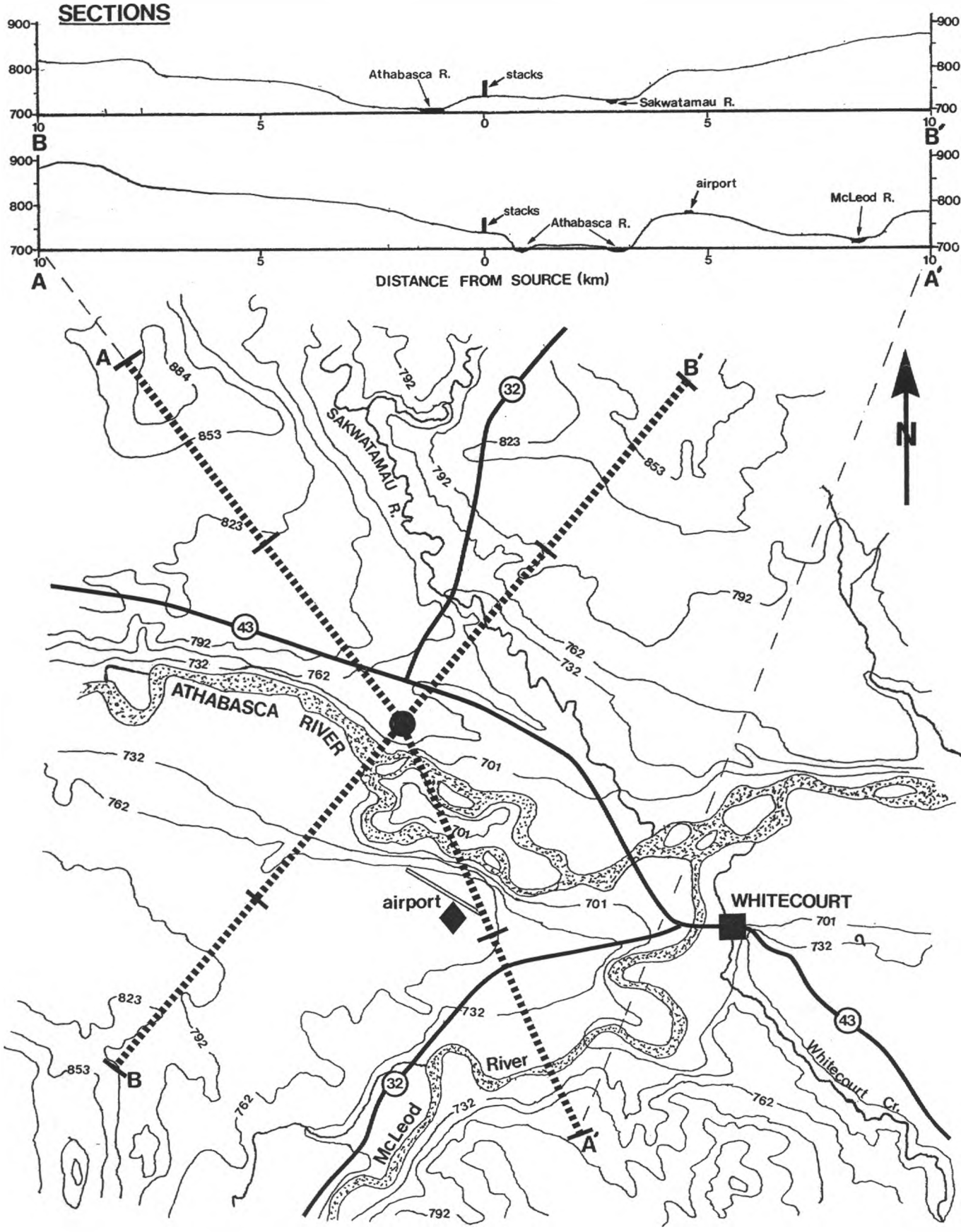


TABLE 51-1: COMPARISON OF METEOROLOGICAL CONDITIONS AT WHITECOURT, ALBERTA AND QUESNEL, B.C.

	J	F	M	A	M	J	J	A	S	O	N	D	AVG
Max. Temp (°C)													
Whitecourt	10.8	-3.3	0.8	9.7	16.7	19.9	22.2	20.8	15.8	10.0	-0.8	-7.7	7.8
Quesnel	-6.6	0.6	5.6	11.8	18.5	21.7	24.0	22.8	18.3	11.1	2.2	-2.9	10.6
Min. Temp (°C)													
Whitecourt	-22.3	-16.9	-12.6	-4.4	1.6	5.5	7.9	7.0	2.0	-3.4	-11.7	-18.5	-5.5
Quesnel	-16.1	-10.9	-6.7	-1.7	2.7	6.8	8.7	8.1	4.4	0.2	-5.9	-5.1	-3.8
Mean Temp (°C)													
Whitecourt	-16.6	-10.2	-5.9	2.7	9.2	12.7	15.1	13.9	8.9	3.4	-6.3	-13.1	1.2
Quesnel	-11.3	-5.1	-0.5	5.1	10.7	14.2	16.4	15.4	11.4	5.7	-1.8	-6.9	4.4
Rel. Humidity (%)													
Whitecourt	78	76	72	63	60	68	73	78	78	73	79	81	73
Quesnel	81	78	68	58	57	64	63	70	76	75	83	83	71
Fog Occurrences (%)													
Whitecourt	3.8	3.6	3.2	2.2	2.4	4.0	4.5	8.3	6.5	4.1	7.8	4.5	4.6
Quesnel	14.0	11.4	5.8	3.4	4.1	5.9	6.8	11.8	19.4	18.3	19.3	15.6	11.3
Wind Speed (km/hr)													
Whitecourt	9.6	9.5	10.1	10.5	11.2	10.4	9.3	8.5	9.1	9.2	8.8	8.9	9.6
Quesnel	3.9	3.8	4.5	4.9	4.3	3.7	2.9	2.5	2.9	4.3	4.0	4.1	3.8
Calm Winds (%)													
Whitecourt	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
Quesnel	53	54	46	40	42	46	54	57	57	47	50	50	50

Question 52

On page 5-14 it suggests that small quantities of "turpentine and other odorous gases" may exist in the waste steam and these would be routed to the waste heat recovery system. Discuss what happens to the waste steam when the heat recovery system is off line. If direct venting to atmosphere is planned please address the need for a secondary control system for those time periods when the waste heat recovery system is down.

Response

Except in the case of a process upset and for short periods of time during start-up and shut down, the waste heat recovery system will be operated when the paper machine is operational. For the brief periods of time when the waste heat recovery system is not in operation, the waste steam will be vented directly to the atmosphere.

At Quesnel River Pulp, waste heat is only partially recovered, and throughout a large part of the year, the steam is vented directly to the atmosphere. As noted in Appendix 2 of the EIA report (pg. 10) these emissions are not detectable and have not been a concern.

Question 53

Please discuss ANC's preferred choice of "smokeless burner" and any alternatives considered with particular reference to burner characteristics during start-up, periods of erratic feed and flyash. Also indicate if the quantity of feed material is sufficient to justify a hog fuel recovery system.

Response

In the normal operating mode, waste steam recovered from cTMP refining operations will provide over 75 percent of the mill steam demand. Installation of a hog fuel boiler to supply the balance cannot be economically justified.

Incineration is considered preferable on both an environmental and practical basis to landfill. Incineration is used at a large number of sawmills in western Canada. In some locations as many as six or eight "smokeless burners" are located in close proximity.

Wood waste from the on-site barking and chipping operation will be conveyed directly to the incinerator. A by-pass will be provided for short term storage when the incinerator is shut down for ash removal. It is anticipated that the rate of mill waste generation will be less erratic than for a typical sawmill. Thus, the incinerator operation will be more stable than for a sawmill.

During detailed design and prior to purchase of equipment, alternative burner designs, including a refractory unit such as the Olivine-type and control concepts will be assessed. The best practical equipment will be chosen and installed.

Significant fallout of flyash on the adjacent outside chip piles could result in pulp contamination and paper quality problems. It is anticipated that poor wood waste incinerator operation will pose an internal operating constraint before an unacceptable off-site impact is noticed.

Ouestion 54

Please discuss how the particulate emissions data for the wood waste incinerator reported in Table 10 of Appendix 2 (page 13) were obtained i.e. the sampling technique used. Actual test results for the unit sampled should be provided.

Response

The particulate emissions were estimated based on a source emission test conducted on a modified wood waste burner on Vancouver Island. A scaffold was erected beside the burner and a "swing stage" was used to bridge from the scaffolding to the burner. A heat shield was used to protect the sampling crew during the test program.

Since gas exit velocities were too low to be measured by a pitot tube, a fluidic sensor that can measure flows in the order of 1 ft/s (0.3 m/s) was used. A Radar Pneumatic high volume particulate sampler with an extended sampling probe was used to sample the particulate.

The results of the test were that a modified wood waste burner could meet B.C. Level A emission levels for a hog fuel boiler (0.1 gr/dscf at 12% CO_2) if well maintained and operated. Actual test results can be obtained from the B.C. Ministry of Environment (unpublished report).

SECTION 10

TRANSPORTATION AND UTILITIES

Ouestion 55

Discuss the need for special measures at the junction of Highway 43 near the mill site in order to ensure the safe turning of vehicles.

Response

With the predominant use of log-haul units of overall length up to 30 m, it is incumbent upon the design of any vehicle turning movements to incorporate protection for other users of the facility in order to prevent log swing hazards.

The intention of the proposed intersection of the mill site assess road and Highway 43 is to provide a margin of safety within the geometric design, for turning movements of vehicles with large overhangs, such log haul units.

The proposal is to provide extra lane widths and depressed separation medians and channelization for turning movements of log haul units.

These units tend to be somewhat slow on acceleration and braking manoeuvres and the intersection design will accommodate these requirements in providing a minimum or hazard free environment for the general highway travelling public.

Recognition of the role of the vertical alignment of Highway 43 throughout this area on the final design of deceleration and acceleration lanes will be addressed and suitable modifications incorporated.

The geometric design of the intersection will be developed in accordance with the special requirements of the Design Branch of Alberta Transportation for lumber mill highway intersections. Design vehicle turning templates will be utilized to ensure that tail swing from log haul units will occur over depressed medians and channelized areas of the intersection. Care will be taken to ensure that no tail swing hazard from log haul units will occur in active lanes of Highway 43 or the mill site access road.

Question 56

Summarize the demands for transportation infrastructure associated with mill operation and the need for further road improvements. Include discussion of the financial implications of the infrastructure required and who would be responsible for their development.

Response

ANC is well located for highway transportation with the property immediately adjoining highway 43. The company plans to utilize a new forest access road to be constructed by the government and which runs in an East-West direction through the company's proposed Forest Management Area. This road is expected to be completed from Knight through to the ANC mill site. Thus there will be very little log haul traffic on the existing highway system.

There is at the present time no rail service to the site. Plans were formulated, a routing chosen and preliminary clearance obtained for a bridge over the Athabasca River and a spur line connecting the CN siding west of Whitecourt to the mill site. This service is estimated to cost approximately $9 million. ANC is undertaking the development of this access. The provincial government has agreed upon a grant for infrastructure assistance in the amount of $8.3 million toward road, rail and other service costs.

It is planned that there will be local truck traffic moving newsprint from Whitecourt to Edmonton and other Alberta locations. The number of truck loads is expected to be about eight per day and is not expected to have an adverse impact.

Other than the measures described in the previous response there would be no need for further road improvements.

Ouestion 57

Using text and tables as appropriate, identify and discuss the environmental factors considered in the selection of corridor, preferred route and alignment of the rail spur including the crossing of the Athabasca River. For example, terrain, hydrology, wildlife/fisheries, vegetation, cultural resources, recreation/land use, operational constraints.

Response

The acceptable railway gradient and the intervening topography primarily dictated the selected corridor for the railway spur from the CNR siding at Whitecourt to the plant site. The differential elevation of the siding and the alluvial plain of approximately 35 metres limited severely the location of the rail grade. Topographic restraints included a major river crossing.

The rail line will originate at the CNR siding in west Whitecourt and from chainage 0+000 to 0+1900 m, will be located on a semi-elevated inactive flood plain at elevation 700 m. At this point, the ground surface drops to the active flood plain and the Athabasca River.

Between the river crossing and the existing siding, the spur line will skirt the westerly edge of the Town and existing gravel leases. It would appear to be sufficiently beyond the Town limits to avoid curtailment of any foreseeable expansion of the Town in this direction.

From the bridge site, the grade runs northerly across the flood plain, slowly rising to elevation 700 m at chainage 0+4700 m and on to a cobbly gravel plain covered with a stand of pine.

The grade across the flood plain will act as a barrier to wildlife movement. However, the easterly side will be adjacent to the townsite and is unlikely to be a highly desirable habitat for animal wildlife because of the presence of the gravel operation, the land development and other man-made activity.

Immediately north of the river, the land is traced with old oxbows, is wet and is scrub brush covered. It shows no evidence of human activity, except for old logging operations.

Beyond chainage 0+4700 m, the land rises rapidly to elevation 725 m and generally undulates between elevation 725 m and 735 m to the plant site.

Once on the upper alluvial plain on which the proposed plant site is located, the rail spur will follow along, but back from the crest of the river bank, deflecting southerly to avoid the existing and future gravel operations as much as possible.

The rail spur will generally parallel Highway 43 at a distance of a few hundred metres to a thousand metres. It is anticipated there will be approximately four switches per week on the rail spur during which wildlife could be affected over its length. The affected area along the proposed route of the tail spur is now occupied by several active gravel leases. Loading, crushing and hauling of processed materials already create extensive noise and activity in the vicinity.

The proposed bridge site was selected on a straight flowing section of the river where the banks are most stable. Locating to the west would require two bridges as the two arms of the river converge a short distance to the west of the selected site. To the east the river widens to double its width creating an unacceptable condition for the crossing. Insofar as the effect on fisheries, the bridge, being on a straight section of the river with deep even flow, should not have any adverse environmental effect.

During the investigation for the bridge site, the alignment of the existing piers of the abandoned bridge at the Highway 43 crossing was considered, but this was not acceptable to Alberta Transportation.

Other factors were noted in spur line design to minimize environmental impact. These include:

- The railway grades were designed to follow natural grade as closely as possible to minimize visual and physical impact on the surrounding land. With minimum cuts and fills, less forest clearing is required, minimum right-of-way will be required and wherever possible level crossings and surface lease impacts are reduced.

- In setting the alignment, the design has allowed the natural drainage to be used wherever possible. The right-of-way grade will be protected from water erosion by the use of geotextiles, rip rap and seeding certain areas of the grade.

- Each road crossing of the rail line will be designed to standards consistent with safe access across the rail line.

- The upper rail grade has been designed to peak just before the edge of river escarpment to stop any possible run away rail cars from traversing the whole length of the rail spur.

- The right-of-way will be cleared meeting the requirements of the Alberta Department of Forestry, Public Lands and Wildlife. The bridge will be designed to meet the hydraulic and clearance requirements of the Department of Environment and the Navigable Water Act.

The selected corridor permits the rail gradient to be maintained at a maximum of 0.77%, which is within the acceptable gradient range.

Because of the topographical conditions and relative location of the siding, the river and the high north bank of the river valley, no other suitable corridor exists.

Question 58

Discuss concisely the potential environmental effects associated with the rail spur and bridge and analyze their significance with respect to factors such as magnitude, duration and geographical extent. Consider the operation and maintenance phase as well as the construction phase.

Response

See response to Questions 57 and 59.

Question 59

Provide an environmental protection plan to minimize and/or mitigate any adverse effects during construction and operation of the rail spur. Identity those adverse impacts that cannot be satisfactorily resolved (i.e. the residual impacts after mitigation) and analyze their implications.

Response

In order to minimize or mitigate any adverse effects during construction and operation of the spur certain procedures and controls are to be initiated.

1. To minimize terrain disturbance, construction activities will be confined to the rights-of-way and designated accesses. This includes not only soil disturbances but also tree and vegetation disturbance.

2. Mitigation of soil erosion will include drainage control and construction stop work orders during wet weather.

3. To minimize or mitigate visual disturbance slopes and exposed earth faces will be seeded. Long or large raw faces will, in addition to grass seeding, be replanted with native tree selection.

4. Bridge pier construction will be carried out in the winter period of November to April. Close cooperation with the provincial Fish and Wildlife authorities will maintained.

Certain activities such as train movement during operation may result in minor wildlife disturbance. Being a spur line, train velocities should be low providing a measure of safety to wildlife. Noise disturbance should be minimal. The presence of bush and trees along the right-or-way and the restricted access to the undeveloped areas will provide additional mitigational effect and wildlife protection.

The existence of the railway grade across the river flood plain will provide a barrier to wildlife. However, the Town lies to the east of the grade which in itself tends to ward off game.

The presence of the rail right-of-way may tend to provide greater access to hunters. However, numerous trails, cutlines and gravel pit access presently provide multiple access to the area. The increased human traffic from the rail line should not be a significant factor.

Ouestion 60

Discuss the feasibility of minimizing environmental impacts by locating linear facilities such as the electrical transmission line, the gas service line, access road, and rail spur in corridors.

Response

The provision of a utility corridor accommodating road access, power line, gas line, and telephone from Highway 43 access to the plant is provided for, assuming that the major utilities will arrive at the site at this location.

The location of prime source for gas and power has not been precisely determined but it is expected to come from the vicinity of Whitecourt to the east. When the sources and location are determined, it may be feasible to provide a corridor in part or in total for gas and power. Rail access to the plant site will come from the south and east, making inclusion of the rail spur impractical in a common corridor with other utilities.

As to the environmental impact of power and gas utility, off-site, it is assumed to be the responsibility of the utility company involved and will he handled by them.

SECTION 11

SOCIO-ECONOMIC

Question 61

Estimate (as a percentage) the Alberta, other Canadian, and foreign content for engineering and project management, and for equipment and materials.

Response

As indicted in the EIA report, emphasis will be placed on procurement from local contractors and suppliers. It will, however, be the contractor's responsibility to convince the owner, project managers and prime contractors that local contractors and suppliers have the required experience and performance record to execute the work in a satisfactory manner, on time and at competitive price and quality levels.

Based on contract negotiations underway and on NLK's experience on similar projects in Alberta, percentage distribution of content is estimated as follows:

	Alberta	Other Canadian	Foreign
Engineering and Project Management	35	65	0
Equipment and Materials	32	38	30
Total Project	46	36	18

The foreign content is essentially limited to supply of the paper machine, which will be manufactured in Brazil.

Question 62

Outline the procurement strategy to be utilized on the project. How will the proponent identify, prequalify and assess Alberta bidders?

Response

Procurement activities will be centred in the ANC/NLK office in Edmonton at:

Suite 360
10055 - 106 Street
Edmonton, Alberta
T5J 2Y2

Telephone: (403) 423-3384
Telecopier: (403) 424-3228

Advertisements will be placed in the Whitecourt Star, Edmonton Journal and Calgary Herald inviting contractors to submit prequalification information for contracts involving on-site labour. For direct equipment purchases, the list of qualified bidders will be prepared following searches of appropriate trade and general directories and review of qualification information submitted by companies based in Alberta and elsewhere.

All bids will be assessed considering quality, price and delivery. The value of potential future service for Alberta based bidders will be included in quality evaluation.

Question 63

Briefly summarize the local business opportunities in the region that may arise from the construction and operation of the mill e.g. materials and services that could be provided locally.

Response

During construction, materials and services that can be provided locally (Alberta) include:

a. Transportation services
b. Site clearing
c. Grading and excavation
d. Paving and road construction
e. Foundation construction
f. Concrete structure construction
g. Fabrication and erection of structural steel
h. Supply and installation of cladding, roof decks, partitions, and so on
i. Supply and installation of building and equipment insulation
j. Supply and installation of lighting, power and control wiring
k. Supply and installation of process and service piping
l. Fabrication of tanks and vessels
m. Supply and installation of material handling equipment
n. Supply and installation of heating and ventilating equipment
o. Mechanical equipment installation
p. Electrical equipment installation
q. Instrumentation installation
r. Specialized start-up services
s. Construction equipment rental

During operation, materials and services that can be supplied locally (Alberta) include:

a. Transportation services
b. Wood harvesting
c. Tree planting and forest maintenance.
d. Petroleum products
e. Natural Gas
f. Electric power
g. Chemicals, including sulphur dioxide, caustic soda, sulphuric acid, lime, and alum
h. Professional services
i. Maintenance services
j. Construction services for improvements and expansion

Question 64

Define the terms used in the discussions on employment e.g. direct jobs created by ANC, and spin-off jobs.

Response

The ANC newsprint project will create employment in two ways during the construction and the operations periods. Jobs created both during construction and operations which will engage workers working directly on the newsprint mill are referred to as direct or basic employment or direct or basic jobs. Income in the form of wages and salaries resulting from direct employment will be spent locally or within the study region to create jobs in the service sector. These jobs are referred to as induced jobs/employment. Also, expenditures made by ANC on local supplies either for the construction or the operations of the newsprint plant will create jobs in the business service sector. Jobs resulting from such indirect spending are referred to as indirect jobs/employment. Both indirect and indirect jobs are generally referred to as non-basic jobs/employment or as spin-off employment or employment multiplier effects.

ANC will be involved in a woodland operation to produce wood supplies. The woodland operation will create direct employment in the logging and transportation areas. The majority of the woodland operation area is outside the study region to the west. For the purpose of the impact assessment, the woodland operation was considered a separate project, and its indirect and induced effects were not included in avaluating employment and economic impact.

Question 65

Please explain in more detail how the figures for permanent in-migrants associated with ANC shown in Table 3.4, page 43 or Appendix 4 were derived and how they were used to forecast the population projections for Whitecourt.

Please confirm that ANC will continue to provide updated forecasts of workforce requirements to appropriate community groups, local authorities and Alberta Career Development & Employment, Alberta Municipal Affairs, and Alberta Economic Development and Trade.

Response

It is assumed that the number of jobs which will be filled by non-residents or in-migrant workers during the construction through to the third year of operations of the ANC newsprint mill will be as follows:

	Construction Period			Operation Period			
Year	1988	1989	1990[1]	1990[2]	1991	1992	1993
a) Jobs created							
direct	79	415	299	190	190	190	190
spin-off	330	330	330	450	450	450	450
total	409	805	629	640	640	640	640
b) Jobs filled by permanent immigrants							
direct	0	0	0	140	140	140	140
spin-off	100	100	100	150	150	150	150
total	100	100	100	290	290	290	290

It is assumed that permanent in-migrant workers will be accompanied by family members, with an average family size of 3.4 persons. Thus, in 1988 and 1989, the total number of in-migrants will be 340 persons in each year (i.e. 3.4 x 100), and from 1990 onward, the total number of in-migrants will be 1,000 approximately (i.e. 3.4 x 290). The average family size of the existing population in the study region is also 3.4 persons.

The in-migrant population is assumed to have similar demographic characteristics as that of the existing population which has a natural growth rate of 0.025 per year, i.e. when new births were subtracted from deaths each year, on the average, there are 2.5

(1) up to the second quarter of 1990

(2) starting from the third quarter of 1990

newly born for every 100 people added to the study region's population each year. The in-migrant population is adjusted to reflect this natural rate of increase. Therefore, an initial in-migrant population of 340 will increase to approximately 350 in the following year (i.e. 340 x 1.025).

The projected population of the study region with the ANC project is calculated by adding the in-migrant population to the expected population in the study region without the project.

ANC will maintain direct communication with appropriate agencies to provide forecasts on work force requirements. Forecasts will be revised periodically as implementation of the project progresses and every reasonable effort will be made to keep concerned agencies updated.

SECTION 12

HEALTH

Question 66

During the initial operation of the paper machine up to 15% semi-bleached kraft pulp could be used as a machine furnish (page 3-16). Please discuss the potential for chloro-organics and dioxins to be discharged in effluents or emissions. Provide flow diagrams with quantities as appropriate.

Response

Semi-bleached kraft pulp will be used by ANC for a period of about one year at a level approaching 15% of machine furnish. This will assist in machine start-up. The pulp will be purchased in bale form at about 84% BD (92% AD) consistency.

Pulp is very well washed prior to drying and baling and the level of any chlorinated phenolics or related compounds remaining with the saleable product would be extremely low, if even detectable at all. With subsequent repulping, dilution and washing at ANC, no detectable levels would be anticipated in the mill effluent.

As a result of studies conducted over the past several years, trace levels of dioxin (in the parts per trillion and parts per quadrillion range) have been detected in some chemical pulp mill effluents and paper products. There has been no indication to date that such levels are hazardous to human health or the environment. Epidemological studies conducted on people exposed to very high levels of dioxin due to industrial accidents and herbicide application-- Vietnam; Nitro, West Virginia; Times Beach, Missouri; and Seveso, Italy, to name a few-- have shown no long term health impact as a result of the exposure. The effects of dioxin on humans is effectively summarized by the following quotation excerpted from the document 'Dioxins and Furans: The Canadian Perspective', published by CCRFM in October 1987. "So far we only have conclusive evidence of one human health effect related to dioxin exposure-- a temporary, non-life threatening skin condition called chloracne. Based on the scientific evidence available today we cannot establish a conclusive link between human exposure to dioxins and long term effects such as cancer, coronary disease or abnormal reproduction."

Question 67

It is indicated that one-third of the required wood supply will be residual chips purchased from sawmills. Describe the measures ANC will take to ensure that these chips are not contaminated with preservatives such as pentachlorophenols.

Response

It is anticipated that a considerable volume of softwood chips will be purchased from sawmills. These chips are produced as residuals in the untreated lumber manufacturing operation. No chips will be purchased which have been treated with preservatives or chemicals, as they would disturb ANC's manufacturing process. Contracts with supply mills will specifically exclude contaminated chips.

Question 68

Please provide more details on domestic wastewater treatment and disposal e.g. and the nature, location and discharge destination for the package sewage treatment plant. If a septic tank and tile field is an option, site suitability should be discussed including reference to necessary approvals.

Response

During construction, sanitary sewage will be collected and stored in holding tanks at the site. Sewage from these tanks will be trucked to the Town of Whitecourt and discharged into the Town's sewage treatment facilities as required.

Sanitary sewage from permanent plant washrooms and lunch facilities will be collected separately from process effluent for treatment via a septic tank and perforated pipe absorption field in compliance with the Alberta Plumbing and Drainage Act. The field shall be installed such that it is located at a depth not less than 1.5 m vertical distance above the existing groundwater table. Septic tank and field sizing and materials will be in conformance with the Alberta Plumbing and Drainage Act. The system is proposed to be located on the east side of the site near the lunch and washroom facilities. The field will be located in the sand and gravel layer of the subsoil thereby allowing for the excellent percolation capabilities of this material. The clay till layer is expected to provide an impermeable layer reducing percolation into the permanent groundwater table.

Further testing will be conducted on the soil to determine percolation rates and required field size to accommodate the mill operating sewer load.

Ouestion 69

Please elaborate on anticipated incremental effects on wastewater loading from the Town of Whitecourt to the Athabasca River as a result of the population increase attributed to the ANC development.

Response

The increase in population size in Whitecourt attributable to the ANC development is predicted to be an additional 1100 persons by 1993 (total population - 8400). This will result, assuming approximately 100 gallons per day per person of sewage production, in an additional sewage loading of 110,000 gallons per day to the Town treatment plant. The treatment facility has a design capacity for approximately 8000 people but with upgrading, the capacity can be increased by 67%, or more than adequate capacity to handle the projected population increase.(1)

Hamilton et al.(2) found no evidence of increased loadings of nitrogen, phosphorous or coliform levels at Site A4, the closest monitoring station below Whitecourt, suggesting that current levels of sewage discharge are not having large downstream impacts. Some local enrichment is likely, but has not been documented, and it is considered very unlikely that the small increment in treated sewage volumes due to the ANC development will have any impact on the Athabasca River environment, or on downstream users.

(1) Yellowhead Regional Planning Commissions, 1987a. Whitecourt General Municipal Plan.

(2) Hamilton, H.R. M.V. Thompson and L. Corkum. 1985. Water quality overview of the Athabasca River Basin. Prep. for Alta. Env. Planning Division.

SECTION 13

PUBLIC CONSULTATION

Question 70

Outline the steps taken by ANC to ensure a review of the EIA by the public. Provide the results of the public review of the EIA. Document the concerns raised by the public and how the ANC has addressed these concerns.

Response

The EIA for the proposed ANC newsprint mill near Whitecourt was submitted to Alberta Environment on 16 May 1988 and copies were forwarded to downstream communities along the Athabasca River, health units, special interest groups and other Alberta government officials. Two copies were also placed in the Whitecourt Public Library. Total distribution, excluding ANC and NLK, was 90 copies, with breakdown as noted below:

	Number of copies
Alberta Environment	45
Downstream communities (incl. health units)	33
Special interest groups	5
Other Alberta Government personnel	7
Total	90

Copies of the covering letters accompanying distribution of the EIA were forwarded to Dr. A. Seifried or Ms. E. Cabral of Alberta Environment. The covering letter provided the address and phone number of the ANC office in Whitecourt, as well as a contact person to whom questions or comments could be addressed.

During the public meetings held to discuss the project, questions raised by those present were answered satisfactorily at the time, with two exceptions. These questions pertained to the potential for increased foaming in the Athabasca River due to ANC effluent (from Mayor Kluin, Village of Fort Assiniboine) and mercury levels in the Athabasca River (Councillor E. Yoder ID 17E, Smith). Both questions were answered by mail. Copies of the replies are included in Appendix 2.

Only one inquiry was received by ANC following distribution of the EIA. This came from Mr. L.H. Davies, Director of Environmental Health for the Lac Ste. Anne Health Unit in Stony Plain. Copies of the original inquiry and reply are included in Appendix 2.

Question 71

Provide a plan outlining how ANC will deal with public inquiries and concerns as the project proceeds.

Response

ANC has already opened offices in Whitecourt and Edmonton. It is expected that the public consultation process will continue as already established. Enquiries will be received at the various offices or through respective Government departments. ANC has the resources to respond to them in a thorough and expeditious way. Meetings with community council, official or special interest groups will be arranged as appropriate to deal with issues and concerns as they may be raised. For example, a public meeting has been scheduled with the Town of Athabasca for 4 August 1988 to specifically discuss impact of the project on Athabasca River water quality.

Question 72

ANC has been made aware of the public concern to increase efforts in recycling and in particular the need to address the feasibility to de-ink and recycle used newspaper. Please clarify your position on this matter.

Response

ANC is aware of the potential to use old newspapers and other waste paper as raw material for newsprint production. About 10 percent of current North American newsprint consumption is produced from recycled fibre. However, most of the existing waste paper based facilities are located in or near major population centres where relatively large tonnages of waste paper can be economically collected and transported to the point of use.

Current consumption of newsprint in Alberta is about 100,000 tonnes per annum, of which it is estimated that in the order of 75 percent is consumed in the major centres of Edmonton and Calgary. Potentially, about 30,000 tonnes per annum could be collected and recycled. A substantial portion of the potentially available paper is already being collected and used as raw material for paper and paper board manufacture. The economic size of an efficient de-inking system is in excess of 50,000 tonnes per annum. ANC will monitor the situation, however, and is prepared to incorporate paper recycling when and if it should become economic.

SECTION 14

ENVIRONMENTAL PROTECTION PLAN

Question 73

Provide a tabular summary of predicted impacts and proposed mitigative measures for the biophysical and socio-economic components. List irreversible adverse impacts i.e. residual impacts. Provide, if possible, a quantitative forecast of each residual impact having regard for magnitude, duration (timing), extent (geographic distribution), level of confidence and range of uncertainty of the predicted changes. Terms used to describe the significance of project-induced changes e.g. major, short-term, regional, minimal should be unambiguously defined.

Response

Potential Impact	Mitigation
Atmospheric	
- Particulate emissions during upsets	- Regulated fuel flow; burner maintenance
- Fog, water vapour	- Appropriate site selection
Aquatic	
- Reduced DO under extreme low flows	- Effluent storage, reaeration
- Toxic effluents	- Aerobic secondary treatment - In-plant control systems
- Surface runoff	- Runoff retention pond
- Groundwater contamination	- Lined ponds and landfills, dyked storage tanks
Terrestrial	
- Wildlife habitat loss	- Provision of buffer areas

Residual Impacts

Water Quality

The addition of any effluent, including municipal sewage, will reduce water quality somewhat from pristine conditions. The primary impact from the ANC effluent will occur during low flow periods in winter. This impact is considered to be minor (i.e. does not reduce the value of the resource below publicly acceptable levels), medium-term (i.e. over the life of the project) and regional (i.e. extends downstream beyond Whitecourt).

Landfill

Development of a landfill for solid wastes will remove a small area from other development while the landfill remains active. This impact is also considered to be minor, medium-term, as the site can be reclaimed, and, since the landfill will be designed to prevent surface runoff or groundwater contamination, site-specific.

Mill Site

Development of the mill site will also remove this area from other development (e.g. gravel) and eliminate a small area of wildlife habitat. As with the landfill, these impacts are considered to be minor and medium-term. Some impacts from the mill site, such as noise, will extend slightly beyond the site boundaries, and therefore are considered to be local (i.e. confined to the general Whitecourt area) rather than site-specific.

Infrastructure

The ANC project will place some pressures on the existing Whitecourt infrastructure (e.g. sewage treatment). However, these social/economic costs are generally greatly offset by the project economic benefits. Therefore any residual socio-economic impacts would be considered minor, short-term (i.e. can be resolved within 5 years of development), and local.

Question 74

Provide additional details on monitoring. Consider both source and ambient monitoring. Identify monitoring work needed with reference to 1) air quality and water quality, 2) public concerns and, 3) the performance of mitigative measures.

Response

Suggested Monitoring Program - Air Quality

As previously noted, modelling results show that SO_2 and NO_x emissions from the proposed mill are predicted to be well below Alberta Environment ambient air quality guidelines. Based on these predicted levels, it is not envisaged that there will be any requirements for continuous emission monitoring.

However, after mill start-up and as part of the License to Operate, it is anticipated that stack testing will be conducted on the package boiler and the glycol/water heater to determine prevailing levels of oxides of nitrogen and sulphur oxides. As previously noted, modelling of these emissions has indicated that ground level concentrations of these contaminants will be well within Alberta guidelines, and ambient monitoring should not be required.

Due to the physical nature of the wood waste incinerator, it is not practical or normally required to conduct regular source monitoring.

To monitor the ambient levels of particulates from the wood waste incinerator, it is anticipated that selected dustfall and total suspended particulate (TSP) sampling will be required. Typical dustfall sampling would be conducted on the property boundary while TSP sampling would typically consist of a sampler located off-site between the incinerator and a designated receptor (i.e. the Town of Whitecourt). Specific ambient monitoring would, however, be negotiated as part of the License to Operate under the Clean Air Act.

Suggested Monitoring Program - Water Quality

A routine water quality monitoring program will be developed to assess the chemical constituents in the mill effluent and to ensure that no environmental risks are occurring. The proposed parameters to be measured, the type of samples collected, he location where samples will be collected and the frequency of sampling are shown in Table 74-1.

The relative toxicity of the wastewater will be assessed using rainbow trout in a 96 hour bioassay. Since the Alberta criteria for this test are more stringent than the Federal guidelines, the Alberta standards will be used. In addition, chronic (i.e. long

term) direct impacts in the river environment will be assessed by monitoring benthic invertebrate community structure (biomonitoring).

The format of biomonitoring programs in Alberta has been will established. Sampling stations will be located both upstream (background sites) and at several points well downstream (impact and recovery sites) from the ANC wastewater outfall. Physical parameters at each site (e.g. depth, velocity, substrate) will be standardized. Five replicated samples of the benthic invertebrate community will be taken at each site. A number of descriptive statistical techniques will be used to determine the extent of differences between communities and patterns in community structure. In addition to the traditional indices (e.g. diversity), the data will be analyzed using ordination techniques (e.g. reciprocal averaging, principal component analysis) and pattern recognition techniques (e.g. cluster analysis. Trophic guild analysis will also be used to complement these findings.

ANC will monitor river flow conditions in the late winter periods. Flows will be obtained from Alberta Environment (Flow Forecasting) on a weekly basis and compared to the calculated 7Q10. During very low flow conditions, river oxygen levels will also be monitored. The extent of this program, and the responsible agency will be determined in discussion with Alberta Environment.

Public Concerns

ANC will continue to be responsive to public concerns over the life of the project. A response will be provided in a timely fashion to all concerns addressed to ANC by either telephone or mail. Wherever necessary, follow-up contact will be made to ensure that the concern has been adequately addressed.

Performance of Mitigative Measures

ANC will monitor the effectiveness of any environmental mitigation programs undertaken. In addition, during plant upsets that have a potential for significant changes to air or water emissions, additional monitoring of a scope and nature appropriate to the event will be initiated. The performance of mitigative measures will be detailed to the Alberta government, using a reporting format established in the License to Operate.

Table 74-1: Suggested Effluent Monitoring Program - Water

Parameter	Sample Type	Location	Frequency
BOD_5	24 hr. composite	pond influent	3 consecutive days/week
	24 hr. composite	pond effluent	3 consecutive days/week
TSS	24 hr. composite	pond influent	daily
	24 hr. composite	pond effluent	daily
Resin Acids	24 hr. composite	pond effluent	every 12 months
Toxicity	24 hr. composite	pond effluent	every 3 months
Heavy Metals	24 hr. composite	pond effluent	every 12 months
Nutrients (N,P)	24 hr. composite	pond effluent	every month
Dissolved Oxygen	-	pond effluent	continuous
pH	-	pond effluent	continuous
Flow	-	pond effluent	continuous
Colour	24 hr. composite	pond effluent	3 consecutive days/week
TON	grab	pond effluent	every 2 weeks
Temperature	-	pond influent	continuous
	grab	pond effluent	daily
Benthic	-	Athabasca River	as required by water licence

Question 75

Outline the monitoring to be carried out by the proponent including objectives and a list of parameters and locations to be used. Discuss what action ANC will take to mitigate any problems and/or impacts determined as the result of monitoring. Discuss how proposed monitoring such as regular benthic macroinvertebrate surveys will be interpreted to establish whether any chronic impacts are occuring on the aquatic microorganisms.

Response

See response to Question 74.

Question 76

Please outline your contingency plan if the dye studies referred to page 4-7 do not confirm the dispersion model.

Response

The proposed diffuser design is a well proven configuration. There is considered to be little risk that it will not disperse the effluent effectively. If, however, diffusion should not prove to be adequate, the original design will be reassessed, effective remedial measures will be defined and modifications will be made as required.

Ouestion 77

Please provide more detail on the contingency systems and procedures for the management of emergency/upset conditions,

Response

A detailed contingency and emergency response plan will be prepared and submitted to the Standards and Approvals Branch of Alberta Environment prior to finalization of a License to Operate. The approved plan will be incorporated in the License conditions. This procedure is outlined in the Action Plan for Environmental Law Enforcement in Alberta.

APPENDIX 1

EIA REVIEW LETTER

FROM ALBERTA ENVIRONMENT

Alberta
ENVIRONMENT
Environmental Protection Services
Environmental Assessment Division
7th Floor, Oxbridge Place, 9820 - 106 Street, Edmonton, Alberta, Canada T5K 2J6 403/427-6209 Telex 037-2006, TWX 610-831-2636

15 July 1988

Mr. Ron Stern
Managing Director
Alberta Newsprint Company Ltd.
c/o Nystrom, Lee, Kobayashi & Associates
2130 West 12th Avenue
VANCOUVER, British Columbia
V6K 2N3

Dear Mr. Stern:

Re: Alberta Newsprint Company Ltd. (ANC)
Whitecourt Newsprint Mill
Environmental Impact Assessment (EIA)

The EIA report submitted on May 16, 1988 has been reviewed by the Alberta government with input from the federal government through Environment Canada. The results of this review were discussed with your representatives on June 28 and July 7, 1988. The enclosed additional information is identified as necessary to complete the EIA report. Specific attention to the discussions of effluent treatment and water quality in the Athabasca River is required.

Alberta Environment appreciates your willingness to respond to public concerns. ANC should continue to provide the public with an opportunity to review the EIA report, and the public should be kept informed of the concerns which are being addressed. I would appreciate confirmation of where copies of the report are available for review, and how ANC plans to obtain public comment during this review phase.

If you have any questions or wish to discuss project requirements further, please contact Mrs. Anke Seifried at (403) 427-6224.

Yours truly,

F.J. Schulte
DIRECTOR

Attachments

cc: N. Tywoniuk
D. Fromson
J.A. Brennan
K.R. Smith

ALBERTA NEWSPRINT COMPANY LTD. (ANC)
WHITECOURT NEWSPRINT MILL
ENVIRONMENTAL IMPACT ASSESSMENT

Information deficiencies in the EIA are as follows[1]:

Biochemical Oxygen Demand (BOD)/Dissolved Oxygen (DO)

1) As requested on March 21, 1988 please provide an assessment of the environmental impacts associated with an effluent discharge to the Athabasca River of 5.0 kg of biochemical oxygen demand (BOD_5) per Finished Metric Ton or a lower figure if dissolved levels in the river can not be maintained above 5 mg/L under low flow conditions (7Q10).

2) ANC has calculated 7Q2 and 7Q10 flows of 38.6 m^3/sec and 30.4 m^3/sec respectively. These vary from flows of 36.7 m^3/sec and 29.0 m^3/sec calculated by Alberta Environment ("Athabasca River Basin Low Flows Analysis", 1984). Please explain how the flows on page 5-2 were calculated and why the low flows of Alberta Environment were not used.

3) Please provide a graph and text comparing the anticipated range in BOD loadings entering the wastewater treatment system with the BOD_5 concentrations in the final effluent discharged. The range should include the worst case conditions as well as those customarily observed in the industry. Discuss what seasonal variation may be expected in effluent quality.

4) Please explain how the BOD decay rates in Table 4 (in Appendix 1 - page 3-8) were developed and why March sampling data were used to calibrate the model instead of the February data. Provide an update for predicted DO levels under 7Q10 conditions using the February 1988 data.

5. With respect to predictions of DO levels in the river (page 5-7), provide further detail on the model used in the assessment including the sensitivity of the modelling and confidence limits. Discuss the margin of safety under worst case conditions. Please comment on the need to use a higher ultimate BOD than permitted by the model. Comment on the significance of biological enrichment due to the nutrients and biosolids to be discharged from the mill. Provide an estimate and discuss the DO demand caused by this additional enrichment.

6) Decomposition of effluent biosolids in the receiving environment can contribute both carbonaceous and nitrogenous oxygen demand. Please discuss to what extent the latter has been considered in the predicted BOD_5 in Table 4-1.

7) On page 5-5 and in Table 5-3 information on background BOD levels is provided. Please clarify: (a) at what time of the year background BOD levels of 1.0 mg/l were measured, (b) what the background BOD levels are predicted to be at the 7Q10 flow of 30.4 m^3/sec and at the mean flow of 253 m^3/s, and (c) what the final BOD concentrations in the river are at the 7Q10 flow and at the mean flow.

1 All references are to the Main report unless noted.

Total Suspended Solids (TSS)

8) Please provide more specific information on the usual values for TSS concentrations of the aeration pond effluent.

9) Please clarify the apparent discrepancy between the reference in Appendix 1 to the The National Council of the Paper Industry for Air and Stream Improvement Study, i.e. NCASI, 1982 that indicates high BOD decay rates for only 10% of the effluent's total BOD (Appendix 1 page 3-5) and the assumption on page 3-9 of Appendix 1 that suggests most of ANC's effluent's BOD would have a high decay rate.

10) Please explain at what loading TSS will increase by 7.1 mg/L (Appendix 1, page 5-7, 4th paragraph).

11) On page 4-5 of Appendix 1 it is stated that following final dilution the ANC and Millar Western Pulp Ltd. (MWPL) TSS loadings would not meet the Canadian Water Quality Objectives for the 7Q2 flow and that the ANC loadings alone would not meet theobjectives at extreme low flows. Please provide the justification and supporting evidence for the conclusion that these suspended solid levels will have no impact on the river at winter flows. What mitigative measures does ANC propose to undertake to minimize or eliminate these potential exceedences.

Other Parameters

12) Discuss the following and their anticipated influence on water quality; please provide the anticipated concentrations and loadings for total phenolics, metals (manganese and zinc in particular), tannins, and lignins. Consider the influence of low flows when discussing their environmental impacts. Outline, as appropriate plans for mitigation and monitoring.

13) Please identify the source of the aluminum in the effluent (referred to on 4-2 of Appendix 1). On page 3-22 of the main report it indicates that clarifier sludge will be dewatered and disposed in a landfill.

14) Provide further information on alum discharges, their impact on water quality in the mixing zone and downstream (page 4-12). Consider variation in background water quality as well as seasonal variation in effluent quality.

15) In the Process Block Diagram on page 3-14, Diethylene Triamine Penta Acetic Acid is shown as the chelating agent, while in the Appendix, Ethylene Diamine Tetra Acetic Acid is indicated. Please clarify which agent is to be used and elaborate on its environmental significance.

16) The effluent concentrations for nitrogen and phosphorus in Table 4 (page 4-4) seem high compared to other mills. Provide justification for the values indicated. Discuss how nutrients will be monitored and outline contingency plans to deal with problems associated with excess nutrients.

17) On page 5-11 it is indicated that effluent discharge will result in total phosphorus (TP) downstream exceeding Alberta Surface Water Quality Objectives. Please discuss potential impacts in more detail including the mitigation measures ANC will undertake if excessive enrichment is identified downstream. Discuss the availability of TP in the effluent versus the naturally-occurring TP in the river.

18) Please address the degree of nitrification that might occur in the Aerated Stabilization Basin (ASB). It appears additions of nitrogen and phosphorous are planned at an approximate C:N:P ration of 88:6:1 to enhance biological activity.

19) Please provide further elaboration on the use of slimicides (page 3-21). Provide flow diagrams with quantities as appropriate. Discuss if slimicides are biodegradable and identify any impacts on the ASB.

20) Please provide the sodium sulphite usage rate and percentage (page 3-19, second last paragraph).

21) Please provide the justification for the company's confidence to keep sodium levels to the levels anticipated in the effluent (Appendix 1-page 4-7).

22) In view of the wide discrepancy in colour estimates of Simons and HydroQual, please discuss what range of values may be expected during ANC's actual operation (Appendix 1-page 4-6). How far, if at all, downstream will these colour values be observed. Consider seasonal variation in effluent discharge and seasonal variation in flow and mixing of the Athabasca River.

Seasonal Water Quality

23) Please confirm whether Table 5-2 (page 5-3) is based on summer data only (May-October). If yes, this is not considered a valid comparison base for low flow impacts. Please provide data on low winter flow and assess the water quality impacts expected at these low winter flows. With reference to the parameters listed in Table 5-2 on page 5-3, please provide further discussion of the effects of seasonal fluctuations in water quality.

24) Provide additional qualitative information on the design and operation of the wastewater treatment system. For example, the measures to be taken to maintain high performance. Discuss how the effects of factors such as seasonal climatic conditions, wood species, and machine furnish have been considered with respect to waste volumes, hydraulic loading and treatment efficiencies.

25) Elaborate on the seasonal variation expected in effluent quality and compare this with the seasonal variation anticipated in the Athabasca River. Consider the parameters listed in Table 5-2 (page 5-3) and those listed in Question 12.

26) Please clarify whether data in Table 1, Appendix 1, are from the February or March sampling program and what assumptions were used in estimating ice free zones below the pulp mills.

27) The open water reach measured below Champion in February 1988 was 9 km. Explain the rationale for the 15 km lead referenced in discussion of Champion on page 3-11 of Appendix 1. Comment on whether 15 km is typical of open water reaches in that area during periods of extremely low temperatures. Also provide some additional explanation of the procedures used to calculate the open water reaeration rate.

28) The effluent temperature is anticipated to be between 30-35°C. No seasonal variation was given. Please clarify.

29) Provide further details on: (1) the effluent diffuser, and (2) the characteristics of the mixing zone. Provide quantitative estimates of the length of the mixing zone for a full range of river flows under open water and ice conditions. Describe how the estimates were calculated including assumptions made. Consider the effects that river morphology, notably the number of islands and side channels in the river below the site, will have on the size and shape of the mixing zone.

Fisheries

30) Provide further information on the effect of the effluent diffuser on fish. Will the channel diffuser be placed in the main river channel or a secondary side channel? Discuss the quality of the effluent in the mixing zone during plant operation and its impact on fish. Consider seasonal variation in river flows and effluent quality. Address the extent and duration of the area of fish avoidance. Indicate the area and percentage of the river width affected. Consider the influence of both the ANC and the Millar Western diffusers. Refer to the modelling studies of ANC and Millar Western as appropriate. Outline ANC's plans to verify the results of modelling including a proposed schedule.

31) Please confirm how the proposed water intake will meet the Alberta Fish and Wildlife Guideline No. 10 for these types of structures (copy attached).

32) Please elaborate on the proposed use of a hot water line to prevent frazzle ice problems. Please discuss if this water will have been chlorinated, will contain other chemicals toxic to fish, and if it will be released to the river.

33) Please provide evidence in support of the statement on page 4-6, second last paragraph, that kraft mill effluent is potentially more toxic than CTMP effluent - with particular reference to the 96 hr. LC_{50}.

34) Please identify any potential spawning habitat or other critical habitat in the vicinity of the water intake, effluent diffuser, the mixing zone, and the rail bridge.

Land Use/Reclamation

35) Elaborate on the extent, nature and volume of commercial quality aggregate on the site, including the quantities that could be sterilized by this development.

36) Please confirm that soils will be salvaged for future use.

Groundwater Protection and Spills

37) Discuss the prevention of groundwater contamination as a result of runoff or seepage from the process area and other areas such as wood storage and chip piles. Clarify local groundwater conditions. Briefly summarize mitigative measures and outline a general plan for groundwater montoring at the mill site.

38) Identify all chemical storage and operating locations that will be lined to ensure confinement of deleterious substances.

39) Please provide a conceptual water management and surface drainage plan for the site including the log storage and chip storage areas. Include information on the factors that will be considered in the design of any ponds or drainage structures. Identify pertinent approval processes as appropriate. Address the need to integrate surface drainage with the wastewater treatment system to prevent groundwater contamination or prevent contaminants such as wood resins from entering natural water courses.

40) Please provide additional information on the prevention, control and management of chemical and process spills inside and outside of buildings at the mill site. Describe disposal procedures for contained spills.

Solid Waste Management and Disposal

41) Provide further details on solid waste handling and disposal. Comment on the general suitability of the proposed mill area for an on-site landfill and the approach that would be follows to protect groundwater. Where are the most likely locations for am an on-site landfill and/or an off-site landfill?

42) Provide additional details on the proposed plans to dispose of dewatered water treatment sludge in the landfill. Please include information on management of sludge dewatering liquid or leachate from the landfill.

43) The sludge from the effluent clarifier will be incinerated along with rejects from the chip screening (page 4-17). Will incineration be continuous or will the sludge be stored?

Air Quality

44) Provide a windrose and a STAR data summary for the Whitecourt area and discuss their implications for dispersion.

45) Building wakes will affect air quality and therefore must be included in the dispersion calculations. Use the SEEC model or the EPA-ISC model for both SO_2 and NO_x emitters.

46) Re-run the dispersion model using the STACKS2 program. The version used has been superceded by STACKS2.

47) Stack 3 may have a serious stack aerodynamic downwash problem. Discuss the implications of this in terms of air quality.

48) Please provide information on the expected frequency of conditions where fog formation would occur with fog transport occurring perpendicular to the river valley.

59) Please provide additional information on emissions under upset conditions - such as plant start up/shut down, control equipment failure, and process equipment malfunction. Elaborate on mitigative measures as appropriate.

50) Please discuss the variation in emissions, if any, that is anticipated, for example regular day/night variation or seasonal variation.

51) Please discuss how odour studies and fog studies at Quesnel, B.C. are applicable to this site (presumably there may be different emission rates, different dispersion characteristics, different distances from the community to the mill and different terrain and vegetation). Provide copies of any reports referenced.

52) On page 5-14 it suggests that small quantities of "turpentine and other odorous gases" may exist in the waste steam and these would be routed to the waste heat recovery system. Discuss what happens to the waste steam when the heat recovery system is off line. If direct venting to atmosphere is planned please address the need for a secondary control system for those time periods when the waste heat recovery system is down.

53) Please discuss ANC's preferred choice of "smokeless burner" and any alternatives considered with particular reference to burner characteristics during start up, periods of erratic feed and flyash. Also indicate if the quantity of feed material is sufficient to justify a hog fuel heat recovery system.

54) Please discuss how the particulate emissions data for the wood waste incinerator reported in Table 10 of Appendix 2 (page 13) were obtained i.e. the sampling technique used. Actual test results for the unit sampled should be provided.

Transportation and Utilities

55) Discuss the need for special measures at the junction of Highway 43 near the mill site in order to ensure the safe turning of vehicles.

56) Summarize the demands for transportation infrastructure associated with mill operation and the need for further road improvments. Include discussion of the financial implications of the infrastructure required and who would be responsible for their development.

57) Using text and tables as appropriate, identify and discuss the environmental factors considered in the selection of corridor, preferred route and alignment of the rail spur including the crossing of the Athabasca River. For example, terrain, hydrology, wildlife/fisheries, vegetation, cultural resources, recreation/land use, operational constraints.

58) Discuss concisely the potential environmental effects associated with the rail spur and bridge and analyze their significance with respect to factors such as magnitude, duration and geographical extent. Consider the operation and maintenance phase as well as the construction phase.

59) Provide an environmental protection plan to minimize and/or mitigate any adverse effects during construction and operation of the rail spur. Identify those adverse impacts that cannot be satisfactorily resolved (i.e. the residual impacts after mitigation) and analyze their implications.

60) Discuss the feasibility of minimizing environmental impacts by locating linear facilities such as the electrical transmission line, the gas service line, access road, and rail spur in corridors.

Socio-Economic

61) Estimate (as a percentage) the Alberta, other Canadian, and foreign content for engineering and project management, and for equipment and materials.

62) Outline the procurement strategy to be utilized on the project. How will the proponent identify, prequalify and assess Alberta bidders?

63) Briefly summarize the local business opportunities in the region that may arise from the construction and operation of the mill eg. materials and services that could be provided locally.

64) Define the terms used in the discussions on employment e.g. direct jobs created by ANC, and spin-off jobs.

65) Please explain in more detail how the figures for permanent in-migrants associated with ANC shown in Table 3.4, page 43 of Appendix 4 were derived and how they were used to forecast the population projections for Whitecourt.
Please confirm that ANC will continue to provide updated forecasts of workforce requirements to appropriate community groups, local authorities and Alberta Career Development & Employment, Alberta Municipal Affairs, and Alberta Economic Development and Trade.

Health

66) During the initial operation of the paper machine up to 15% semi-bleached kraft pulp could be used as machine furnish (page 3-16). Please discuss the potential for chloro-organics and dioxins to be discharged in effluents or emissions. Provide flow diagrams with quantities as appropriate.

67) It is indicated that one-third of the required wood supply will be residual chips purchased from sawmills. Describe the measures ANC will take to ensure that these chips are not contaminated with preservatives such as pentachlorophenols.

68) Please provide more details on domestic wastewater treatment and disposal e.g. and the nature, location and discharge destination for the package sewage treatment plant. If a septic tank and tile field is an option, site suitability should be discussed including reference to necessary approvals.

69) Please elaborate on anticipated incremental effect on wastewater loading from the Town of Whitecourt to the Athabasca River as a result of the population increase attributable to the ANC development.

Public Consultation

70) Outline the steps taken by ANC to ensure a review of the EIA by the public. Provide the results of the public review of the EIA. Document the concerns raised by the public and how the ANC has addressed these concerns.

71) Provide a plan outlining how ANC will deal with public inquiries and concerns as the project proceeds.

72) ANC has been made aware of the public concern to increase efforts in recycling and in particular the need to address the feasibility to de-ink and recycle used newspaper. Please clarify your position on this matter.

Environmental Protection Plan

73) Provide a tabular summary of predicted impacts and proposed mitigative measures for the biophysical and socio-economic components. List irreversible adverse impacts i.e. residual impacts. Provide, if possible, a quantitative forecast of each residual impact having regard for magnitude, duration (timing), extent (geographic distribution), level of confidence and range of uncertainty of the predicted changes. Terms used to describe the significance of project-induced changes e.g. major, short-term, regional, minimal should be unambiguously defined.

74) Provide additional details on monitoring. Consider both source and ambient monitoring. Identify monitoring work needed with reference to 1) air quality and water quality, 2) public concerns and, 3) the performance of mitigative measures.

75) Outline the monitoring to be carried out by the proponent including objectivesand a list of parameters and locations to be used. Discuss what action ANC will take to mitigate any problems and/or impacts determined as the result of monitoring. Discuss how proposed monitoring such as regular benthic macroinvertebrate surveys will be interpreted to establish whether any chronic impacts are occurring on the aquatic microorganisms.

76) Please outline your contingency plan if the dye studies referred to page 4-7 do not confirm the dispersion model.

77) Please provide more detail on the contingency systems and procedures for the management of emergency/upset conditions.

FISHERIES HABITAT PROTECTION GUIDELINES

Guidelines No. 10 Date: December, 1982

CONCERNING: WATER INTAKES: SCREENING REQUIREMENTS FOR FISHERIES

INTENT: To prevent the loss of fish or fish fry due to water diversion schemes of any type.

GUIDELINES: These guidelines are for intake structures with stationery screens.

1. SCREEN MATERIAL: The screen material shall be made of a durable material such as aluminum, stainless steel, brass or bronze.

2. Screen Mesh Size: Clear openings of the screen (the space between strands) shall not exceed 0.375 in. (9.5 mm) square in waters frequented by salmonids and 0.5 in. (12.7 mm) square in waters frequented by warm water species. Square-mesh wire cloth with 0.25 in. (0.64 mm) diameter wire is recommended.

3. Approach Velocity: On the approach to the intake, the velocity shall not exceed 1.5 ft. per sec. (0.46 m per sec.) across the face of the screen. The entire screen area should be constructed below the minimum water level.

4. Screen Support: The screen shall be adequately supported with stiffeners or "back-up" material to prevent excessive sagging.

5. Screen Protection: The intake structure shall, where necessary, be equipped with a trash rack or similar device to prevent damage to the screen from floating debris, ice, etc.

6. Screen Accessibility: The screen shall be readily accessible for cleaning and inspection. (Screen panels or screen assemblies which cannot be removed for cleaning, inspection and repairs should be avoided.)

7. Allowable Openings: The portion of the intake structure which is submerged at a maximum water level shall be designed and assembled such that no opening exceed 3/8 (0.375) in. in width.

8. Design and Location: The design and location of the intake structure shall be such that a uniform flow distribution is maintained throughout the total screen area. Also, the intake should most often be located in the deepest part of the river.

BACKGROUND: Screens with the above specifications are applicable to relatively small diversions including pump intakes and are most suitable with a submerged intake. Large diversions, particularly surface diversions, present difficult cleaning problems and will generally require special consideration, perhaps involving a self-cleaning type screen. In many circumstances it is acceptable to eliminate screening requirements if the approach velocity (measured at the river or lake intake) does not exceed 0.75 fps. (0.23 m.p.s.).

**One cubic foot per second = 450 U.S. gallons per minute.
= 375 Imperial gallons per minute.

Screening of fish may take the form of either a physical or a behavioural block; the former is the method used by these guidelines. Factors to consider include swimming ability salmon fry may be affected by velocities greater then 0.4 fps. (0.12 mps.), physical size of the fish salmon fry are stopped by sizes less than 0.10 in (2.5 mm) and behavior.

In the provinces of British Columbia, Manatoba, Saskatchewan and Alberta, the Northwest Territories and the Yukon Territory, every ditch, channel or canal constructed or adapted for conducting water from any lake, river or stream, for irrigating, manufacturing, domestic or other purposes, shall in the Minister deems it necessary in the public intrest, be provided at its entrance or intake with a fish guard or a metal or wire grating covering or netting, so fixed as to prevent the passage of fish from any lake, river or stream into such ditch, channel or canal.

Such fish guards shall have meshes or holes of such dimensions as the Minister may prescrible, and shall be built and maintained by the owner or occupier of such ditch, channel or canal, subject to the approval of the Minister or of such officer as he may appoint to examine it.

The owner or accupier of such ditch, channel or canal shall maintain such fish guard in a good and efficient state of repair, and shall not permit its removal except for renewal or repair and during the time such renewal or repair is being effected the sluice or gate at the intake or entrance shall be closed, and the passage of fish into the ditch, channel or canal prevented.

IMPLEMENTATION: Presently the Division places appropriate clauses under authorities issued pursuant to the Public Lands Act and Water Resources Act. The procedure shall continue as is. Screening of the irrigating system intakes has not been a policy of the Fish and Wildlife Division.

LEGISLATIVE REFERENCES: Fisheries Act (Canada) Section 28
Water Resources Act, Section 6 and 11
Public Lands Act, Section 20

APPENDIX 2

PUBLIC PARTICIPATION CORRESPONDENCE (ADDITIONAL)

ALBERTA ENVIRONMENT

Alberta Newsprint Company Ltd.

May 25, 1988

Dr. Anke Seifried, Coordinator
Environmental Assessment Division
Alberta Environment
11th Floor, Oxbridge Place
9820- 106 Street
EDMONTON. Alberta
T5K 2J6

Dear Dr. Seifried

Subject: Community Contact List

The purpose of this letter is to record contacts that were made as a part of the public consultation program where a follow-up meeting was not held; and certain exceptions where contacts were not made.

1. Contacted Mr. Alan Charles, Manager of the County of Barrhead on April 20th. Mr. Charles was familar with the public consultation process. He was given information on the proposed newsprint project. This would be referred to the Council and if they wished to have a meeting I would be contacted.

   Subsequently, a letter was received from the County of Barrhead, a copy of which was included in the Appendices to the EIA. It stated that they had no objection to the proposed mill provided all federal and provincial codes related to pollution were complied with.

2. On April 15, 1988 contacted Chief Robert Cree of the Fort McMurray Band, Clearwater Station, near Fort McMurray. A meeting was proposed but Chief Cree stated that they obtained their water supply from Gregoire Lake and thus they were not affected by the water quality in the Athabasca. He asked about air emissions from the proposed mill. Upon being advised that they were very low and limited to gas fired boiler flue gas, combustion of wood waste and water vapour, he stated they had no concerns about levels of pollution and saw no need for a meeting.

3. Of the licensed downstreams water users, those in the Fort McMurray area were contacted on April 26th and extended an invitation to attend the joint meeting to be held in the City Hall at Fort McMurray on April 29th. These included the following:

   - Suncor. Spoke with Mr. Don Klymm, Manager of Environmental Affairs. They were not concerned but may send a representative.
   - Syncrude Canada Ltd. Spoke with Mr. Don Thompson, Manager of Environmental Operations and Affairs. They were not concerned but may send a representative.

- Conmac Western Industries. Spoke with Bob Rayburn, Operations Supervisor. They only used the river water for gravel washing. They were not concerned and would not attend.

- Fort McMurray Golf Club. Attempted to contact Mr. Don Larson at his place of work but he was not available. Information was left as to the purpose of the phone call with a request that Mr. Larson attend the meeting or phone back. No phone call was received.

  Arising from these contacts, two representatives from Syncrude attended the City of Fort McMurray meeting. No other licensed downstream water users were contacted. However, the town of Athabasca and the City of Fort Mc Murray were covered by meetings held with their councils or representatives.

4. With respect to the Health Units, a meeting was held with the Fort McMurray Health Unit. The Athabasca Health Unit attende the Athabasca joint meeting. Ed Najdziak, Public Health Inspector for the Stony Plain-Lac Ste Anne Health Unit based in Whitecourt attended the Whitecourt Council, Department Heads and Committee Chairman Meeting held on May 3, 1988.

   A copy of the EIA will be mailed to the following:

   - Dr. Roy Corns, Medical Officer of Health
     Stony Plain-Lac Ste Anne Health Unit,
     Stony Plain, Alberta

   - Dr. Kenneth Hodgins, Medical Officer of Health
     Sturgeon Health Unit
     St. Albert, Alberta

   - Gizela Chizik, Public Health Inspector,
     Barrhead Health Unit,
     Barrhead, Alberta

For your information the following changes were noted in the Community Contact List, February 15, 1988 as supplied to us:

1. Municipalities

   - Village of Fort Assiniboine

     Brenda Strawson resigned as mayor. Elections were being held at the time of our meeting.

2. Improvement District and Counties

   - I.D. 17E, Slave Lake

     The new manager is Mr. Bill Willows

3. Indian Bands

Fort Chipewyan Band, Fort Chipewyan

The new chief is Pat Marsel.

On behalf of the Alberta Newsprint Company, I would like to thank you and your staff for the cooperation extended to us throughout the public consultation program.

Yours very truly,

ALBERTA NEWSPRINT COMPANY LIMITED

Elmer M. Berlie, P. Eng

Environmental Coordinator

EMB/EB

cc: Mr. D.A. Fromson
NLK -Vancouver

WHITECOURT PUBLIC MEETING

WHITECOURT STAR APRIL 6th and 13th Editi

Alberta Newsprint Company Ltd.

PUBLIC MEETING

Alberta Newsprint Company extends an invitation 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

Alberta Newsprint Company Ltd.

May 18, 1988

Bud Winger
Manager
Town of Whitecourt
P.O. Box 509
WHITECOURT, AB
T0E 2L0

Dear Mr. Winger:

On behalf of Alberta Newsprint Company Ltd. thank you very much for arranging for Council, your department heads and various representatives to attend the meeting held in the Lower Banquet Room of the Whitecourt Motor Inn on May 3rd.

The review of the socio economic section of our EIA at that time was most helpful.

We would also like to take this opportunity of thanking the Council and staff for their participation at the public meeting on April 21st and for the assistance rendered to our consultants in preparing the EIA. This has been much appreciated.

Yours sincerely,
ALBERTA NEWSPRINT COMPANY LTD.

Elmer M. Berlie, P. Eng.
Environmental Co-ordinator

EMB/lk

xc: Bill McPhee
Director of Development and Works, Whitecourt, AB

: Mayor Helmut Kreiner
Town of Whitecourt

: Doug Fromson, P. Eng.
Nystrom, Lee, Kobayashi & Associates
Vancouver, BC

5109 — 50th Street, P.O. Box 2098, Whitecourt, Alberta T0E 2L0 (403) 778-3857

IMPROVEMENT DISTRICT 15

Alberta Newsprint Company Ltd.

5109 - 50th Street, P.O. Box 2098
WHITECOURT, ALBERTA
T0E 2L0 PH: 778-4222

April 21, 1988

Mr. Rudy Goettel
Manager
I.D. 15
Provincial Building
WHITECOURT, AB
T0E 2L0

DELIVERED BY HAND

Dear Mr. Goettel:

This is to confirm my telephone conversation of April 12th indicating that Alberta Newsprint Company Ltd. intends to meet with officials of the Town of Whitecourt, the I.D. and all communities downstream of Whitecourt on the Athabasca River.

As a part of this program we expect to meet with you and the I.D. Advisory Board at 9:30 a.m. April 22nd, in the I.D. offices. 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.

cc: Brian Bietz
Beak Consulting Ltd.

: Doug Fromson, P. Eng.
Nystrom, Lee, Kobayashi & Associates

CITY OF FORT MCMURRAY

IMPROVEMENT DISTRICT NO. 18 (N)

SYNCRUDE CANADA LTD.

Alberta Newsprint Company Ltd.

5109 - 50th Street, P.O. Box 2098
WHITECOURT, ALBERTA
T0E 2L0

April 14, 1988

Mr. Robert Byron
Chief Administrative Officer
City of Fort McMurray
9909 Franklin Avenue
Fort McMurray, Alberta
T9H 2K4

Dear Mr. Bryon:

This is to confirm my telephone conversations of April 13th and 14th with Marilyn Ham, 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 we expect to meet with your group at 9:30 a.m. April 29th, in the Third Floor Board Room of City Hall. At that time we will present an introduction to our newsprint mill project and address any concerns you may have.

If we find it necessary to change the date or time of this meeting, you will be advised as soon as possible. Likewise, if you find that a change is required, please contact me as early as you can at 778-3857 or 778-4222.

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 21, 1988

Mr. Leo Bourassa
Manager
I.D. 18 and 24
Provincial Building
9915 Franklin Ave.
FT. MCMURRAY, AB
T9H 2K4

Dear Mr. Bourassa:

This is to confirm my telephone conversations of April 14th 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 your representatives at a meeting to be held with the City and other groups at 9:30 a.m. April 29th, in the Third Floor Board Room of City Hall. 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 Fromsom, P. Eng.
Nystrom, Lee, Kobayashi & Associates

5109 — 50th Street, P.O. Box 2098, Whitecourt, Alberta T0E 2L0 (403) 778-3857

Alberta Newsprint Company Ltd.

May 18, 1988

Mr. Robert Byron
Chief Administrative Officer
City of Fort McMurray
9909 Franklin Avenue
Fort McMurray, Alberta
T9H 2K4

Dear Mr. Byron:

Thank you very much for arranging the April 29th joint meeting that was held in the Third Floor Board Room of City Hall, that was attended by representatives of the City, I.D. No. 18 and Syncrude Canada.

The meeting afforded an excellent opportunity 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, P. Eng.
Nystrom, Lee, Kobayashi & Associates
Vancouver, BC

5109 — 50th Street, P.O. Box 2098, Whitecourt, Alberta T0E 2L0 (403) 778-3857

FORT MCMURRAY HEALTH UNIT

Alberta Newsprint Company Ltd.

May 18, 1988

Dr. Al Nicholson
Ft. McMurray Health Unit
9921 Main Street
FT. MCMURRAY, AB
T9H 4B4

Dear Dr. Nicholson:

On behalf of Alberta Newsprint Company presentation team, we would like to thank the Fort McMurray Health Unit for meeting with us in the Fourth Floor Board Room of the Provincial Building on April 29th.

This meeting gave us an excellent opportunity to describe the proposed newsprint mill to be built near Whitecourt, to discuss its potential impact and to respond to some very challenging questions by you and your staff.

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, B.C.

5109 — 50th Street, P.O. Box 2098, Whitecourt, Alberta T0E 2L0 (403) 778-3857

FORT MCKAY

Alberta Newsprint Company Ltd.

PUBLIC CONSULTATION PROGRAM

MEETING WITH:	Fort McKay Indian Band
LOCATION:	Band Office, Fort McKay
DATE & TIME:	May 17, 1988 1:15 to 2:50 PM
ATTENDEES:	Jim Boucher, Chief of Band Ian Faichney, Citizen of Fort McKay Francis Orr, Band Member
ANC REPRESENTATIVES:	Ron Stern, Managing Director, ANC Neil Desaulniers, Director, ANC Doug Fromson, Project Co-ordinator Nystrom, Lee, Kobayashi & Associates, (NLK) Consulting Engineers Dr. Brian Bietz, Senior Environmental Scientist, Beak Associates Consulting Ltd. Elmer Berlie, Environmental Co-ordinator, ANC

PRESENTATION:

After opening remarks by Chief Boucher, regarding their study of the Athabasca River for Alberta Environment, 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 newaprint 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.

He stated that our studies show that there will be no effect on the river at Fort McKay; in fact, no effect after a few miles downstream of Whitecourt.

Doug Fromson then explained the process used to produce the pulp stock for the paper machine and the steps involved in the manufacture of newsprint.

QUESTIONS & RESPONSES:

Q: (Boucher) What is rationale for returning effluent to river rather than having zero effluent?

A: (Fromson) It is not practical to design a pulp mill for zero discharge. There is no mill in the world operating that way. In our mill we will use 20 m^3 of water per tonne, whereas old mills would use over 100 m^3 per tonne.

Q: (Boucher) I understand that other mills in the world are having trouble reducing their chemical discharge.

A: (Stern) That is the advantage of the CTMP process. Mechanical pulp processes have lower chemical usage than chemical based pulp mills. We will use less chemical per tonne of pulp than Millar Western because we are producing one grade of pulp for newsprint. This pulp is not as bright as pulp produced for some other purposes.

A: (Desaulniers) There is a very marked distinction between chemical based pulp mills and those using the mechanical process.

Q: (Boucher) All people in the pulp industry that have come to see us state that there are no adverse effects from pulp mills. It is like the report of the Surgeon General in the United States stating the cigarettes are addictive and the tobacco industry saying that is not true?

A: (Stern) The major issue reported in the press today is dioxin and chlorinated phenols from some pulp mills. Since we don't use chlorine, we will not have that problem.

A: (Desaulniers) Our wood; pine, spruce and aspen, is all relatively easy to process. In contrast, many mills in the United States use Southern Pine and it is very difficult to achieve the desired pulp properties. They have to use very harsh chemical treatment to brighten the pulp.

Q: (Boucher) Have you run a material balance across your mill?

A: (Fromson) In the EIA, which you should have in about ten days, we will show the levels of caustic soda, sulphuric acid, liquid SO_2 and sodium hydrosulphite that are to be used in the process.

sulphuric acid, liquid SO_2 and sodium hydrosulphite that are to be used in the process.

Q: (Boucher) What affect will these chemicals have?

A: (Fromson) The sulphur compounds are oxidized to form sulphate. The other chemicals will be present in very small amounts in the effluent.

A: (Bietz) Sulphate levels in the river here may run about 50 ppm whereas the drinking water standard allows up to 500 ppm. The addition to the river from the mill effluent is very small, in the order of a few parts per million. These comments also apply in a relative way to sodium. These chemicals will not affect the river quality or make it unsafe for animal or human consumption.

Q: (Boucher) How much water will you use from the river?

A: (Fromson) We will use about one percent of the Whitecourt minimum flow rate or about 0.08 percent of the average flow rate.

Q: (Boucher) Will the EIA include the combined impact of existing and proposed plants?

A: (Bietz) Yes, our model study looked at that. Since there is no chlorine in the mill process, the major issue to be studied is the BOD of the mill effluent and the resultant impact on dissolved oxygen content. We modelled the river at its worst condition of low flow and ice covered. This analysis showed that the dissolved oxygen will not go below the 5.0 mg/l guideline level.

Q: (Boucher) Have you looked at other components in the effluent?

A: (Bietz) Not in the modelling. We know their concentration level in the effluent. When released to the river they are diluted by about 100 times at the lowest flow rate in the river.

Q: (Boucher) So the solution to pollution is dilution?

A: (Bietz) No. Those chemicals containing sulphates and sodium are non-reactive in the effluent treatment system. Resin acids and other substances with BOD are degraded in the effluent treatment system. The

resultant dissolved oxygen levels are above the guideline that provides protection for fish.

Q: (Boucher) You have a base line when you run your model?

A: (Bietz) Yes, we take the river at a normal upstream condition above Whitecourt. We than add Millar Western and ANC mills. The impact of organic discharges will be complete by the confluence of the Lesser Slave River and the DO level will be above the 5.0 mg/l level.

Q: (Boucher) Have you looked at the effect on the food chain?

A: (Bietz) At Hinton, an elevated growth rate is seen in the benthic invertebrates and this effect disappears within 50 kms downstream of the mill.

The ANC mill will have 1/10 effluent volume of Hinton but slightly more nutrient so we will expect a more vigorous invertebrate population. The benthic monitoring program would likely be done twice a year to monitor this effect.

COMMENT (Boucher)

Our people have seen a major change in the amount of fisheries and a decline in the water quality. The question we are going to debate is the impact of the ANC mill on the river water quality.

We use the river as a food source so we are concerned about things that go into the river. It is in the political arena and we are going to address it in that sphere.

Q: (Boucher) What is the stage of permitting and what are your deadlines?

A: (Stern) We will file the EIA within ten days. We hope to clear the site in July. We hope to have the permit to construct issued by Alberta Environment in August or September so we can do some foundation work this fall.

Q: (Boucher) Do you expect a hearing under the Clean Air Act or the Clean Water Act?

A: (Stern) No.

Q: (Boucher) What is the ownership of ANC and the composition of the Board of Directors?

A: (Stern) Ownership primarily rests with companies associated with me, Ron Stern, so if people wish to judge me and the associations I have had over the years, that is fine.

As for offshore ownership, there is none now and I don't anticipate any; if there is any in the future, it will be small.

Q: (Boucher) Will you operate year round on a daily basis and what is your learning curve?

A: (Stern) Yes, we will operate about 353 days per year on a 24 hour basis. We expect to be at 75 percent capacity within a year. Our program for training our staff should enable us to accomplish this.

Q: (Boucher) What about plant upsets?

A: (Fromson) This mill is primarily a mechanical process. It is not like Suncor, Syncrude, refineries, gas plants or kraft mills that have many highly sensitive processes and much inter-related equipment. So, unless it is paper breaking and piling up all over the place, not much can go wrong in terms of a process upset that would impact on air quality or water quality.

Q: (Boucher) How about your logging operation and reforestation?

A: (Desaulniers) We will be using contract loggers and haulers. Reforestation is required under an FMA. Alberta has the toughest rules in this respect and we must follow the forest management policy and the rules. All areas will be reforested in accordance with goal management practice and Forest Services requirements. All forest programs must be approved annually by the Alberta Forest Service.

CLOSING

Chief Boucher thanked us for coming to Fort McKay and said he would be interested in receiving the EIA.

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.

May 18, 1988

Chief Jim Boucher
Fort McKay Indian Band
P.O. Box 5360
FORT MCMURRAY, AB
T9H 3G4

Dear Chief Boucher:

Thank you very much for arranging the meeting that was held in the Band Office on May 17th.

This meeting enabled us to discuss the proposed newsprint mill to be constructed on the Athabasca River west of Whitecourt and to answer the many questions that were of concern to you.

Should 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.

Elmer M. Berlie, P. Eng.
Environmental Co-ordinator

EMB/lk

xc: Doug Fromson, P. Eng.
Nystrom, Lee, Kobayashi & Associates
Vancouver, BC

5109 — 50th Street, P.O. Box 2098, Whitecourt, Alberta T0E 2L0 (403) 778-3857

FORT CHIPEWYAN

Alberta Newsprint Company Ltd.

PUBLIC CONSULTATION PROGRAM

MEETING WITH: Fort Chipewyan Advisory Council
I.D. 18(N) and the Public

LOCATION: Multiplex

DATE & TIME: May 17, 1988 8:20 to 9:20 PM

ATTENDEES:

ADVISORY COUNCIL

Emile Girard, Chairperson
Pat Flett, Member
Roy Vermillion, Member
Archie Cyprien, Member
David Tuccaro, Member
Marcel Ullicac, Land Programs, I.D. 18N

Sheila Flett, Recorder

THE PUBLIC

Lloyd C. Flett, Metis Association (Local 12
Scott Flett, Alberta Environment
Darrel Tuccaro, Lakeshore Sports
Denis C. Dufresne, Dufresne Enterprises
Herman Stegehuir, Alberta Forest Service
Beverly Wilson, Alberta Forest Service
Joe Vermillion, Local Businessman
Charles Fraser, Cannoral Ent. Ltd.
Bob Jagt, Municipal Affairs, High Level
Real Gagnon, Municipal Affairs, High Prairi
Ed LePine, Local resident
Bill Hilsew, Municipal Affairs, I.D. 18N
Fred R. Fraser, Municipal Officer III
Donald C. Cohn, RCMP
Roy Flett, Alberta Transportation

ANC REPRESENTATIVES:

Ron Stern, Managing Director, ANC
Neil Desaulniers, Director, ANC
Doug Fromson, Project Co-ordinator
Nystrom, Lee, Kobayashi & Associates, (NLK) Consulting Engineers
Dr. Brian Bietz, Senior Environmental Scientist, Beak Associates Consulting Ltd.
Elmer Berlie, Environmental Co-ordinator, A

PRESENTATION:

After opening remarks by Emile Girard, 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.

He stated that our studies show that there will be no effect on the river at Fort McKay; in fact, no effect after a few miles downstream of Whitecourt.

QUESTIONS & RESPONSES

Comment - (Lloyd Flett) Every year we have several groups like yourselves coming here and telling us that no bad effects will take place on the river. That is what they said about the dam in B.C. We have seen low levels in the lake and lowest flows ever in the river. What is going to be for our children? Ten to twenty years from now, if this keeps on, we will have no river and and delta. We are concerned what is going to happen to the river.

Q. (R. Vermillion) What has been the response from the other communities?

A: (Stern) The main concern has been for the maintenance of good water quality in the Athabasca.

Q: (Stegehuir) Will there be any air pollution?

A: (Fromson) Water vapour and combustion products from the boiler stack and the waste incinerator will be discharged. There will be no odourus emissions.

Q: (Emile Girard) As you can see, we are all concerned about the river. If you take one percent, the other mills take two and five percent, soon there are no percents and no river. What monitoring will there be?

A: (Bietz) There will be the usual daily analysis for chemical properties of the effluent, tri-weekly BOD analysis, toxicity tests will be done quarterly and possibly two bio-monitoring surveys each year.

Alberta Environment has quadrupled the monitoring frequency at Hinton covering 40 km downstream. Millar Western has to monitor 10-15 km and ANC will likely join with Millar Western on common parts of their bio-monitoring program.

Q: (Cyprien) What if there is a major upset?

A: (Stern) Alberta Environment would shut us down.

A: (Fromson) All tanks containing potentially hazardous chemicals will be diked and there will be level indicators and alarms on all process vessels and tanks.

Q: (Dufresne) What if there was a major chemical spill of sulphuric acid into the river due to an accident on the bridge?

A: (Bietz) Since the Athabasca originates in the mountains, it has a high limestone content. We say it has a high buffering capability. The acid reacts with the limestone which neutralizes its chemical activity. A test was run on a river in Alberta and there was no detectable acid just one or two hundred feet from the spill.

Q: (Scott Flett) How may more mills can there be before the river is completely polluted?

A: (Bietz) Effluent of the type we are talking about does not pollute the river. The river is self-regenerating. The mills put an effluent into the river that consumes oxygen as the micro organisms feed on it, that is biochemical oxygen demand (BOD). As each mill comes on stream, it could be required to discharge less BOD in its effluent in order to keep the dissolved oxygen above 5.0 mg/l.

Q: (Roy Vermillion) Where does Whitecourt get its water?

A: (Bietz) Both Whitecourt and Millar Western get their water from the same intake station on the McLoed River.

Q: (Roy Vermillion) What is the stage of your project and when will construction start?

A: (Stern) We are just completing the EIA and it will be filed in a week. Site clearing will commence in July and if we get the permit to construct from Alberta Environment, we hope to start construction in August or September.

CLOSING REMARKS

Emile Girard thanked ANC for coming up to make the presentation. Everyone is concerned about the river and this gives us an opportunity to register this concern. He asked that the parties listed in our memo to him of May 4th receive a copy of the EIA.

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.

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

5109 — 50th Street, P.O. Box 2098, Whitecourt, Alberta T0E 2L0 (403) 778-3857

Alberta Newsprint Company Ltd.

May 18, 1988

Mr. Emile Girard
Chairman
Fort Chipewyan Advisory Council
I.D. 18(N)
FORT CHIPEWYAN, AB
T0P 1B0

Dear Mr. Girard:

On behalf of the Alberta Newsprint Company, thank you very much for the opportunity to make a presentation on our proposed newsprint mill, on the Athabasca River west of Whitecourt, to your Council and members of the Fort Chipewyan community on the evening of May 17th.

We appreciated the many comments and challenging questions that were presented to us on the concerns held by members of the community.

Should you have any questions, they can be addressed to me at Whitecourt and they will be responded to.

Yours very truly,
ALBERTA NEWSPRINT COMPANY LTD.

Elmer M. Berlie, P. Eng.
Environmental Co-ordinator

EMB/lk

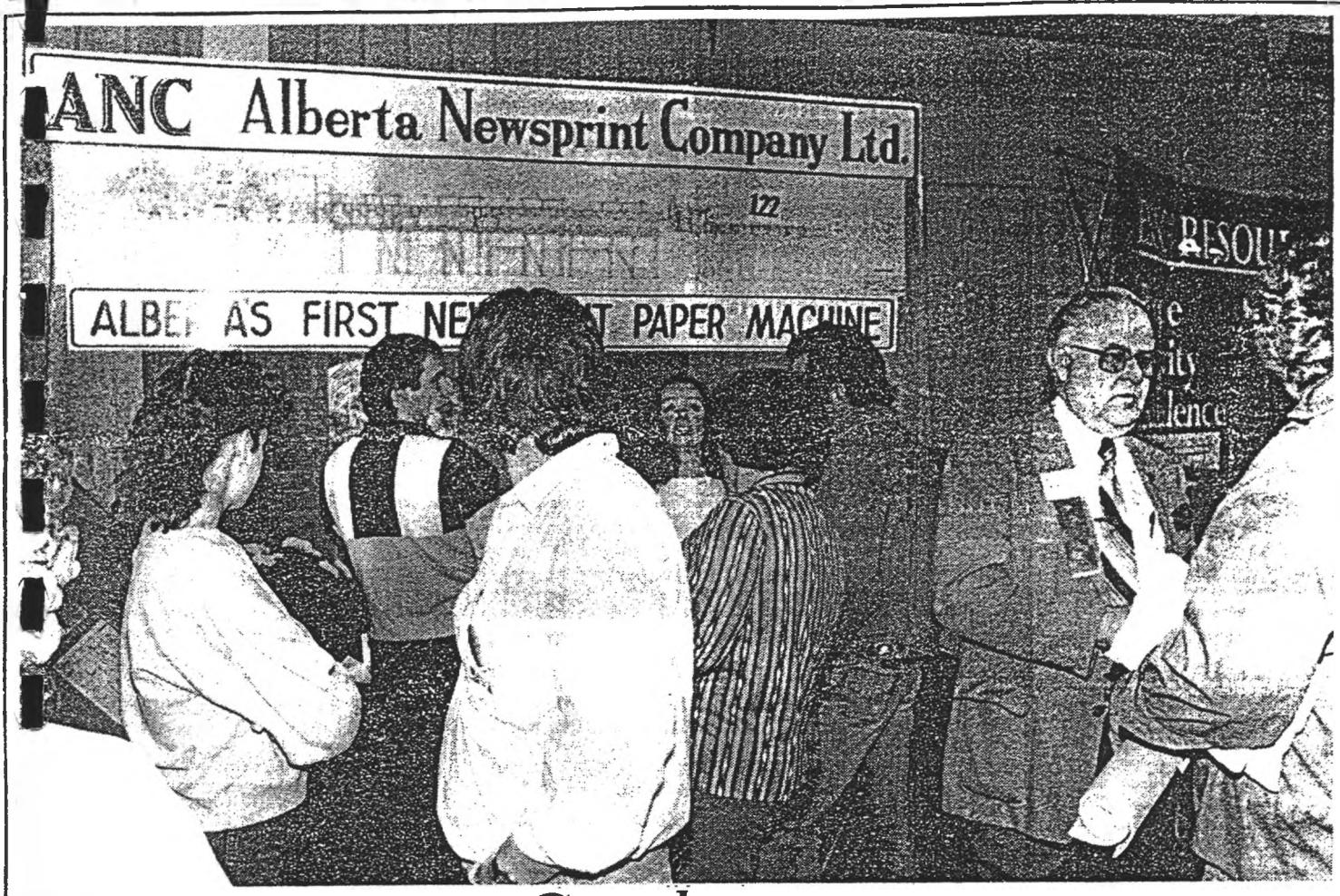
xc: Doug Fromson, P. Eng.
Nystrom, Lee, Kobayashi & Associates
Vancouver, BC

: Mr. Leo Bourassa
Manager
I.D. 18
Ft. McMurray, AB

5109 — 50th Street, P.O. Box 2098, Whitecourt, Alberta T0E 2L0 (403) 778-3857

WHITECOURT TRADE FAIR

WHITECOURT STAR
Vol. 27 No. 20 May 18, 1988 Whitecourt, Alberta



Good news

One of the most popular booths at the sixth annual Chamber of Commerce trade fair was the Alberta Newsprint Company's. ANC environmental co-ordinator Elmer Berlie (right) greets a visitor Sunday, the third day of the fair.

Visitors, exhibitors happy with fair

By Frankie Thornhill

A positive and festive atmosphere made this year's version of the Chamber of Commerce trade fair a roaring success with exhibitors, visitors and organizers.

And as an added bonus, the increase in participation over previous years means the sixth annual fair was also the most successful in terms of money raised for the chamber. In excess of $18,000 will show on the books once all the bills are paid, predicted director Linda Berryman.

"I'm really pleased," she said. "It went great. We got a lot of positive feedback."

Exhibitors were "really impressed" with the crowds, she said, and gate receipts show numbers were up over last year for all three days.

"Whitecourt has a reputation among regular trade fair participants of being one of the most organized to work with," according to Alberta Display, the company that sets up the booths, Berryman said.

"It's a good feeling. I achieved everything I wanted to achieve, and the committee's happy. Chamber manager Irma Edgell, chamber industrial director Al Drumm and member Bob Holzer formed the committee. This was Berryman's second year organizing the fair.

The children's midway rides and games, a new addition to the fair this year, helped contribute toward the festive atmosphere, Berryman said.

"And the outdoor display area was full — there were no empty spaces."

Two participants approached Berryman before the fair was over, wanting to book space for next year because they were certain it would be sold out.

In '87, 101 booths were sold — 15 fewer than this year's 116. Berryman's goal was 120.

Some booked two or three booths, with 83 participants in all. Local businesses numbered 41, 26 were from out of town, and there were 16 corporations and clubs represented.

The Alberta Newsprint Company booth was one of the most popular at the fair. Company environmental co-ordinator Elmer Berlie said between 300 and 400 people had questions for him, with only one expressing concern about the environment — the rest had positive comments.

"Whitecourt continues to astound me," he said, remarking on the high calibre of the fair.

"There were lots of comments on the variety of displays," Berryman said.

She gives much of the credit for the positive mood to the exhibitors themselves.

"The exhibitors had a good attitude. They made the atmosphere."

CORRESPONDENCE WITH OTHER TOWNS AND AGENCIES

Alberta Newsprint Company Ltd.

May 19, 1988

The attached notice, copied from the April 22, 1988 issue of the Windspeaker, also appeared in the following papers:

Athabasca Advocate	April 18, 1988
Barrhead Leader	April 19, 1988
Fort McMurray Express	April 22, 1988
Mayerthorpe Freelancer	April 20, 1988
Lakeside Leader	April , 1988
Whitecourt Star	April 20, 1988
Fort McMurray To-day	April 15, 1988

5109 — 50th Street, P.O. Box 2098, Whitecourt, Alberta T0E 2L0 (403) 778-3857

[redacted] just last week I had a [redacted] scooted back out of the [redacted] before you could [redacted] aple sugar.

Gordon Poitras said the thief made off with a couple hundred dollars. Even though this happened it didn't throw a damper into

be havin a jigging contest [redacted] the summer they will run the winners off for a big trophy.

Slave auctioned

Metis Local 1888 held

the March 18 issue and she re[redacted] [redacted]stas[redacted] calls an[redacted]sa[redacted] of them were from me. Come on guys show some respect for our good looking women and keep the crap in the bathroom.

Birthday greetings

Happy Birthday Uncle Alex, yes Alex Lafferty is a second uncle to yours truly and his 95th birthday was a very special event to all of us who love the man he is.

Uncle Alex is special to me because I remember when we were very young we used to visit him, my auntie Beatrice and his brother, Uncle Frank, every weekend. Being the innocent person then and still am today they used to call me the "Little Angel" and the name still fits me today.

Don't forget, it's the Little Angel's birthday on April 29 and I will be accepting presents, Irene, but keep your hands to yourself, I'm not that easy.

Finally, a special birthday greeting goes out to a very special lady, former first lady of the Metis Association, Edna Sinclair. I am not going to say how old she is because she does not look that old. By the time this column comes out it will be a belated greeting for her March 28 birthday. Most of us know her and her daughter, Lorraine, as the Metis Judds because of the way they sing and harmonize together. And also because Edna looks younger and

VILLAGE OF FORT ASSINIBOINE

OFFICE OF THE ADMINISTRATOR
BOX 150
FORT ASSINIBOINE, ALBERTA T0G 1A0
Telephone: (403) 584-3922

June 07, 1988

Mr. Elmer M. Berlie, P. Eng.
Environmental Co-Ordinator
5109 - 50th Street
Box 2098
Whtecourt, AB
TOE 2L0

Dear Mr. Berlie:

RE: **ALBERTA NEWSPRINT COMPANY LTD.**

On behalf of Village Council and myself, thank you for meeting with us on May 25, 1988.

It was very informative and we enjoyed the discussions that took place.

As mentioned at the meeting, there was a concern brought up by Councillor Pechanec concerning the foaming of the river and the potential of more of this happening. We await your timely reply.

Yours truly,

Helen Kluin
Municipal Administator

/hbk

RESPONSES TO UNANSWERED QUESTIONS

AND EIA REVIEW ENQUIRIES

Alberta Newsprint Company Ltd.

4th Floor
2025 West Broadway
Vancouver, B.C.
V6J 1Z6

5 July 1988

Ms. Helen Kluin
Municipal Administrator
Village of Fort Assiniboine
Box 150
Fort Assiniboine, Alberta
T0G 1A0

Reference: NLK Project 1674
Alberta Newsprint Company Ltd.
Newsprint Mill
251-709 - Environmental Impact Assessment

Dear Ms. Kluin:

During the meeting of 25 May 1988 with yourself and the Village Council, a question was raised by Councillor Pęchanic concerning the potential for increased foaming in the Athabasca River due to discharge of effluent from the proposed Alberta Newsprint Company Ltd. (ANC) mill near Whitecourt.

The propensity for foaming in pulp mill effluents is typically due to several factors:

1. Dissolving during the pulping process of natural surfactants (or fatty acids) contained in the wood.

   Fatty acids are effectively biodegraded in a secondary treatment facility. The greater the degree of BOD (biochemical oxygen demand) removal in the biobasin, the lower the residual level of fatty acids in the treated effluent. ANC will design the effluent treatment system to achieve 90% BOD removal efficiency, which will result in a BOD discharge to the river of 5 kg/AD tonne of newsprint. This is the lowest effluent discharge of any mill currently operating or planned on the Athabasca River. The potential for foaming due to residual fatty acids will be minimal.

2. Natural reaeration of effluent prior to river discharge is the primary cause of foam generation.

   Some mills allow treated effluent to cascade over flow measurement weirs and along open flow channels to the river diffuser. This can lead to significant levels of foam generation. ANC will have a submerged outfall from the biobasin, with effluent piped to the river diffuser. This will result in little air entrainment and minimal foaming.

3. The use of liquid pitch dispersants (essentially concentrated soaps) for pitch control in the mill.

   Some mills use liquid dispersants to solubilize and remove pitch in the pulping process. Residual levels of these surfactants in the effluent can aggravate foaming. ANC will use talc for pitch control which will not contribute to the potential for foam creation.

In summation, the high BOD removal efficiency, submerged effluent outfall and non use of liquid pitch dispersants will all minimize the risk of foam generation in the Athabasca River due to the discharge of treated ANC effluent.

I trust this will answer your question. Should further information be required, please feel free to contact the undersigned.

Sincerely,

ALBERTA NEWSPRINT COMPANY LTD.

W. Gunning, P. Eng.

WG/fh

cc: A. Seifried, Alberta Environment

NLK

TELEPHONE (604) 733-0344
TELECOPIER (604) 733-6613
TELEX 04-53432

NYSTROM, LEE, KOBAYASHI & ASSOCIATES

CONSULTING ENGINEERS
A CORPORATE PARTNERSHIP

2130 WEST 12TH AVENUE, VANCOUVER, B. C. CANADA V6K 2N3

6 July 1988

Mr. Ed Yoder
Councillor I.D. 17E
Box 215
Smith, Alta. T0G 2B0

Reference: NLK Project 1674
Alberta Newsprint Co. Ltd.
Newsprint Mill
251.709 - Environmental Impact Assessment
Mercury Contamination

Dear Mr. Yoder:

We trust that you and your fellow councillors have now had an opportunity to review the Environmental Impact Assessment (EIA) report, send to you in May.

An outstanding item with respect to the Hamlet of Smith, is the prevailing recommendation by Alberta Forestry, Lands and Wildlife (Fish and Wildlife) that certain fish should not be consumed by pregnant women and by others not more than once per week. These recommendations are included in the 1988 Guide to Sportfishing Regulations. Copies of the pertinent pages (pgs 5, 20 and 21) are enclosed for your reference.

You will note that the cause for restricting fish consumption is the possibility of mercury contamination. The booklet points out that the mercury appears to result from natural mercury in soils and sediments.

The existing pulp mill at Hinton does not employ mercury in the process. The Millar Western Pulp facility and the Alberta Newsprint Mill will also not use mercury in the process. As noted in the booklet, industrial discharges are not the cause of mercury levels in the Athabasca River and thus the cause of suggested restrictions on fish consumption.

6 July 1988
Mr. Ed Yoder
Councillor I.D. 17E
Ref.: NLK Project 1674

Please call or write if you have any further questions. Our telephone number in Whitecourt is (403) 778-3857 and in Edmonton (403) 423-3384.

Yours truly,

NYSTROM, LEE, KOBAYASHI & ASSOCIATES

D.A. Fromson, P. Eng.

DAF/ms

Enclosure

cc: Anke Seifried, Alberta Environment

GENERAL REGULATIONS

Sportfishing in beaver ponds is governed by the same rules as apply to the streams in which the ponds are found.

Angling is not permitted through the ice into any flowing waters in Fish Management Areas 2, 3, 4, 6 or that portion of Fish Management Area 5 west of highway 2, or in any beaver pond.

Bait cannot be set out or used to attract fish unless it is attached to a hook used in angling.

Live fish may not be used as bait.

Where the use of bait fish is NOT permitted dead fish of other species or parts thereof may be used.

Lights cannot be used to sportfish unless they are part of a lure used in angling.

Snares and firearms cannot be used in fishing.

Removal of fish from or disturbance of fish in facilities or structures designed to capture, hold or facilitate the passage of fish is prohibited.

Fishing by any method within 25 metres (81 ft) of the lower end of any fishway is prohibited.

Live fish or fish eggs may not be placed in any waters of the province except those from which they were taken.

Selling, buying, trading or bartering fish taken by sportfishing is prohibited.

Any fish possessed at other than your permanent residence must be skinned, cut or packed so that the species can be readily identified, the number of fish can be readily determined and, for fish to which a size limit applies, the length can be readily determined.

In the case of filleted fish, two pieces of the flesh of fish of the same species is considered to be one fish.

HOOK AND LINE FISHING (ANGLING)

One line may be used when angling into open water.

Three lines may be used when angling into ice covered water.

Each line used in angling may be equipped with not more than three hooks.

Lines used in angling must be attended at all times and, in any case, may not be farther than 30 metres (100 ft) from the angler.

Snagging is prohibited.

Gaff hooks and dip nets may be used to assist landing fish caught by angling except that gaff hooks may not be possessed by persons fishing in trophy waters. See Fish Management Areas 6, 7 and 8.

BOWFISHING

Cross-bows may not be used.

Trout, mountain whitefish, arctic grayling and sturgeon may not be taken.

Bowfishing is not permitted in trophy waters. See Fish Management Areas 6, 7 and 8.

SPEARFISHING

Only spears propelled by spring, elastic, compressed gas or muscular power are permitted.

Spearfishing is not permitted unless the fisherman is swimming.

Spearfishing is not permitted within 30 metres (100 ft) of a swimmer.

Trout, mountain whitefish, arctic grayling and sturgeon may not be taken.

Spearfishing is not permitted in trophy waters. See Fish Management Areas 6, 7 and 8.

SPORTFISHING FOR BAIT FISH

A person authorized to sportfish may take bait fish for non-commercial use by dip net, seine net or minnow trap.

Fish other than bait fish caught in a sportfisherman's net or trap must be immediately released unharmed.

The possession of live bait fish is prohibited. All live bait fish removed from the water must be killed immediately.

Fishing for bait fish is not permitted in trophy waters or other specified waters. See Fish Management Areas 1 to 8.

Seine nets may not be larger than 3 metres (10 ft) in length or 2 metres (6½ ft) in depth.

Minnow traps may not have dimensions greater than 60 centimetres (24 in) in length by 30 centimetres (12 in) in width, depth or diameter.

Not more than 2 minnow traps may be used at one time.

Minnow traps must bear the operator's name, address and sportfishing licence number.

STURGEON FISHING

No sturgeon shorter than 1 metre (39 in) may be retained.

Only 2 sturgeon may be retained in a fiscal year — one for each tag issued with a Sturgeon Fishing Licence. The tag is to be passed through the mouth and gill cavity and locked. It cannot be removed until the sturgeon is being prepared for consumption or taxidermy.

MERCURY WARNING

Mercury levels in some species of fish in certain Alberta rivers and lakes are above safe levels (greater than 0.5ppm) for human consumption recommended by Health and Welfare Canada. Studies of the distribution of mercury in Alberta have not identified point sources of mercury contamination. Mercury accumulations in fish appear to result from the natural mercury in Alberta soils and sediments. Rivers and lakes with fish species which contain mercury accumulations in excess of the safe level are listed under Fish Management Areas 1, 5, 6 and 7 in this guide. Individuals who regularly consume northern pike, walleye, sauger, goldeye or burbot from these waters should observe the following guidelines:

Pregnant women should not eat these fish.

Others should not eat more than one meal of these fish per week.

Monitoring of fish stocks in other waterbodies is continuing. The public will be advised when fish stocks with unsafe mercury accumulations are discovered.

ALBERTA FISHING EDUCATION PROGRAM

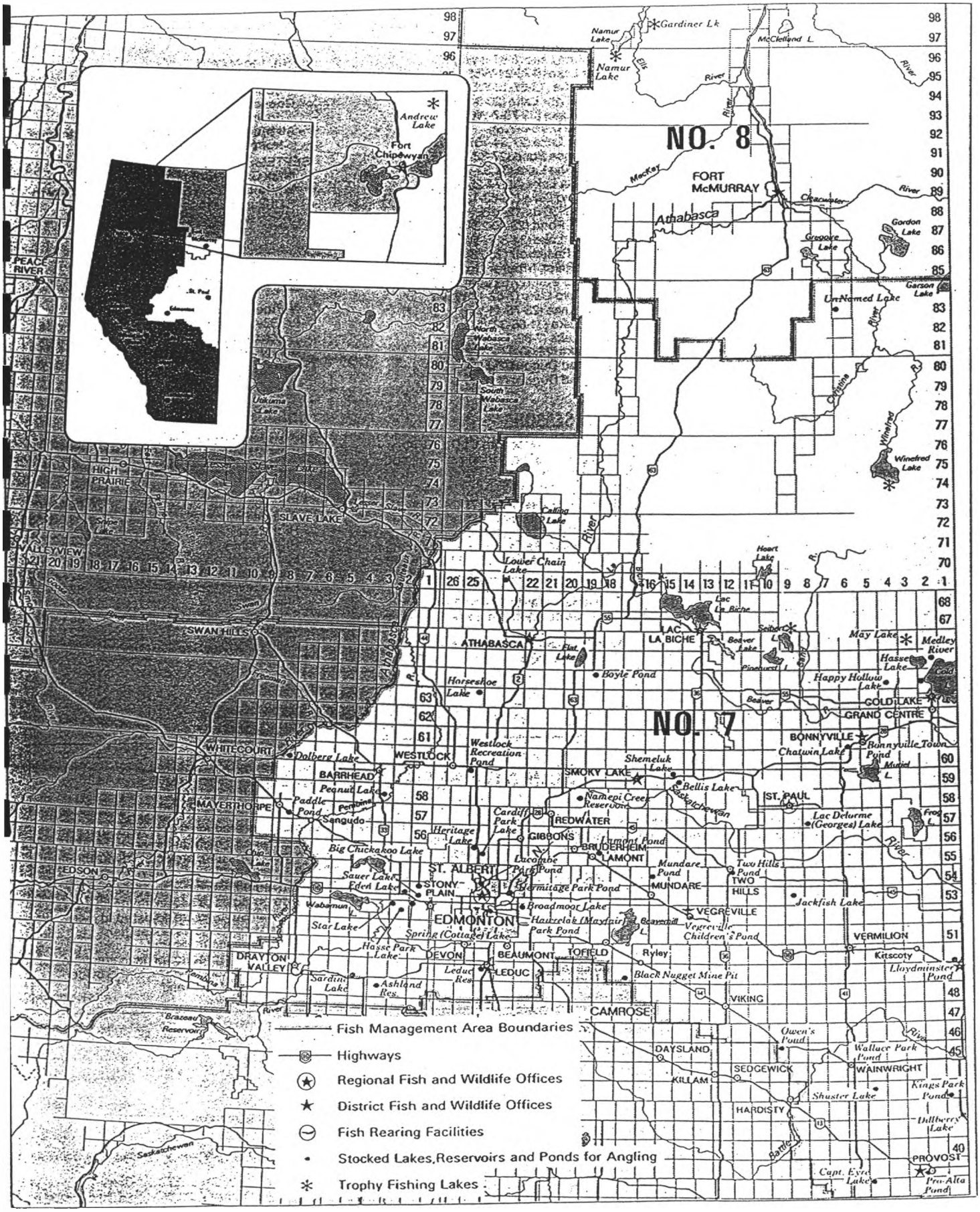
The Fish and Wildlife Division is pleased to announce the new Alberta Fishing Education Program. Courses will be offered at various locations to help novice and experienced sportfishermen to get more enjoyment out of the sport.

Highly qualified instructors will provide over 10 hours of coursework using a new comprehensive, well illustrated manual. The course provides instruction on

fish identification,
fisheries management,
ethics,
legal responsibilities,
boat safety,
first aid, and
cooking.

For more information on how you can participate in the Alberta Fishing Education Program, contact your Fish and Wildlife District Office or the Program Support Branch in Edmonton at 422-2605 or Calgary at 297-6423.

FISH MANAGEMENT AREAS 7 & 8



FISH MANAGEMENT AREA 7

SIZE LIMITS

Provincial limits apply — see page 4.

DAILY CATCH AND POSSESSION LIMITS

Provincial limits apply — see page 4 — with the following limitation on the daily catch and possession limits of 10 northern pike and 3 lake trout:

Waters	Daily Catch and Possession Limits
May Lake (66-3-W4)	2 northern pike
Seibert Lake (66-9-W4)	2 northern pike
Winefred Lake (75-5-W4)	5 northern pike
Cold Lake (63,65-1,2-W4)	
September 15 to November 15	0 lake trout

SPORTFISHING IN TROPHY WATERS

— May Lake, Seibert Lake and Winefred Lake are designated as trophy waters.
— A Trophy Waters Fishing Licence is required to angle in these lakes if a sportfishing licence is required. See page 4.
— Possession of a gaff hook is not permitted while fishing in trophy waters.
— Use of bait except that made of feather, fibre, rubber, wood, metal, glass or plastic, is not permitted.
— Capture of bait fish is not permitted.
— Spearfishing and bowfishing are not permitted.
— Fish taken in trophy waters are part of the provincial daily catch and possession limits.

BAIT AND LURE RESTRICTIONS

Fishing for bait fish and the use of bait fish are not permitted in any of the following waters:

Ashland Reservoir (20-48-3-W5)
Bellis Lake (15-59-15-W4)
Big Chickakoo Lake (33,34-53-1-W5)
Black Nugget Mine Pit (1-49-18-W4)
Bonnyville Town Pond (Bonnyville)
Boyle Pond (16-64-19-W4)
Broadmoor Lake (Sherwood Park)
Capt Eyre Lake (30-38-5-W4)
Cardiff Park Lake (24-55-25-W4)
Chatwin Lake (4-61-6-W4)
Dillberry Lake (36-41-1-W4)
Dolberg Lake (1-60-8-W5)
Eden Lake (13-53-2-W5)
Happy Hollow Lake (25-64-4-W4)
Hasse Lake (13,14-52-2-W5)
Hasse Lake (19-64-2-W4)
Hawreluk Park Pond (Edmonton)
Heritage Lake (Morinville)
Hermitage Park Pond (Edmonton)
Horseshoe Lake (31-63-25-W4)
Jackfish Lake (20-53-9-W4)
Kings Park Pond (7-43-1-W4)
Lac Delorme (George's Lake) (5-57-8-W4)
Lacombe Park Pond (St. Albert)
Leduc Reservoir (27-49-25-W4)
Lloydminster Pond (Lloydminster)
Lottie Lake (58-11-W4)
Lower Chain Lake (7-69-23-W4)
Medley River (23-65-2-W4)
Mundare Fish and Game Pond (53-16-W4)
Namepi Creek Reservoir (14-58-20-W4)
Owen's Pond (28-45-10-W4)
Paddle River Pond (1-57-3-W5)
Peanut Lake (15-58-3-W5)
Pro Alta Pond (18-39-2-W4)
Sardine Lake (32-48-4-W5)
Sauer Lake (28-53-1-W5)
Shemeluk Lake (25-60-17-W4)
Shuster Lake (25-43-5-W4)
Spring (Cottage) Lake (30-52-1-W5)
Star Lake (19-52-2-W5)
Two Hills Pond (32-54-12-W4)
Vegreville Children's Pond (Vegreville)
Wallace Park Pond (Wainwright)
Westlock Recreation Pond (31-59-25-W4)

CLOSED SEASONS

The following waters are **CLOSED TO FISHING** during the periods shown, both dates inclusive:

APRIL 1 to MAY 6
Winefred Lake (75-4-W4) See Winefred Lake below for other closures.

APRIL 1 to MAY 20
All tributary streams to and outlet streams from:
Angling Lake (60-3-W4)
Baptiste Lake (66,67-24-W4)
Cache Lake (59-12-W4)
Calling Lake (72-22-W4)
Ethel Lake (63-3-W4)
Floatingstone Lake (60-11-W4)
Hilda Lake (64-3-W4)
Ironwood Lake (65-10,11-W4)
Isle Lake (53,54-5,6-W5)
Lac La Nonne (57-3-W5)
Manatokan Lake (63-7-W4)
Matchayaw (Devil's) Lake (54-1-W5)
Missawawi Lake (66-15-W4)
Moore Lake (64-4-W4)
Steele (Cross) Lake (65-25,26-W4)
Tucker Lake (64-4,5-W4)
Vincent Lake (59-9,10-W4)
Wabamun Lake (52,53-4,5-W5)
All outlet streams from:
Bonnie Lake (59,60-13-W4)
Mons Lake (60-16-W4)
All tributary streams to:
Hanmore Lake (61-17,18-W4)
Lower Mann Lake (60-11,12-W4)
Upper Mann Lake (59-10,11-W4)
Amisk Lake (64,65-18-W4) and all inlet streams
Beaver Lake (66-12,13-W4)
Beaver River (Kaufman's Creek, Christie Creek, Beaver Creek), that portion situated in 65,66-13,14-W4 and all tributaries to that portion
Blackett Lake (66-11-W4)
Bourque Lake (65,66-4-W4) and all inlet streams
Cold Lake (63,65-1,2-W4) except that portion lying in 64-2-W4 and all inlet streams to Cold Lake
Grist River tributary to Winefred Lake
Horse Creek tributary to Plamondon Creek
Jackson Lake (67-10,11-W4)
Kehewin Lake (58,59-7-W4) and all inlet streams
Kinnaird Lake (66,67-10-W4)
Lac La Biche that portion within 1 kilometre (.6 mile) of the mouth of the Owl River (see Owl River)
Lac Ste. Anne (54,55-3,4-W5), and all inlet streams and all outlet streams
McGuffin Lake (67-11-W4)
Orloff Lake (73,74-23,24-W4) and all inlet streams
Owl River (23-68-13-W4) (see Lac La Biche)
Plamondon Creek (12-68-16-W4), inlet stream to Lac La Biche
Rock Island Lake (75-22,23-W4) and all inlet streams
Sand River, tributary to Winefred Lake
Spencer Lake (67-9-W4) and all inlet streams
Sturgeon River upstream of Big Lake and its tributaries entering upstream of Big Lake
Wandering River, tributary to the La Biche River
Winefred Lake (75-4-W4), that portion within 1 kilometre (.6 mile) of the mouth of the Sand River and that portion within 1 kilometre (.6 mile) of the mouth of the Grist River
Winefred River, that portion within 1.5 kilometres (1 mile) of Winefred Lake
Wolf Lake (66-6,7-W4) and all inlet streams

APRIL 1 to MAY 31
All tributary streams to and outlet streams from **Lac Poitras** (24-56-11-W4)
All inlet streams to and outlet streams from **Lac Sante** (56-11-W4)
Seibert Lake (66-9-W4), and all inlet streams and all outlet streams.

MERCURY WARNING

Fish from the waters listed below may contain mercury levels which exceed the recommended safe levels of mercury for human consumption: See page 5.

Athabasca River - walleye
Helena Lake (66-11-W4) - walleye and northern pike
Hilda Lake (64-3-W4) - walleye and northern pike
Ironwood Lake (65-10-W4) - walleye and northern pike
Lac La Nonne (57-3-W5) - walleye
Moose Lake (61-7-W4) - walleye and northern pike
Muriel Lake (60-4,5-W4) - northern pike
North Saskatchewan River - walleye, sauger, northern pike and goldeye

FISH AND WILDLIFE DISTRICT OFFICE TELEPHONE NUMBERS

Athabasca	675-2419
Barrhead	674-8236
Bonnyville	826-3142
Cold Lake	639-3377
Drayton Valley (1:00-4:30)	542-6767
Edmonton	427-3574
Lac La Biche	623-5247
Leduc (1:00-4:30)	986-6775
Lloydminster	871-6495
Provost (1:00-4:30)	753-2433
St. Paul*	645-6313
Smoky Lake	656-3556
Stony Plain	963-6131
Vegreville (1:00-4:30)	632-5410
Vermilion	853-8137

*Regional Office, Box 1450, Eldorado Building

Stony Plain - Lac Ste. Anne Health Unit

[redacted]UB-OFFICES

Box 2098
Spruce Grove, Alberta
[redacted]E 2C0
[redacted]lephone: 962-4072

[redacted]63 Provincial Building
[redacted]hitecourt, Alberta
[redacted]E 2L0
Telephone: 778-5555

(HEAD OFFICE)
P.O. Box 210, Stony Plain,
Alberta, Canada T0E 2G0
Telephone: 963-2206

SUB-OFFICES

Box 430
Fox Creek, Alberta
T0H 1P0
Telephone: 622-37[redacted]

HOME CARE:
Box 210,
Stony Plain, Alberta
T0E 2G0
Telephone: 963-33[redacted]

June 22, 1988

Mr. W. Gunning, P. Eng.
Alberta Newsprint Company
P.O. Box 2098
Whitecourt, Alberta
T0E 2L0

Dear Sir:

RE: Environmental Impact Assessment
Project 1674
Newsprint Mill 251.709

The document prepared by Nystrom, Lee, Kobayashi and Associates has been reviewed and the following comments are offered for your consideration.

Section 3
5.03 Water Supply (pp. 3-22 & 23) It is presumed that the clarifier sludge (last line page 3-22) is the same material referred to in 4.01 (page 4-16) & 4.02 (page 4-17).

The potable water system for the mill personnel, as distinct from that used in mill operation, will also be subjected to scrutiny by the local board of Stony Plain-Lac Ste. Anne Health Unit. The Public Health Act defines a place of business as a "public place" and the nuisance and general sanitation regulation made under the authority of the Act provides for the potability of the water and that it is produced under sanitary conditions.

5.06 Mill Offices (pp. 3-24) This describes the facilities and offices that will be accommodated in the 3-story building. No reference is made to any food service yet, on page 4-3 the matter of kitchen facilities is

addressed regarding sewage discharge from a kitchen. Will there be a staff canteen in the mill?

Section 4
2.01 Effluent Sources (p. 4-3) Although not directly involved with sewage disposal approval we will be interested to see how a packaged domestic waste treatment plant functions as these have not been too common in Alberta. If such an installation malfunctions the local board will be vitally concerned with that impact.

4.02 (p. 4-17) The total tonnage per annum of waste to be disposed of is given in BDMT for a total of 54,400 tonnes. Are the 2,200 tonnes of water treatment sludge referred to represent bone-dry or are they still at the 20% BD consistency and similarly, the effluent clarifier sludge tonnage (30%BD)?

Some concern has been expressed by the municipal authorities that the tonnage of wastes being generated could overwhelm the new regional landfill. How is the tonnage of wastes shown in table 4-4 (page 4-17) reconciled against the 12,000 tonnes referred to in your letter of April 28, 1988 to the Town of Whitecourt (appendix 5)? The other concern there being that if sludge is in a fluid state, will it have any effect on groundwater from a leachate point of view?

The local board has the ultimate responsibility of ensuring that a landfill functions in a way that no public health problems will arise.

Section 5
1.04 (p. 5-12) The bacteriological quality of surface water as it relates to contact recreational use is provided for in the nuisance and general sanitation regulation made pursuant to the Public Health Act. If necessary, the local board can take samples.

Appendix 4
P. 31 - I am surprised that the DPA Group Inc. in assessing community services appears to have ignored the presence of an integral part of the community services, viz: the Stony Plain-Lac Ste. Anne Health Unit. The Whitecourt office of the health unit provides well-utilized services of

community health nursing, dental health, speech/language pathology, environmental health inspection and home-care. All these departments are experiencing increased work loads because of the overall growth of the community: so much so that staff increases are required to cope with the anticipated additional development that the Alberta Newsprint Company Ltd. mill will engender.

Appendix 5
Your letter dated April 28, 1988 to the Town of Whitecourt uses the figure of 12,000 tonnes of wastes that will have to be disposed of; you suggest that this could be used as cover material at the landfill. In the event that this volume could not be accepted into the landfill, the alternative would be the establishment of an industrial waste site on the mill property.

I hope these comments will be of use to you.

Yours truly,

Lyndon H. Davies, C.P.H.I.(C)
Director, Environmental Health

LHD/lb
cc: Esmerelda Cabral
Environmental Assessment Division
Alberta Labour

NLK

TELEPHONE (604) 733-0344
TELECOPIER (604) 733-6613
TELEX 04-53432

NYSTROM, LEE, KOBAYASHI & ASSOCIATES

CONSULTING ENGINEERS
A CORPORATE PARTNERSHIP

2130 WEST 12TH AVENUE, VANCOUVER, B. C. CANADA V6K 2N3

6 July 1988

Mr. Lyndon H. Davies, C.P.H.I. (C)
Director, Environmental Health
Stony Plain - Lac Ste. Anne Health Unit
P.O. Box 210
Stony Plain, Alberta
T0E 2G0

Reference: NLK Project 1674
Alberta Newsprint Company Ltd.
Newsprint Mill
251.709 - Environmental Impact Assessment

Dear Mr. Davies:

In your correspondence to the undersigned, dated 22 June 1988, several questions were raised pertaining to the Environmental Impact Assessment for the Alberta Newsprint Company ltd. (ANC) newsprint mill near Whitecourt.

The questions are addressed by Section, following the pattern used in your initial correspondence.

Section 3

1. The water treatment plant sludge is referenced on page 3-22 as well as pages 4-16 and 4-17. Effluent clarifier sludge is also referenced on both pages 4-16 and 4-17.

2. The potable water system for mill employees will be designed and installed to meet all pertinent Alberta regulations.

3. At the present time there are no plans to install a staff cafeteria at the mill site. Food and beverages will most likely be provided through vending machines with appropriate facilities for heating of food (i.e. microwave).

6 July 1988
Mr. L.H. Davies
Stony Plain - Lac Ste. Anne Health Unit
Ref.: NLK Project 1674

Section 4

1. The packaged sewage treatment plant currently planned for the mill will be designed and built to comply with all pertinent Alberta regulations.

2. The quantity of water treatment sludge is estimated at 2200 BDMT/annum. The landfilled sludge will typically be about 20% BD consistency for a wet weight of 11,000 MT/annum. Similarly, the effluent clarifier sludge will represent approximately 3200 BDMT/annum or 10,700 MT/annum at 30% BD consistency.

3. Organic wastes generated on site will be disposed of primarily through incineration. This will leave inorganic wastes consisting of water treatment sludge and burner ash for landfill disposal.

   The water treatment sludge will comprise about 11,000 MT/annum at 20% BD consistency while the burner ash would be landfilled dry at about 1,000 MT/annum for a total of 12,000 MT/annum. This is the same quantity referenced in the correspondence to the Town of Whitecourt, dated 28 April 1988.

   The water treatment sludge will contain about 80% water by weight. This material will be predominently silt indigenous to the Athabasca River and small quantities of water treatment chemicals (lime and alum). There will be no pulping byproducts or chemicals present in this sludge and as such should have negligible impact on groundwater from a potential leachate point of view.

Section 5

We extend our apologies for the fact that the Stony Plain - Lac Ste. Anne Health Unit was not referenced in the socio-economic study of the Whitecourt area. This was purely an oversight and, of course, is not meant to detract from the valuable services offered to the community.

6 July 1988
Mr. L.H. Davies
Stony Plain - Lac Ste. Anne Health Unit
Ref.: NLK Project 1674

Appendix 5

If for some reason the inorganic wastes could not be disposed of in the Whitecourt sanitary landfill facility, ANC would design and construct a suitable landfill site which would meet with Alberta Environment regulations.

We trust this letter addresses the questions raised to your satisfaction. Should more information be required, please feel free to contact the undersigned.

Yours truly,

NYSTROM, LEE, KOBAYASHI & ASSOCIATES

W. Gunning, P. Eng.

WG/fh

cc: A. Seifried, Alberta Environment

APPENDIX 3

AIR DISPERSION STUDY

STACKS2 MODELLING

FOR NO_x, SO_2 AND PARTICULATE

OVER FLAT AND HILLY TERRAIN

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 =	54.200000	M**3/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	M**3/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	M**3/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 = 165.946 PPM 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 (PPM)
1	48.	133.568
2	32.	32.112
3	98.	0.265

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 =	54.200000	M**3/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	M**3/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	M**3/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 = 179.329 PPM 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 (PPM)
1	63.	150.940
2	30.	28.363
3	194.	0.026

ANC Whitecourt - SO2 hilly terrain

PARAMETERS FOR SOURCE NUMBER 1: A STACK

STACK HEIGHT =	34.00	M	
STACK DIAMETER =	2.100	M	
GAS EXIT SPEED =	13.0000	M/S	
GAS TEMPERATURE =	230.0	C	
EMISSION RATE =	.2325000	G/S	AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE =	2.0	C	
STACK DISTANCE =	.0	M	FROM ORIGIN

PARAMETERS FOR SOURCE NUMBER 2: A STACK

STACK HEIGHT =	34.00	M	
STACK DIAMETER =	.850	M	
GAS EXIT SPEED =	12.0000	M/S	
GAS TEMPERATURE =	260.0	C	
EMISSION RATE =	.0322000	G/S	AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE =	2.0	C	
STACK DISTANCE =	.0	M	FROM ORIGIN

PARAMETERS FOR SOURCE NUMBER 3: A STACK

STACK HEIGHT =	26.00	M	
STACK DIAMETER =	8.500	M	
GAS EXIT SPEED =	4.0000	M/S	
GAS TEMPERATURE =	550.0	C	
EMISSION RATE =	.3180000	G/S	AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE =	2.0	C	
STACK DISTANCE =	.9	M	FROM ORIGIN

AMBIENT TEMPERATURE = 10.0 C

DIFFUSION WITHIN A MIXING LAYER REACHING TO THE
LEVEL OF THE HIGHEST PLUME OR 100. M, WHICHEVER IS LARGER

TEN-METRE WINDSPEEDS BETWEEN 1.0 AND 20.0 M/S
IN INCREMENTS OF .5 M/S ARE EXAMINED

DISTANCE FROM ORIGIN IN METRES	ELEVATION ABOVE ORIGIN IN METRES
1000.	50.
2000.	150.
3000.	200.
5000.	250.
6000.	300.
7000.	350.

DISTANCE TO TREE CANOPY = 0. M FROM ORIGIN

NUMBER	(M/S)	HEIGHT (M)	MAXIMUM ($\mu g/m^3$)	MAXIMUM (M)
1	1.0	227.	.000	912.
2	1.0	66.	.346	912.
3	1.0	842.	.000	912.
1	1.5	124.	.357	1905.
2	1.5	42.	.125	1905.
3	1.5	490.	.000	1905.
1	2.0	101.	.447	1445.
2	2.0	38.	.148	1445.
3	2.0	378.	.000	1445.
1	2.5	87.	.521	1202.
2	2.5	35.	.162	1202.
3	2.5	310.	.000	1202.
1	3.0	79.	.564	1000.
2	3.0	33.	.185	1000.
3	3.0	266.	.000	1000.
1	3.5	72.	.606	832.
2	3.5	32.	.209	832.
3	3.5	232.	.000	832.
1	4.0	66.	.657	759.
2	4.0	31.	.211	759.
3	4.0	204.	.000	759.
1	4.5	61.	.695	692.
2	4.5	30.	.215	692.
3	4.5	183.	.000	692.
1	5.0	57.	.722	631.
2	5.0	29.	.221	631.
3	5.0	166.	.000	631.
1	5.5	55.	.741	575.
2	5.5	29.	.229	575.
3	5.5	153.	.000	575.
1	6.0	52.	.752	525.
2	6.0	28.	.237	525.
3	6.0	142.	.001	525.
1	6.5	50.	.783	525.
2	6.5	28.	.221	525.
3	6.5	131.	.002	525.
1	7.0	48.	.785	479.
2	7.0	28.	.231	479.
3	7.0	123.	.002	479.
1	7.5	46.	.805	479.
2	7.5	27.	.218	479.
3	7.5	116.	.006	479.
1	8.0	44.	.815	479.
2	8.0	27.	.206	479.
3	8.0	109.	.012	479.
1	8.5	44.	.814	437.
2	8.5	27.	.216	437.
3	8.5	104.	.011	437.
1	9.0	42.	.821	437.
2	9.0	26.	.206	437.
3	9.0	98.	.017	437.
1	9.5	41.	.822	437.
2	9.5	26.	.197	437.
3	9.5	94.	.020	437.
1	10.0	41.	.818	398.
2	10.0	26.	.207	398.
3	10.0	90.	.015	398.
1	10.5	40.	.819	398.
2	10.5	26.	.198	398.
3	10.5	86.	.021	398.
1	11.0	39.	.818	398.
2	11.0	26.	.190	398.
3	11.0	83.	.030	398.

2	11.5	26.	.183	398.
3	11.5	80.	.042	398.
1	12.0	37.	.808	398.
2	12.0	25.	.176	398.
3	12.0	77.	.055	398.
1	12.5	37.	.800	398.
2	12.5	25.	.170	398.
3	12.5	74.	.070	398.
1	13.0	36.	.792	398.
2	13.0	25.	.164	398.
3	13.0	72.	.086	398.
1	13.5	35.	.782	398.
2	13.5	25.	.159	398.
3	13.5	69.	.103	398.
1	14.0	35.	.772	398.
2	14.0	25.	.154	398.
3	14.0	67.	.121	398.
1	14.5	34.	.762	398.
2	14.5	25.	.149	398.
3	14.5	65.	.140	398.
1	15.0	34.	.751	398.
2	15.0	25.	.144	398.
3	15.0	64.	.159	398.
1	15.5	34.	.740	398.
2	15.5	25.	.140	398.
3	15.5	62.	.178	398.
1	16.0	33.	.728	398.
2	16.0	24.	.136	398.
3	16.0	60.	.197	398.
1	16.5	33.	.717	398.
2	16.5	24.	.132	398.
3	16.5	59.	.216	398.
1	17.0	32.	.706	398.
2	17.0	24.	.129	398.
3	17.0	57.	.234	398.
1	17.5	32.	.695	398.
2	17.5	24.	.125	398.
3	17.5	56.	.251	398.
1	18.0	32.	.684	398.
2	18.0	24.	.122	398.
3	18.0	55.	.268	398.
1	18.5	32.	.673	398.
2	18.5	24.	.119	398.
3	18.5	54.	.284	398.
1	19.0	32.	.696	363.
2	19.0	24.	.128	363.
3	19.0	53.	.256	363.
1	19.5	31.	.686	363.
2	19.5	24.	.125	363.
3	19.5	52.	.271	363.
1	20.0	31.	.676	363.
2	20.0	24.	.122	363.
3	20.0	51.	.286	363.

OVERALL MAXIMUM TREETOP CONCENTRATION = 1.085 $\mu g/m^3$ AS A 1.00 HOUR AVERAGE
DISTANCE OF OCCURRENCE = 363. M
CRITICAL TEN-METRE WINDSPEED = 20.0 M/S

MAXIMUM PERMISSIBLE CONCENTRATION = .807 $\mu g/m^3$ AS A 1.00 HOUR AVERAGE

ALBERTA DEPARTMENT OF THE ENVIRONMENT, STACK52 MODEL

ANC Whitecourt - SO2 flat terrain

PARAMETERS FOR SOURCE NUMBER 1: A STACK

STACK HEIGHT =	34.00	M	
STACK DIAMETER =	2.100	M	
GAS EXIT SPEED =	13.0000	M/S	
GAS TEMPERATURE =	230.0	C	
EMISSION RATE =	.2325000	G/S	AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE =	2.0	C	
STACK DISTANCE =	.0	M	FROM ORIGIN

PARAMETERS FOR SOURCE NUMBER 2: A STACK

STACK HEIGHT =	34.00	M	
STACK DIAMETER =	.850	M	
GAS EXIT SPEED =	12.0000	M/S	
GAS TEMPERATURE =	260.0	C	
EMISSION RATE =	.0322000	G/S	AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE =	2.0	C	
STACK DISTANCE =	.0	M	FROM ORIGIN

PARAMETERS FOR SOURCE NUMBER 3: A STACK

STACK HEIGHT =	26.00	M	
STACK DIAMETER =	8.500	M	
GAS EXIT SPEED =	4.0000	M/S	
GAS TEMPERATURE =	550.0	C	
EMISSION RATE =	.3180000	G/S	AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE =	2.0	C	
STACK DISTANCE =	.0	M	FROM ORIGIN

AMBIENT TEMPERATURE = 10.0 C

DIFFUSION WITHIN A MIXING LAYER REACHING TO THE
LEVEL OF THE HIGHEST PLUME OR 100. M, WHICHEVER IS LARGER

TEN-METRE WINDSPEEDS BETWEEN 1.0 AND 20.0 M/S
IN INCREMENTS OF .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

NUMBER	(M/S)	HEIGHT (M)	MAXIMUM (ug/m^3)	MAXIMUM (M)
1	1.0	262.	.000	1202.
2	1.0	87.	.216	1202.
3	1.0	884.	.000	1202.
1	1.5	183.	.173	2754.
2	1.5	67.	.103	2754.
3	1.5	595.	.000	2754.
1	2.0	144.	.224	1905.
2	2.0	57.	.132	1905.
3	2.0	450.	.000	1905.
1	2.5	120.	.286	1585.
2	2.5	51.	.140	1585.
3	2.5	364.	.000	1585.
1	3.0	104.	.333	1318.
2	3.0	47.	.152	1318.
3	3.0	306.	.000	1318.
1	3.5	93.	.367	1096.
2	3.5	44.	.167	1096.
3	3.5	264.	.000	1096.
1	4.0	85.	.408	1000.
2	4.0	42.	.167	1000.
3	4.0	233.	.000	1000.
1	4.5	78.	.440	912.
2	4.5	40.	.169	912.
3	4.5	209.	.000	912.
1	5.0	73.	.466	832.
2	5.0	39.	.172	832.
3	5.0	190.	.000	832.
1	5.5	69.	.486	759.
2	5.5	37.	.176	759.
3	5.5	174.	.001	759.
1	6.0	65.	.501	692.
2	6.0	37.	.180	692.
3	6.0	161.	.001	692.
1	6.5	62.	.511	631.
2	6.5	36.	.185	631.
3	6.5	150.	.001	631.
1	7.0	59.	.533	631.
2	7.0	35.	.174	631.
3	7.0	141.	.004	631.
1	7.5	57.	.548	631.
2	7.5	35.	.165	631.
3	7.5	132.	.008	631.
1	8.0	55.	.553	575.
2	8.0	34.	.171	575.
3	8.0	125.	.008	575.
1	8.5	54.	.563	575.
2	8.5	34.	.163	575.
3	8.5	119.	.014	575.
1	9.0	52.	.569	575.
2	9.0	33.	.155	575.
3	9.0	113.	.023	575.
1	9.5	51.	.572	575.
2	9.5	33.	.149	575.
3	9.5	108.	.035	575.
1	10.0	49.	.572	575.
2	10.0	33.	.143	575.
3	10.0	104.	.050	575.
1	10.5	48.	.555	631.
2	10.5	32.	.125	631.
3	10.5	100.	.094	631.
1	11.0	47.	.567	575.
2	11.0	32.	.132	575.
3	11.0	96.	.066	575.

2	11.5	32.	.138	525.
3	11.5	92.	.049	525.
1	12.0	46.	.571	525.
2	12.0	32.	.133	525.
3	12.0	89.	.056	525.
1	12.5	45.	.567	525.
2	12.5	31.	.129	525.
3	12.5	86.	.065	525.
1	13.0	44.	.573	479.
2	13.0	31.	.135	479.
3	13.0	84.	.055	479.
1	13.5	43.	.569	479.
2	13.5	31.	.131	479.
3	13.5	81.	.065	479.
1	14.0	43.	.564	479.
2	14.0	31.	.127	479.
3	14.0	79.	.076	479.
1	14.5	42.	.560	479.
2	14.5	31.	.123	479.
3	14.5	77.	.087	479.
1	15.0	42.	.554	479.
2	15.0	31.	.119	479.
3	15.0	75.	.099	479.
1	15.5	41.	.548	479.
2	15.5	30.	.116	479.
3	15.5	73.	.111	479.
1	16.0	41.	.542	479.
2	16.0	30.	.113	479.
3	16.0	71.	.123	479.
1	16.5	40.	.536	479.
2	16.5	30.	.110	479.
3	16.5	70.	.136	479.
1	17.0	40.	.530	479.
2	17.0	30.	.107	479.
3	17.0	68.	.147	479.
1	17.5	40.	.523	479.
2	17.5	30.	.104	479.
3	17.5	67.	.159	479.
1	18.0	39.	.517	479.
2	18.0	30.	.102	479.
3	18.0	66.	.171	479.
1	18.5	39.	.510	479.
2	18.5	30.	.099	479.
3	18.5	64.	.182	479.
1	19.0	39.	.522	437.
2	19.0	30.	.105	437.
3	19.0	63.	.166	437.
1	19.5	38.	.516	437.
2	19.5	30.	.102	437.
3	19.5	62.	.177	437.
1	20.0	38.	.510	437.
2	20.0	30.	.100	437.
3	20.0	61.	.188	437.

ug/m^3

OVERALL MAXIMUM TREETOP CONCENTRATION = .797 AS A 1.00 HOUR AVERAGE

DISTANCE OF OCCURRENCE = 437. M

CRITICAL TEN-METRE WINDSPEED = 20.0 M/S

MAXIMUM PERMISSIBLE CONCENTRATION = .807 AS A 1.00 HOUR AVERAGE

ug/m^3

ANC Whitecourt - NOx hilly terrain

PARAMETERS FOR SOURCE NUMBER 1: A STACK

STACK HEIGHT =	34.00	M	
STACK DIAMETER =	2.100	M	
GAS EXIT SPEED =	13.0000	M/S	
GAS TEMPERATURE =	230.0	C	
EMISSION RATE =	67.8000000	G/S	AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE =	2.0	C	
STACK DISTANCE =	.0	M	FROM ORIGIN

PARAMETERS FOR SOURCE NUMBER 2: A STACK

STACK HEIGHT =	34.00	M	
STACK DIAMETER =	.850	M	
GAS EXIT SPEED =	12.0000	M/S	
GAS TEMPERATURE =	260.0	C	
EMISSION RATE =	6.4320000	G/S	AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE =	2.0	C	
STACK DISTANCE =	.0	M	FROM ORIGIN

PARAMETERS FOR SOURCE NUMBER 3: A STACK

STACK HEIGHT =	26.00	M	
STACK DIAMETER =	8.500	M	
GAS EXIT SPEED =	4.0000	M/S	
GAS TEMPERATURE =	550.0	C	
EMISSION RATE =	3.1800000	G/S	AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE =	2.0	C	
STACK DISTANCE =	.0	M	FROM ORIGIN

AMBIENT TEMPERATURE = 10.0 C

DIFFUSION WITHIN A MIXING LAYER REACHING TO THE
LEVEL OF THE HIGHEST PLUME OR 100. M, WHICHEVER IS LARGER

TEN-METRE WINDSPEEDS BETWEEN 1.0 AND 20.0 M/S
IN INCREMENTS OF .5 M/S ARE EXAMINED

DISTANCE FROM ORIGIN IN METRES	ELEVATION ABOVE ORIGIN IN METRES
1000.	50.
2000.	150.
3000.	200.
5000.	250.
6000.	300.
7000.	350.

DISTANCE TO TREE CANOPY = 0. M FROM ORIGIN

NUMBER	(M/S)	HEIGHT (M)	MAXIMUM (ug/m^3)	MAXIMUM (M)
1	1.0	176.	69.595	3020.
2	1.0	54.	18.241	3020.
3	1.0	731.	.000	3020.
1	1.5	123.	106.152	2000.
2	1.5	42.	23.071	2000.
3	1.5	484.	.000	2000.
1	2.0	101.	130.392	1445.
2	2.0	38.	29.588	1445.
3	2.0	378.	.000	1445.
1	2.5	87.	151.800	1202.
2	2.5	35.	32.407	1202.
3	2.5	310.	.000	1202.
1	3.0	77.	170.309	1096.
2	3.0	33.	31.838	1096.
3	3.0	260.	.000	1096.
1	3.5	71.	182.395	912.
2	3.5	32.	36.767	912.
3	3.5	229.	.000	912.
1	4.0	66.	191.540	759.
2	4.0	31.	42.181	759.
3	4.0	204.	.000	759.
1	4.5	61.	202.546	692.
2	4.5	30.	43.026	692.
3	4.5	183.	.001	692.
1	5.0	57.	210.641	631.
2	5.0	29.	44.233	631.
3	5.0	166.	.003	631.
1	5.5	55.	216.227	575.
2	5.5	29.	45.702	575.
3	5.5	153.	.004	575.
1	6.0	52.	225.594	575.
2	6.0	28.	42.405	575.
3	6.0	140.	.018	575.
1	6.5	50.	228.421	525.
2	6.5	28.	44.236	525.
3	6.5	131.	.021	525.
1	7.0	48.	229.039	479.
2	7.0	28.	46.123	479.
3	7.0	123.	.022	479.
1	7.5	46.	234.713	479.
2	7.5	27.	43.501	479.
3	7.5	116.	.058	479.
1	8.0	44.	237.794	479.
2	8.0	27.	41.145	479.
3	8.0	109.	.124	479.
1	8.5	44.	237.258	437.
2	8.5	27.	43.204	437.
3	8.5	104.	.109	437.
1	9.0	42.	239.281	437.
2	9.0	26.	41.138	437.
3	9.0	98.	.168	437.
1	9.5	42.	236.914	398.
2	9.5	27.	43.140	398.
3	9.5	95.	.101	398.
1	10.0	41.	238.469	398.
2	10.0	26.	41.301	398.
3	10.0	90.	.145	398.
1	10.5	40.	238.901	398.
2	10.5	26.	39.606	398.
3	10.5	86.	.214	398.
1	11.0	39.	235.351	363.
2	11.0	26.	41.498	363.

2	11.5	26.	39.962	363.
3	11.5	81.	.239	363.
1	12.0	38.	235.654	363.
2	12.0	26.	38.532	363.
3	12.0	78.	.330	363.
1	12.5	37.	234.841	363.
2	12.5	26.	37.197	363.
3	12.5	75.	.438	363.
1	13.0	36.	233.544	363.
2	13.0	25.	35.948	363.
3	13.0	72.	.561	363.
1	13.5	36.	230.188	331.
2	13.5	26.	37.672	331.
3	13.5	71.	.437	331.
1	14.0	36.	229.349	331.
2	14.0	25.	36.516	331.
3	14.0	69.	.550	331.
1	14.5	35.	228.156	331.
2	14.5	25.	35.425	331.
3	14.5	67.	.675	331.
1	15.0	35.	226.673	331.
2	15.0	25.	34.397	331.
3	15.0	65.	.811	331.
1	15.5	34.	224.952	331.
2	15.5	25.	33.424	331.
3	15.5	63.	.955	331.
1	16.0	34.	223.039	331.
2	16.0	25.	32.504	331.
3	16.0	62.	1.107	331.
1	16.5	34.	219.702	302.
2	16.5	25.	33.969	302.
3	16.5	61.	.877	302.
1	17.0	34.	218.299	302.
2	17.0	25.	33.103	302.
3	17.0	59.	1.012	302.
1	17.5	33.	216.737	302.
2	17.5	25.	32.278	302.
3	17.5	58.	1.153	302.
1	18.0	33.	215.042	302.
2	18.0	25.	31.493	302.
3	18.0	57.	1.297	302.
1	18.5	33.	213.240	302.
2	18.5	25.	30.744	302.
3	18.5	56.	1.444	302.
1	19.0	32.	211.350	302.
2	19.0	25.	30.029	302.
3	19.0	55.	1.593	302.
1	19.5	32.	209.390	302.
2	19.5	25.	29.347	302.
3	19.5	53.	1.743	302.
1	20.0	32.	207.375	302.
2	20.0	25.	28.693	302.
3	20.0	52.	1.892	302.

ug/m^3

OVERALL MAXIMUM TREETOP CONCENTRATION = 280.587 AS A 1.00 HOUR AVERAGE

DISTANCE OF OCCURRENCE = 437. M

CRITICAL TEN-METRE WINDSPEED = 9.0 M/S

MAXIMUM PERMISSIBLE CONCENTRATION = 300 ug/m^3 AS A 1.00 HOUR AVERAGE

ALBERTA DEPARTMENT OF THE ENVIRONMENT, STACKS2 MODEL

ANC Whitecourt - NOx flat terrain

PARAMETERS FOR SOURCE NUMBER 1: A STACK

STACK HEIGHT =	34.00	M	
STACK DIAMETER =	2.100	M	
GAS EXIT SPEED =	13.0000	M/S	
GAS TEMPERATURE =	230.0	C	
EMISSION RATE =	67.8000000	G/S	AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE =	2.0	C	
STACK DISTANCE =	.0	M	FROM ORIGIN

PARAMETERS FOR SOURCE NUMBER 2: A STACK

STACK HEIGHT =	34.00	M	
STACK DIAMETER =	.850	M	
GAS EXIT SPEED =	12.0000	M/S	
GAS TEMPERATURE =	260.0	C	
EMISSION RATE =	6.4320000	G/S	AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE =	2.0	C	
STACK DISTANCE =	.0	M	FROM ORIGIN

PARAMETERS FOR SOURCE NUMBER 3: A STACK

STACK HEIGHT =	26.00	M	
STACK DIAMETER =	8.500	M	
GAS EXIT SPEED =	4.0000	M/S	
GAS TEMPERATURE =	550.0	C	
EMISSION RATE =	3.1800000	G/S	AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE =	2.0	C	
STACK DISTANCE =	.0	M	FROM ORIGIN

AMBIENT TEMPERATURE = 10.0 C

DIFFUSION WITHIN A MIXING LAYER REACHING TO THE
LEVEL OF THE HIGHEST PLUME OR 100. M, WHICHEVER IS LARGER

TEN-METRE WINDSPEEDS BETWEEN 1.0 AND 20.0 M/S
IN INCREMENTS OF .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

SOURCE NUMBER	WINDSPEED (M/S)	EFFECTIVE HEIGHT (M)	CONTRIBUTION TO MAXIMUM (ug/m3)	DISTANCE TO MAXIMUM (M)
1	1.0	262.	35.361	5248.
2	1.0	87.	12.099	5248.
3	1.0	884.	.000	5248.
1	1.5	183.	53.180	3020.
2	1.5	67.	18.375	3020.
3	1.5	595.	.000	3020.
1	2.0	144.	69.296	2089.
2	2.0	57.	23.597	2089.
3	2.0	450.	.000	2089.
1	2.5	120.	86.485	1738.
2	2.5	51.	25.022	1738.
3	2.5	364.	.000	1738.
1	3.0	104.	100.143	1445.
2	3.0	47.	27.211	1445.
3	3.0	306.	.000	1445.
1	3.5	93.	111.065	1202.
2	3.5	44.	30.037	1202.
3	3.5	264.	.001	1202.
1	4.0	85.	119.056	1000.
2	4.0	42.	33.392	1000.
3	4.0	233.	.001	1000.
1	4.5	78.	128.429	912.
2	4.5	40.	33.750	912.
3	4.5	209.	.003	912.
1	5.0	73.	135.869	832.
2	5.0	39.	34.330	832.
3	5.0	190.	.005	832.
1	5.5	69.	141.702	759.
2	5.5	37.	35.077	759.
3	5.5	174.	.008	759.
1	6.0	65.	146.071	692.
2	6.0	37.	35.938	692.
3	6.0	161.	.011	692.
1	6.5	62.	152.866	692.
2	6.5	36.	33.784	692.
3	6.5	150.	.032	692.
1	7.0	59.	155.446	631.
2	7.0	35.	34.831	631.
3	7.0	141.	.036	631.
1	7.5	57.	159.828	631.
2	7.5	35.	32.993	631.
3	7.5	132.	.078	631.
1	8.0	55.	161.144	575.
2	8.0	34.	34.130	575.
3	8.0	125.	.077	575.
1	8.5	54.	164.105	575.
2	8.5	34.	32.527	575.
3	8.5	119.	.140	575.
1	9.0	52.	164.295	525.
2	9.0	33.	33.685	525.
3	9.0	113.	.129	525.
1	9.5	51.	166.421	525.
2	9.5	33.	32.265	525.
3	9.5	108.	.209	525.
1	10.0	49.	165.436	479.
2	10.0	33.	33.383	479.
3	10.0	104.	.182	479.
1	10.5	48.	167.084	479.
2	10.5	32.	32.112	479.
3	10.5	100.	.262	479.
1	11.0	47.	168.078	479.

3	11.0	96.	.273	479.
1	11.5	46.	168.394	479.
2	11.5	32.	29.825	479.
3	11.5	92.	.314	479.
1	12.0	46.	167.002	437.
2	12.0	32.	30.915	437.
3	12.0	89.	.238	437.
1	12.5	45.	167.349	437.
2	12.5	31.	29.906	437.
3	12.5	86.	.301	437.
1	13.0	44.	167.299	437.
2	13.0	31.	28.958	437.
3	13.0	84.	.376	437.
1	13.5	43.	166.917	437.
2	13.5	31.	28.066	437.
3	13.5	81.	.461	437.
1	14.0	43.	164.958	398.
2	14.0	31.	29.054	398.
3	14.0	79.	.381	398.
1	14.5	42.	164.733	398.
2	14.5	31.	28.228	398.
3	14.5	77.	.462	398.
1	15.0	42.	164.264	398.
2	15.0	31.	27.446	398.
3	15.0	75.	.551	398.
1	15.5	41.	163.589	398.
2	15.5	30.	26.705	398.
3	15.5	73.	.645	398.
1	16.0	41.	162.741	398.
2	16.0	30.	26.002	398.
3	16.0	71.	.744	398.
1	16.5	40.	161.749	398.
2	16.5	30.	25.333	398.
3	16.5	70.	.846	398.
1	17.0	40.	159.721	363.
2	17.0	30.	26.191	363.
3	17.0	68.	.710	363.
1	17.5	40.	158.970	363.
2	17.5	30.	25.563	363.
3	17.5	67.	.805	363.
1	18.0	39.	158.101	363.
2	18.0	30.	24.963	363.
3	18.0	66.	.902	363.
1	18.5	39.	157.134	363.
2	18.5	30.	24.391	363.
3	18.5	64.	1.002	363.
1	19.0	39.	156.084	363.
2	19.0	30.	23.843	363.
3	19.0	63.	1.102	363.
1	19.5	38.	154.964	363.
2	19.5	30.	23.319	363.
3	19.5	62.	1.204	363.
1	20.0	38.	153.785	363.
2	20.0	30.	22.816	363.
3	20.0	61.	1.305	363.

ug/m^3

OVERALL MAXIMUM TREETOP CONCENTRATION = 199.457 AS A 1.00 HOUR AVERAGE

DISTANCE OF OCCURRENCE = 479. M

CRITICAL TEN-METRE WINDSPEED = 10.5 M/S

MAXIMUM PERMISSIBLE CONCENTRATION = 300 ug/m^3 AS A 1.00 HOUR AVERAGE

ALBERTA DEPARTMENT OF THE ENVIRONMENT, STACKS2 MODEL

ANC Whitecourt - PARTICULATE hilly terrain

PARAMETERS FOR SOURCE NUMBER 1: A STACK

STACK HEIGHT =	34.00	M	
STACK DIAMETER =	2.100	M	
GAS EXIT SPEED =	13.0000	M/S	
GAS TEMPERATURE =	230.0	C	
EMISSION RATE =	.0557000	G/S	AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE =	2.0	C	
STACK DISTANCE =	.0	M FROM ORIGIN	

PARAMETERS FOR SOURCE NUMBER 2: A STACK

STACK HEIGHT =	34.00	M	
STACK DIAMETER =	.850	M	
GAS EXIT SPEED =	12.0000	M/S	
GAS TEMPERATURE =	260.0	C	
EMISSION RATE =	.0077000	G/S	AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE =	2.0	C	
STACK DISTANCE =	.0	M FROM ORIGIN	

PARAMETERS FOR SOURCE NUMBER 3: A STACK

STACK HEIGHT =	26.00	M	
STACK DIAMETER =	8.500	M	
GAS EXIT SPEED =	4.0000	M/S	
GAS TEMPERATURE =	550.0	C	
EMISSION RATE =	3.1800000	G/S	AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE =	2.0	C	
STACK DISTANCE =	.0	M FROM ORIGIN	

AMBIENT TEMPERATURE = 10.0 C

DIFFUSION WITHIN A MIXING LAYER REACHING TO THE
LEVEL OF THE HIGHEST PLUME OR 100. M, WHICHEVER IS LARGER

TEN-METRE WINDSPEEDS BETWEEN 1.0 AND 20.0 M/S
IN INCREMENTS OF .5 M/S ARE EXAMINED

DISTANCE FROM ORIGIN IN METRES	ELEVATION ABOVE ORIGIN IN METRES
1000.	50.
2000.	150.
3000.	200.
5000.	250.

7000. 350.

HEIGHT OF TREE CANOPY = 10. M
DISTANCE TO TREE CANOPY = 0. M FROM ORIGIN

SOURCE NUMBER	WINDSPEED (M/S)	EFFECTIVE HEIGHT (M)	CONTRIBUTION TO MAXIMUM (ug/m^3)	DISTANCE TO MAXIMUM (M)
1	1.0	227.	.000	912.
2	1.0	66.	.083	912.
3	1.0	842.	.000	912.
1	1.5	109.	.028	7000.
2	1.5	40.	.004	7000.
3	1.5	413.	.479	7000.
1	2.0	85.	.022	7000.
2	2.0	34.	.003	7000.
3	2.0	297.	1.073	7000.
1	2.5	72.	.025	5754.
2	2.5	31.	.003	5754.
3	2.5	240.	1.397	5754.
1	3.0	63.	.032	4365.
2	3.0	29.	.004	4365.
3	3.0	204.	1.711	4365.
1	3.5	57.	.036	3631.
2	3.5	27.	.005	3631.
3	3.5	175.	2.043	3631.
1	4.0	52.	.042	3000.
2	4.0	26.	.006	3000.
3	4.0	154.	2.377	3000.
1	4.5	48.	.049	2512.
2	4.5	25.	.007	2512.
3	4.5	139.	2.686	2512.
1	5.0	45.	.052	2291.
2	5.0	25.	.007	2291.
3	5.0	126.	2.990	2291.
1	5.5	43.	.058	2000.
2	5.5	24.	.008	2000.
3	5.5	116.	3.292	2000.
1	6.0	41.	.059	1905.
2	6.0	24.	.008	1905.
3	6.0	108.	3.547	1905.
1	6.5	40.	.064	1738.
2	6.5	24.	.009	1738.
3	6.5	102.	3.802	1738.
1	7.0	39.	.077	1445.
2	7.0	24.	.011	1445.
3	7.0	99.	3.908	1445.
1	7.5	39.	.082	1318.
2	7.5	24.	.011	1318.
3	7.5	95.	3.675	1318.
1	8.0	37.	.077	1318.
2	8.0	23.	.011	1318.
3	8.0	89.	3.477	1318.
1	8.5	36.	.073	1318.
2	8.5	23.	.010	1318.
3	8.5	84.	3.334	1318.
1	9.0	36.	.079	1202.
2	9.0	23.	.011	1202.
3	9.0	82.	3.236	1202.
1	9.5	35.	.075	1202.
2	9.5	23.	.011	1202.
3	9.5	78.	3.175	1202.
1	10.0	35.	.083	1096.
2	10.0	23.	.012	1096.
3	10.0	76.	3.118	1096.
1	10.5	34.	.079	1096.
2	10.5	23.	.011	1096.
3	10.5	73.	3.110	1096.

2	11.0	23.	.011	1096.
3	11.0	70.	3.099	1096.
1	11.5	33.	.084	1000.
2	11.5	23.	.012	1000.
3	11.5	69.	3.105	1000.
1	12.0	33.	.092	912.
2	12.0	23.	.013	912.
3	12.0	68.	3.112	912.
1	12.5	33.	.089	912.
2	12.5	23.	.013	912.
3	12.5	65.	3.161	912.
1	13.0	32.	.097	832.
2	13.0	23.	.014	832.
3	13.0	64.	3.193	832.
1	13.5	32.	.094	832.
2	13.5	23.	.014	832.
3	13.5	62.	3.255	832.
1	14.0	32.	.103	759.
2	14.0	23.	.015	759.
3	14.0	61.	3.298	759.
1	14.5	31.	.100	759.
2	14.5	23.	.015	759.
3	14.5	59.	3.367	759.
1	15.0	31.	.097	759.
2	15.0	23.	.014	759.
3	15.0	58.	3.423	759.
1	15.5	31.	.107	692.
2	15.5	23.	.016	692.
3	15.5	57.	3.482	692.
1	16.0	31.	.104	692.
2	16.0	23.	.015	692.
3	16.0	56.	3.545	692.
1	16.5	31.	.113	631.
2	16.5	23.	.017	631.
3	16.5	55.	3.587	631.
1	17.0	30.	.111	631.
2	17.0	23.	.017	631.
3	17.0	54.	3.657	631.
1	17.5	30.	.108	631.
2	17.5	23.	.016	631.
3	17.5	52.	3.715	631.
1	18.0	30.	.106	631.
2	18.0	23.	.016	631.
3	18.0	51.	3.764	631.
1	18.5	30.	.115	575.
2	18.5	23.	.018	575.
3	18.5	51.	3.814	575.
1	19.0	30.	.113	575.
2	19.0	23.	.017	575.
3	19.0	50.	3.870	575.
1	19.5	29.	.110	575.
2	19.5	23.	.017	575.
3	19.5	49.	3.917	575.
1	20.0	30.	.120	525.
2	20.0	23.	.019	525.
3	20.0	49.	3.947	525.

$\mu g/m^3$

OVERALL MAXIMUM TREETOP CONCENTRATION = 4.086 AS A 1.00 HOUR AVERAGE

DISTANCE OF OCCURRENCE = 525. M

CRITICAL TEN-METRE WINDSPEED = 20.0 M/S

MAXIMUM PERMISSIBLE CONCENTRATION = ——— AS A 1.00 HOUR AVERAGE

ALBERTA DEPARTMENT OF THE ENVIRONMENT, STACKS2 MODEL

ANC Whitecourt - PARTICULATE flat terrain

PARAMETERS FOR SOURCE NUMBER 1: A STACK

STACK HEIGHT =	34.00	M	
STACK DIAMETER =	2.100	M	
GAS EXIT SPEED =	13.0000	M/S	
GAS TEMPERATURE =	230.0	C	
EMISSION RATE =	.0557000	G/S	AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE =	2.0	C	
STACK DISTANCE =	.0	M	FROM ORIGIN

PARAMETERS FOR SOURCE NUMBER 2: A STACK

STACK HEIGHT =	34.00	M	
STACK DIAMETER =	.850	M	
GAS EXIT SPEED =	12.0000	M/S	
GAS TEMPERATURE =	260.0	C	
EMISSION RATE =	.0077000	G/S	AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE =	2.0	C	
STACK DISTANCE =	.0	M	FROM ORIGIN

PARAMETERS FOR SOURCE NUMBER 3: A STACK

STACK HEIGHT =	26.00	M	
STACK DIAMETER =	8.500	M	
GAS EXIT SPEED =	4.0000	M/S	
GAS TEMPERATURE =	550.0	C	
EMISSION RATE =	3.1800000	G/S	AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE =	2.0	C	
STACK DISTANCE =	.0	M	FROM ORIGIN

AMBIENT TEMPERATURE = 10.0 C

DIFFUSION WITHIN A MIXING LAYER REACHING TO THE
LEVEL OF THE HIGHEST PLUME OR 100. M, WHICHEVER IS LARGER

TEN-METRE WINDSPEEDS BETWEEN 1.0 AND 20.0 M/S
IN INCREMENTS OF .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

SOURCE NUMBER	WINDSPEED (M/S)	EFFECTIVE HEIGHT (M)	CONTRIBUTION TO MAXIMUM ($\mu g/m^3$)	DISTANCE TO MAXIMUM (M)
1	1.0	262.	.006	36308.
2	1.0	87.	.001	36308.
3	1.0	684.	.228	36308.
1	1.5	183.	.009	20893.
2	1.5	67.	.001	20893.
3	1.5	595.	.378	20893.
1	2.0	144.	.013	13183.
2	2.0	57.	.002	13183.
3	2.0	450.	.536	13183.
1	2.5	120.	.017	10000.
2	2.5	51.	.002	10000.
3	2.5	364.	.703	10000.
1	3.0	104.	.021	7586.
2	3.0	47.	.003	7586.
3	3.0	306.	.871	7586.
1	3.5	93.	.024	6310.
2	3.5	44.	.004	6310.
3	3.5	264.	1.042	6310.
1	4.0	85.	.028	5248.
2	4.0	42.	.004	5248.
3	4.0	233.	1.213	5248.
1	4.5	78.	.033	4365.
2	4.5	40.	.005	4365.
3	4.5	209.	1.383	4365.
1	5.0	73.	.034	3981.
2	5.0	39.	.005	3981.
3	5.0	190.	1.553	3981.
1	5.5	69.	.040	3311.
2	5.5	37.	.006	3311.
3	5.5	174.	1.721	3311.
1	6.0	65.	.043	3020.
2	6.0	37.	.007	3020.
3	6.0	161.	1.889	3020.
1	6.5	62.	.046	2754.
2	6.5	36.	.007	2754.
3	6.5	150.	2.054	2754.
1	7.0	59.	.049	2512.
2	7.0	35.	.007	2512.
3	7.0	141.	2.215	2512.
1	7.5	57.	.052	2291.
2	7.5	35.	.008	2291.
3	7.5	132.	2.374	2291.
1	8.0	55.	.056	2089.
2	8.0	34.	.009	2089.
3	8.0	125.	2.530	2089.
1	8.5	54.	.060	1905.
2	8.5	34.	.009	1905.
3	8.5	119.	2.682	1905.
1	9.0	52.	.064	1738.
2	9.0	33.	.010	1738.
3	9.0	113.	2.828	1738.
1	9.5	51.	.063	1738.
2	9.5	33.	.010	1738.
3	9.5	108.	2.977	1738.
1	10.0	49.	.067	1585.
2	10.0	33.	.010	1585.
3	10.0	104.	3.122	1585.
1	10.5	48.	.071	1445.
2	10.5	32.	.011	1445.
3	10.5	100.	3.226	1445.

2	11.0	32.	.011	1445.
3	11.0	96.	3.088	1445.
1	11.5	46.	.066	1445.
2	11.5	32.	.010	1445.
3	11.5	92.	2.974	1445.
1	12.0	46.	.064	1445.
2	12.0	32.	.010	1445.
3	12.0	89.	2.877	1445.
1	12.5	45.	.062	1445.
2	12.5	31.	.009	1445.
3	12.5	86.	2.794	1445.
1	13.0	44.	.065	1318.
2	13.0	31.	.010	1318.
3	13.0	84.	2.716	1318.
1	13.5	43.	.063	1318.
2	13.5	31.	.010	1318.
3	13.5	81.	2.663	1318.
1	14.0	43.	.061	1318.
2	14.0	31.	.009	1318.
3	14.0	79.	2.616	1318.
1	14.5	42.	.066	1202.
2	14.5	31.	.010	1202.
3	14.5	77.	2.573	1202.
1	15.0	42.	.064	1202.
2	15.0	31.	.010	1202.
3	15.0	75.	2.548	1202.
1	15.5	41.	.069	1096.
2	15.5	30.	.011	1096.
3	15.5	73.	2.525	1096.
1	16.0	41.	.067	1096.
2	16.0	30.	.010	1096.
3	16.0	71.	2.518	1096.
1	16.5	40.	.072	1000.
2	16.5	30.	.011	1000.
3	16.5	70.	2.515	1000.
1	17.0	40.	.078	912.
2	17.0	30.	.013	912.
3	17.0	68.	2.516	912.
1	17.5	40.	.076	912.
2	17.5	30.	.012	912.
3	17.5	67.	2.537	912.
1	18.0	39.	.082	832.
2	18.0	30.	.013	832.
3	18.0	66.	2.553	832.
1	18.5	39.	.080	832.
2	18.5	30.	.013	832.
3	18.5	64.	2.584	832.
1	19.0	39.	.086	759.
2	19.0	30.	.014	759.
3	19.0	63.	2.606	759.
1	19.5	38.	.084	759.
2	19.5	30.	.014	759.
3	19.5	62.	2.643	759.
1	20.0	38.	.083	759.
2	20.0	30.	.013	759.
3	20.0	61.	2.676	759.

ug/m^3

OVERALL MAXIMUM TREETOP CONCENTRATION = 3.308 AS A 1.00 HOUR AVERAGE

DISTANCE OF OCCURRENCE = 1445. M

CRITICAL TEN-METRE WINDSPEED = 10.5 M/S

MAXIMUM PERMISSIBLE CONCENTRATION = ——— AS A 1.00 HOUR AVERAGE

ALBERTA DEPARTMENT OF THE ENVIRONMENT. STACKS2 MODEL

ANC Whitecourt - NOx hilly terrain

PARAMETERS FOR SOURCE NUMBER 1: A STACK

STACK HEIGHT =	34.00	M	
STACK DIAMETER =	2.100	M	
GAS EXIT SPEED =	13.0000	M/S	
GAS TEMPERATURE =	230.0	C	
EMISSION RATE =	54.2000000	G/S	AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE =	2.0	C	
STACK DISTANCE =	.0	M FROM ORIGIN	

PARAMETERS FOR SOURCE NUMBER 2: A STACK

STACK HEIGHT =	34.00	M	
STACK DIAMETER =	.850	M	
GAS EXIT SPEED =	12.0000	M/S	
GAS TEMPERATURE =	260.0	C	
EMISSION RATE =	6.4320000	G/S	AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE =	2.0	C	
STACK DISTANCE =	.0	M FROM ORIGIN	

PARAMETERS FOR SOURCE NUMBER 3: A STACK

STACK HEIGHT =	26.00	M	
STACK DIAMETER =	8.500	M	
GAS EXIT SPEED =	4.0000	M/S	
GAS TEMPERATURE =	550.0	C	
EMISSION RATE =	3.1800000	G/S	AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE =	2.0	C	
STACK DISTANCE =	.0	M FROM ORIGIN	

AMBIENT TEMPERATURE = 10.0 C

DIFFUSION WITHIN A MIXING LAYER REACHING TO THE
LEVEL OF THE HIGHEST PLUME OR 100. M, WHICHEVER IS LARGER

TEN-METRE WINDSPEEDS BETWEEN 1.0 AND 20.0 M/S
IN INCREMENTS OF .5 M/S ARE EXAMINED

DISTANCE FROM ORIGIN IN METRES	ELEVATION ABOVE ORIGIN IN METRES
1000.	50.
2000.	150.
3000.	200.
5000.	250.
6000.	300.

HEIGHT OF TREE CANOPY = 10. M
DISTANCE TO TREE CANOPY = 0. M FROM ORIGIN

SOURCE NUMBER	WINDSPEED (M/S)	EFFECTIVE HEIGHT (M)	CONTRIBUTION TO MAXIMUM (ug/m^3)	DISTANCE TO MAXIMUM (M)
1	1.0	176.	55.479	3000.
2	1.0	54.	18.416	3000.
3	1.0	731.	.000	3000.
1	1.5	124.	83.335	1905.
2	1.5	42.	24.899	1905.
3	1.5	490.	.000	1905.
1	2.0	101.	104.237	1445.
2	2.0	38.	29.588	1445.
3	2.0	378.	.000	1445.
1	2.5	87.	121.351	1202.
2	2.5	35.	32.407	1202.
3	2.5	310.	.000	1202.
1	3.0	79.	131.554	1000.
2	3.0	33.	37.012	1000.
3	3.0	266.	.000	1000.
1	3.5	72.	141.240	832.
2	3.5	32.	41.826	832.
3	3.5	232.	.000	832.
1	4.0	66.	153.119	759.
2	4.0	31.	42.181	759.
3	4.0	204.	.000	759.
1	4.5	61.	161.917	692.
2	4.5	30.	43.026	692.
3	4.5	183.	.001	692.
1	5.0	57.	168.389	631.
2	5.0	29.	44.233	631.
3	5.0	166.	.003	631.
1	5.5	55.	172.854	575.
2	5.5	29.	45.702	575.
3	5.5	153.	.004	575.
1	6.0	52.	180.342	575.
2	6.0	28.	42.405	575.
3	6.0	140.	.018	575.
1	6.5	50.	182.602	525.
2	6.5	28.	44.236	525.
3	6.5	131.	.021	525.
1	7.0	48.	183.096	479.
2	7.0	28.	46.123	479.
3	7.0	123.	.022	479.
1	7.5	46.	187.632	479.
2	7.5	27.	43.501	479.
3	7.5	116.	.058	479.
1	8.0	45.	186.563	437.
2	8.0	27.	45.474	437.
3	8.0	110.	.052	437.
1	8.5	44.	189.667	437.
2	8.5	27.	43.204	437.
3	8.5	104.	.109	437.
1	9.0	42.	191.284	437.
2	9.0	26.	41.138	437.
3	9.0	98.	.168	437.
1	9.5	42.	189.391	398.
2	9.5	27.	43.140	398.
3	9.5	95.	.101	398.
1	10.0	41.	190.634	398.
2	10.0	26.	41.301	398.
3	10.0	90.	.145	398.
1	10.5	40.	190.980	398.
2	10.5	26.	39.606	398.
3	10.5	86.	.214	398.

2	11.0	26.	41.498	363.
3	11.0	84.	.165	363.
1	11.5	38.	188.557	363.
2	11.5	26.	39.962	363.
3	11.5	81.	.239	363.
1	12.0	38.	188.384	363.
2	12.0	26.	38.532	363.
3	12.0	78.	.330	363.
1	12.5	37.	187.734	363.
2	12.5	26.	37.197	363.
3	12.5	75.	.438	363.
1	13.0	37.	184.343	331.
2	13.0	26.	38.902	331.
3	13.0	73.	.337	331.
1	13.5	36.	184.015	331.
2	13.5	26.	37.672	331.
3	13.5	71.	.437	331.
1	14.0	36.	183.344	331.
2	14.0	25.	36.516	331.
3	14.0	69.	.550	331.
1	14.5	35.	182.390	331.
2	14.5	25.	35.425	331.
3	14.5	67.	.675	331.
1	15.0	35.	181.205	331.
2	15.0	25.	34.397	331.
3	15.0	65.	.811	331.
1	15.5	34.	179.829	331.
2	15.5	25.	33.424	331.
3	15.5	63.	.955	331.
1	16.0	34.	176.599	302.
2	16.0	25.	34.880	302.
3	16.0	62.	.749	302.
1	16.5	34.	175.632	302.
2	16.5	25.	33.969	302.
3	16.5	61.	.877	302.
1	17.0	34.	174.511	302.
2	17.0	25.	33.103	302.
3	17.0	59.	1.012	302.
1	17.5	33.	173.262	302.
2	17.5	25.	32.278	302.
3	17.5	58.	1.153	302.
1	18.0	33.	171.907	302.
2	18.0	25.	31.493	302.
3	18.0	57.	1.297	302.
1	18.5	33.	170.466	302.
2	18.5	25.	30.744	302.
3	18.5	56.	1.444	302.
1	19.0	32.	168.955	302.
2	19.0	25.	30.029	302.
3	19.0	55.	1.593	302.
1	19.5	32.	167.388	302.
2	19.5	25.	29.347	302.
3	19.5	53.	1.743	302.
1	20.0	32.	165.778	302.
2	20.0	25.	28.693	302.
3	20.0	52.	1.892	302.

OVERALL MAXIMUM TREETOP CONCENTRATION = 232.979 ug/m³ AS A 1.00 HOUR AVERAGE

DISTANCE OF OCCURRENCE = 437. M

CRITICAL TEN-METRE WINDSPEED = 8.5 M/S

MAXIMUM PERMISSIBLE CONCENTRATION = 300 ug/m³ AS A 1.00 HOUR AVERAGE

ALBERTA DEPARTMENT OF THE ENVIRONMENT, STACKS2 MODEL

ANC Whitecourt - NOx flat terrain

PARAMETERS FOR SOURCE NUMBER 1: A STACK

STACK HEIGHT =	34.00	M	
STACK DIAMETER =	2.100	M	
GAS EXIT SPEED =	13.0000	M/S	
GAS TEMPERATURE =	230.0	C	
EMISSION RATE =	54.2000000	G/S	AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE =	2.0	C	
STACK DISTANCE =	.0	M	FROM ORIGIN

PARAMETERS FOR SOURCE NUMBER 2: A STACK

STACK HEIGHT =	34.00	M	
STACK DIAMETER =	.850	M	
GAS EXIT SPEED =	12.0000	M/S	
GAS TEMPERATURE =	260.0	C	
EMISSION RATE =	6.4320000	G/S	AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE =	2.0	C	
STACK DISTANCE =	.0	M	FROM ORIGIN

PARAMETERS FOR SOURCE NUMBER 3: A STACK

STACK HEIGHT =	26.00	M	
STACK DIAMETER =	8.500	M	
GAS EXIT SPEED =	4.0000	M/S	
GAS TEMPERATURE =	550.0	C	
EMISSION RATE =	3.1800000	G/S	AT REFERENCE TEMPERATURE AND 101.325 KPA
REFERENCE TEMPERATURE =	2.0	C	
STACK DISTANCE =	.0	M	FROM ORIGIN

AMBIENT TEMPERATURE = 10.0 C

DIFFUSION WITHIN A MIXING LAYER REACHING TO THE
LEVEL OF THE HIGHEST PLUME OR 100. M, WHICHEVER IS LARGER

TEN-METRE WINDSPEEDS BETWEEN 1.0 AND 20.0 M/S
IN INCREMENTS OF .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

SOURCE NUMBER	WINDSPEED (M/S)	EFFECTIVE HEIGHT (M)	CONTRIBUTION TO MAXIMUM ($\mu g/m^3$)	DISTANCE TO MAXIMUM (M)
1	1.0	262.	.027	1202.
2	1.0	87.	43.047	1202.
3	1.0	884.	.000	1202.
1	1.5	183.	42.512	3020.
2	1.5	67.	18.375	3020.
3	1.5	595.	.000	3020.
1	2.0	144.	55.396	2089.
2	2.0	57.	23.597	2089.
3	2.0	450.	.000	2089.
1	2.5	120.	66.602	1585.
2	2.5	51.	27.972	1585.
3	2.5	364.	.000	1585.
1	3.0	104.	77.548	1318.
2	3.0	47.	30.333	1318.
3	3.0	306.	.000	1318.
1	3.5	93.	85.666	1096.
2	3.5	44.	33.330	1096.
3	3.5	264.	.000	1096.
1	4.0	85.	95.175	1000.
2	4.0	42.	33.392	1000.
3	4.0	233.	.001	1000.
1	4.5	78.	102.667	912.
2	4.5	40.	33.750	912.
3	4.5	209.	.003	912.
1	5.0	73.	108.615	832.
2	5.0	39.	34.330	832.
3	5.0	190.	.005	832.
1	5.5	69.	113.278	759.
2	5.5	37.	35.077	759.
3	5.5	174.	.008	759.
1	6.0	65.	116.771	692.
2	6.0	37.	35.938	692.
3	6.0	161.	.011	692.
1	6.5	62.	122.202	692.
2	6.5	36.	33.784	692.
3	6.5	150.	.032	692.
1	7.0	59.	124.265	631.
2	7.0	35.	34.831	631.
3	7.0	141.	.036	631.
1	7.5	57.	125.274	575.
2	7.5	35.	35.885	575.
3	7.5	132.	.038	575.
1	8.0	55.	128.820	575.
2	8.0	34.	34.130	575.
3	8.0	125.	.077	575.
1	8.5	54.	128.762	525.
2	8.5	34.	35.225	525.
3	8.5	119.	.073	525.
1	9.0	52.	131.339	525.
2	9.0	33.	33.685	525.
3	9.0	113.	.129	525.
1	9.5	51.	133.039	525.
2	9.5	33.	32.265	525.
3	9.5	108.	.209	525.
1	10.0	49.	132.251	479.
2	10.0	33.	33.383	479.
3	10.0	104.	.182	479.
1	10.5	48.	133.569	479.
2	10.5	32.	32.112	479.
3	10.5	100.	.262	479.

2	11.0	32.	30.928	479.
3	11.0	96.	.273	479.
1	11.5	46.	132.846	437.
2	11.5	32.	31.990	437.
3	11.5	92.	.189	437.
1	12.0	46.	133.503	437.
2	12.0	32.	30.915	437.
3	12.0	89.	.238	437.
1	12.5	45.	133.781	437.
2	12.5	31.	29.906	437.
3	12.5	86.	.301	437.
1	13.0	44.	133.740	437.
2	13.0	31.	28.958	437.
3	13.0	84.	.376	437.
1	13.5	43.	131.819	398.
2	13.5	31.	29.927	398.
3	13.5	81.	.307	398.
1	14.0	43.	131.869	398.
2	14.0	31.	29.054	398.
3	14.0	79.	.381	398.
1	14.5	42.	131.689	398.
2	14.5	31.	28.228	398.
3	14.5	77.	.462	398.
1	15.0	42.	131.314	398.
2	15.0	31.	27.446	398.
3	15.0	75.	.551	398.
1	15.5	41.	130.774	398.
2	15.5	30.	26.705	398.
3	15.5	73.	.645	398.
1	16.0	41.	130.097	398.
2	16.0	30.	26.002	398.
3	16.0	71.	.744	398.
1	16.5	40.	128.174	363.
2	16.5	30.	26.849	363.
3	16.5	70.	.619	363.
1	17.0	40.	127.683	363.
2	17.0	30.	26.191	363.
3	17.0	68.	.710	363.
1	17.5	40.	127.082	363.
2	17.5	30.	25.563	363.
3	17.5	67.	.805	363.
1	18.0	39.	126.388	363.
2	18.0	30.	24.963	363.
3	18.0	66.	.902	363.
1	18.5	39.	125.615	363.
2	18.5	30.	24.391	363.
3	18.5	64.	1.002	363.
1	19.0	39.	124.775	363.
2	19.0	30.	23.843	363.
3	19.0	63.	1.102	363.
1	19.5	38.	123.879	363.
2	19.5	30.	23.319	363.
3	19.5	62.	1.204	363.
1	20.0	38.	122.938	363.
2	20.0	30.	22.816	363.
3	20.0	61.	1.305	363.

ug/m^3

OVERALL MAXIMUM TREETOP CONCENTRATION = 165.942 AS A 1.00 HOUR AVERAGE

DISTANCE OF OCCURRENCE = 479. M

CRITICAL TEN-METRE WINDSPEED = 10.5 M/S

MAXIMUM PERMISSIBLE CONCENTRATION = 300 ug/m^3 AS A 1.00 HOUR AVERAGE

DOWNWASH MODELLING

FOR NO_x, SO_2 AND PARTICULATE

```
SEEC - V1   ALBERTA NEWSPRINT - DOWNWASH EVALUATION (SO2)
     ==================================================

     SITE:       WHITECOURT NEWSPRINT MILL
      ------------------------------------------------

Site Discription:
          LATITUDE:             54.25 xN
          AMBIENT TEMP:         10.00 xC    = 283.16 K
          ROUGHNESS:           100    cm
          AVERAGING TIME:        1.00  h
          ELEVATION ASL:       732.  m
          POLLUTANT MOL WT:     64.1

Options:
          WIND DIRECTIONS:      36
          CALCULATION PLANE:      .00 m
          GRID DENSITY:        1.0DW x 1.0CW
          WINDOW:               from   .Auto. to  .Auto.
          POLLUTANT:            SO2

Building  1:      UTILITIES
          CORNERS AT:           25.0 mN        10.0 mE
                                42.0 mN        10.0 mE
                                42.0 mN        70.0 mE
                                  .0 mN        70.0 mE
                                  .0 mN        40.0 mE
                                25.0 mN        40.0 mE
          HEIGHT:               30.1 m
     Stack  1:    PACKAGE BOILER
          LOCATION:             30.0 mN        65.0 mE
          HEIGHT:              34.00 m
          DIAMETER:             2.10 m
          GAS TEMPERATURE:    230.00 xC  =   503.16 K
          GAS VELOCITY:        13.00 m/s
          POLLUTANT FLOW:    .230000 G/S
            AT REF. TEMP:      25.00 xC    = 298.16 K
     Stack  2:    GLYCOL/WATER HEATER
          LOCATION:             30.0 mN        65.0 mE
          HEIGHT:              34.00 m
          DIAMETER:              .85 m
          GAS TEMPERATURE:    260.00 xC  =   533.16 K
          GAS VELOCITY:        12.00 m/s
          POLLUTANT FLOW:    .030000 G/S
            AT REF. TEMP:      25.00 xC    = 298.16 K
      ==================================================
```

SEEC - VE ALBERTA NEWSPRINT - DOWNWASH EVALUATION (SO2)

SITE: WHITECOURT NEWSPRINT MILL

1

Maximum	Conditions
.99 UG/M3 SO2	WDir = 270x Wind Speed = 1. m/s
	Stability = F
	Location = 30.0 mN, 367.9 mE

Contribution of Stacks		
Stack:	Eff.Height	SO2
1:PACKAGE BOILER	100.6 m	.66 UG/M3
2:GLYCOL/WATER HEATER	70.3 m	.33 UG/M3
TOTAL:		.99 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

2

Maximum	Conditions
.99 UG/M3 SO2	WDir = 90x Wind Speed = 1. m/s
	Stability = F
	Location = 30.0 mN, -237.9 mE

Contribution of Stacks		
Stack:	Eff.Height	SO2
1:PACKAGE BOILER	100.6 m	.66 UG/M3
2:GLYCOL/WATER HEATER	70.3 m	.33 UG/M3
TOTAL:		.99 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

3

Maximum	Conditions
.94 UG/M3 SO2	WDir = 280x Wind Speed = 1. m/s
	Stability = F
	Location = -22.6 mN, 363.3 mE

Contribution of Stacks		
Stack:	Eff.Height	SO2
1:PACKAGE BOILER	100.6 m	.63 UG/M3
2:GLYCOL/WATER HEATER	70.3 m	.32 UG/M3
TOTAL:		.94 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

SEED - V1 ALBERTA NEWSPRINT - DOWNWASH EVALUATION (SO2)

SITE: WHITECOURT NEWSPRINT MILL

4

Maximum	Conditions
.94 UG/M3 SO2	WDir = 100x Wind Speed = 1. m/s
	Stability = F
	Location = 82.6 mN, -233.3 mE

Contribution of Stacks

Stack:	Eff.Height	SO2
1:PACKAGE BOILER	100.6 m	.63 UG/M3
2:GLYCOL/WATER HEATER	70.3 m	.32 UG/M3
TOTAL:		.94 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

5

Maximum	Conditions
.91 UG/M3 SO2	WDir = 290x Wind Speed = 1. m/s
	Stability = F
	Location = -73.6 mN, 349.6 mE

Contribution of Stacks

Stack:	Eff.Height	SO2
1:PACKAGE BOILER	100.6 m	.61 UG/M3
2:GLYCOL/WATER HEATER	70.3 m	.30 UG/M3
TOTAL:		.91 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

```
 SEEC - V1   ALBERTA NEWSPRINT - DOWNWASH EVALUATION (SO2)
      ====================================================

      SITE:       WHITECOURT NEWSPRINT MILL
       ---------------------------------------------------

Site Discription:
          LATITUDE:             54.25 xN
          AMBIENT TEMP:         10.00 xC    = 283.16 K
          ROUGHNESS:           100    cm
          AVERAGING TIME:        1.00  h
          ELEVATION ASL:       732.    m
          POLLUTANT MOL WT:     64.1

Options:
          WIND DIRECTIONS:      36
          CALCULATION PLANE:      .00 m
          GRID DENSITY:        1.0DW x 1.0CW
          WINDOW:               from   .Auto. to  .Auto.
          POLLUTANT:            SO2

Building  1:      CTMP
          CORNERS AT:            42.0 mN        10.0 mE
                                 78.0 mN        10.0 mE
                                 78.0 mN        87.0 mE
                                 42.0 mN        87.0 mE
          HEIGHT:                30.2 m
     Stack  1:    PACKAGE BOILER
          LOCATION:              30.0 mN        65.0 mE
          HEIGHT:               34.00 m
          DIAMETER:              2.10 m
          GAS TEMPERATURE:     230.00 xC  =   503.16 K
          GAS VELOCITY:         13.00 m/s
          POLLUTANT FLOW:     .230000 G/S
            AT REF. TEMP:       25.00 xC    = 298.16 K
     Stack  2:    GLYCOL/WATER HEATER
          LOCATION:              30.0 mN        65.0 mE
          HEIGHT:               34.00 m
          DIAMETER:               .85 m
          GAS TEMPERATURE:     260.00 xC  =   533.16 K
          GAS VELOCITY:         12.00 m/s
          POLLUTANT FLOW:     .030000 G/S
            AT REF. TEMP:       25.00 xC    = 298.16 K
      ====================================================
```

SEEC - V1 ALBERTA NEWSPRINT - DOWNWASH EVALUATION (SO2)

SITE: WHITECOURT NEWSPRINT MILL

4

Maximum	Conditions
.64 UG/M3 SO2	WDir = 30x Wind Speed = 1. m/s
	Stability = E
	Location = -2610.9 mN, -1459.7 mE

Contribution of Stacks

Stack:	Eff.Height	SO2
1:PACKAGE BOILER	120.8 m	.49 UG/M3
2:GLYCOL/WATER HEATER	81.3 m	.14 UG/M3
TOTAL:		.64 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

5

Maximum	Conditions
.64 UG/M3 SO2	WDir = 40x Wind Speed = 1. m/s
	Stability = E
	Location = -2306.0 mN, -1895.1 mE

Contribution of Stacks

Stack:	Eff.Height	SO2
1:PACKAGE BOILER	120.8 m	.49 UG/M3
2:GLYCOL/WATER HEATER	81.3 m	.14 UG/M3
TOTAL:		.64 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

SEEC - V1 ALBERTA NEWSPRINT - DOWNWASH EVALUATION (SO2)

SITE: WHITECOURT NEWSPRINT MILL

1

Maximum	Conditions
.64 UG/M3 SO2	WDir = 0x Wind Speed = 1. m/s
	Stability = E
	Location = -3019.4 mN, 65.0 mE

Contribution of Stacks

Stack:	Eff.Height	SO2
1:PACKAGE BOILER	120.8 m	.49 UG/M3
2:GLYCOL/WATER HEATER	81.3 m	.14 UG/M3
TOTAL:		.64 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

2

Maximum	Conditions
.64 UG/M3 SO2	WDir = 10x Wind Speed = 1. m/s
	Stability = E
	Location = -2973.1 mN, -464.5 mE

Contribution of Stacks

Stack:	Eff.Height	SO2
1:PACKAGE BOILER	120.8 m	.49 UG/M3
2:GLYCOL/WATER HEATER	81.3 m	.14 UG/M3
TOTAL:		.64 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

3

Maximum	Conditions
.64 UG/M3 SO2	WDir = 20x Wind Speed = 1. m/s
	Stability = E
	Location = -2835.5 mN, -978.0 mE

Contribution of Stacks

Stack:	Eff.Height	SO2
1:PACKAGE BOILER	120.8 m	.49 UG/M3
2:GLYCOL/WATER HEATER	81.3 m	.14 UG/M3
TOTAL:		.64 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

SEEC - V1 ALBERTA NEWSPRINT - DOWNWASH EVALUATION (SO2)

SITE: WHITECOURT NEWSPRINT MILL

Site Discription:

LATITUDE:	54.25 xN	
AMBIENT TEMP:	10.00 xC	= 283.16 K
ROUGHNESS:	100 cm	
AVERAGING TIME:	1.00 h	
ELEVATION ASL:	732. m	
POLLUTANT MOL WT:	64.1	

Options:

WIND DIRECTIONS:	36
CALCULATION PLANE:	.00 m
GRID DENSITY:	1.0DW x 1.0CW
WINDOW:	from .Auto. to .Auto.
POLLUTANT:	SO2

Building 1: WAREHOUSE

CORNERS AT:	27.0 mN	255.0 mE
	131.0 mN	255.0 mE
	131.0 mN	365.0 mE
	27.0 mN	365.0 mE
HEIGHT:	9.1 m	

Stack 1: PACKAGE BOILER

LOCATION:	30.0 mN	65.0 mE
HEIGHT:	34.00 m	
DIAMETER:	2.10 m	
GAS TEMPERATURE:	230.00 xC =	503.16 K
GAS VELOCITY:	13.00 m/s	
POLLUTANT FLOW:	.230000 G/S	
AT REF. TEMP:	25.00 xC	= 298.16 K

Stack 2: GLYCOL/WATER HEATER

LOCATION:	30.0 mN	65.0 mE
HEIGHT:	34.00 m	
DIAMETER:	.85 m	
GAS TEMPERATURE:	260.00 xC =	533.16 K
GAS VELOCITY:	12.00 m/s	
POLLUTANT FLOW:	.030000 G/S	
AT REF. TEMP:	25.00 xC	= 298.16 K

SEEC - V1 ALBERTA NEWSPRINT - DOWNWASH EVALUATION (SO2)

SITE: WHITECOURT NEWSPRINT MILL

4

Maximum	Conditions
1.30 UG/M3 SO2	WDir = 10x Wind Speed = 1. m/s
	Stability = F
	Location = -256.2 mN, 14.5 mE

Contribution of Stacks

Stack:	Eff.Height	SO2
1:PACKAGE BOILER	100.6 m	.77 UG/M3
2:GLYCOL/WATER HEATER	70.3 m	.54 UG/M3
TOTAL:		1.30 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

5

Maximum	Conditions
1.30 UG/M3 SO2	WDir = 20x Wind Speed = 1. m/s
	Stability = F
	Location = -243.1 mN, -34.4 mE

Contribution of Stacks

Stack:	Eff.Height	SO2
1:PACKAGE BOILER	100.6 m	.77 UG/M3
2:GLYCOL/WATER HEATER	70.3 m	.54 UG/M3
TOTAL:		1.30 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

SEEC - V1 ALBERTA NEWSPRINT - DOWNWASH EVALUATION (SO2)

SITE: WHITECOURT NEWSPRINT MILL

1

Maximum	Conditions
1.30 UG/M3 SO2	WDir = 40x Wind Speed = 1. m/s
	Stability = F
	Location = -192.6 mN, -121.8 mE

Contribution of Stacks

Stack:	Eff.Height	SO2
1:PACKAGE BOILER	100.6 m	.77 UG/M3
2:GLYCOL/WATER HEATER	70.3 m	.54 UG/M3
TOTAL:		1.30 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

2

Maximum	Conditions
1.30 UG/M3 SO2	WDir = 30x Wind Speed = 1. m/s
	Stability = F
	Location = -221.6 mN, -80.3 mE

Contribution of Stacks

Stack:	Eff.Height	SO2
1:PACKAGE BOILER	100.6 m	.77 UG/M3
2:GLYCOL/WATER HEATER	70.3 m	.54 UG/M3
TOTAL:		1.30 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

3

Maximum	Conditions
1.30 UG/M3 SO2	WDir = 0x Wind Speed = 1. m/s
	Stability = F
	Location = -260.6 mN, 65.0 mE

Contribution of Stacks

Stack:	Eff.Height	SO2
1:PACKAGE BOILER	100.6 m	.77 UG/M3
2:GLYCOL/WATER HEATER	70.3 m	.54 UG/M3
TOTAL:		1.30 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

SEEC - V1 ALBERTA NEWSPRINT - DOWNWASH EVALUATION (SO2)

SITE: WHITECOURT NEWSPRINT MILL

Site Discription:

LATITUDE:	54.25 xN	
AMBIENT TEMP:	10.00 xC	= 283.16 K
ROUGHNESS:	100 cm	
AVERAGING TIME:	1.00 h	
ELEVATION ASL:	732. m	
POLLUTANT MOL WT:	64.1	

Options:

WIND DIRECTIONS:	36	
CALCULATION PLANE:	.00 m	
GRID DENSITY:	1.0DW x 1.0CW	
WINDOW:	from .Auto.	to .Auto.
POLLUTANT:	SO2	

Building 1: PAPER MACHINE

CORNERS AT:	78.0 mN	52.0 mE
	118.0 mN	52.0 mE
	118.0 mN	255.0 mE
	78.0 mN	255.0 mE
HEIGHT:	26.0 m	

Stack 1: PACKAGE BOILER

LOCATION:	30.0 mN	65.0 mE
HEIGHT:	34.00 m	
DIAMETER:	2.10 m	
GAS TEMPERATURE:	230.00 xC	= 503.16 K
GAS VELOCITY:	13.00 m/s	
POLLUTANT FLOW:	.230000 G/S	
AT REF. TEMP:	25.00 xC	= 298.16 K

Stack 2: GLYCOL/WATER HEATER

LOCATION:	30.0 mN	65.0 mE
HEIGHT:	34.00 m	
DIAMETER:	.85 m	
GAS TEMPERATURE:	260.00 xC	= 533.16 K
GAS VELOCITY:	12.00 m/s	
POLLUTANT FLOW:	.030000 G/S	
AT REF. TEMP:	25.00 xC	= 298.16 K

SEEC - V1 ALBERTA NEWSPRINT - DOWNWASH EVALUATION (SO2)

SITE: WHITECOURT NEWSPRINT MILL

4

Maximum	Conditions
.64 UG/M3 SO2	WDir = 30x Wind Speed = 1. m/s
	Stability = E
	Location = -2613.2 mN, -1461.0 mE

Contribution of Stacks

Stack:	Eff.Height	SO2
1:PACKAGE BOILER	120.8 m	.49 UG/M3
2:GLYCOL/WATER HEATER	81.3 m	.14 UG/M3
TOTAL:		.64 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

5

Maximum	Conditions
.64 UG/M3 SO2	WDir = 40x Wind Speed = 1. m/s
	Stability = E
	Location = -2308.0 mN, -1896.8 mE

Contribution of Stacks

Stack:	Eff.Height	SO2
1:PACKAGE BOILER	120.8 m	.49 UG/M3
2:GLYCOL/WATER HEATER	81.3 m	.14 UG/M3
TOTAL:		.64 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

SEEC - V1 ALBERTA NEWSPRINT - DOWNWASH EVALUATION (SO2)

SITE: WHITECOURT NEWSPRINT MILL

1

Maximum	Conditions
.64 UG/M3 SO2	WDir = 0x Wind Speed = 1. m/s
	Stability = E
	Location = -3022.1 mN, 65.0 mE

Contribution of Stacks		
Stack:	Eff.Height	SO2
1:PACKAGE BOILER	120.8 m	.49 UG/M3
2:GLYCOL/WATER HEATER	81.3 m	.14 UG/M3
TOTAL:		.64 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

2

Maximum	Conditions
.64 UG/M3 SO2	WDir = 10x Wind Speed = 1. m/s
	Stability = E
	Location = -2975.7 mN, -465.0 mE

Contribution of Stacks		
Stack:	Eff.Height	SO2
1:PACKAGE BOILER	120.8 m	.49 UG/M3
2:GLYCOL/WATER HEATER	81.3 m	.14 UG/M3
TOTAL:		.64 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

3

Maximum	Conditions
.64 UG/M3 SO2	WDir = 20x Wind Speed = 1. m/s
	Stability = E
	Location = -2838.0 mN, -978.9 mE

Contribution of Stacks		
Stack:	Eff.Height	SO2
1:PACKAGE BOILER	120.8 m	.49 UG/M3
2:GLYCOL/WATER HEATER	81.3 m	.14 UG/M3
TOTAL:		.64 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

SEEC - V1 ALBERTA NEWSPRINT - DOWNWASH EVALUATION (SO2)

SITE: WHITECOURT NEWSPRINT MILL

Site Discription:

LATITUDE:	54.25 xN	
AMBIENT TEMP:	10.00 xC	= 283.16 K
ROUGHNESS:	100	cm
AVERAGING TIME:	1.00	h
ELEVATION ASL:	732.	m
POLLUTANT MOL WT:	64.1	

Options:

WIND DIRECTIONS:	36
CALCULATION PLANE:	.00 m
GRID DENSITY:	1.00W x 1.0CW
WINDOW:	from .Auto. to .Auto.
POLLUTANT:	SO2

Building 1: SHOPS/STORES

CORNERS AT:	48.0 mN	129.0 mE
	78.0 mN	129.0 mE
	78.0 mN	255.0 mE
	48.0 mN	255.0 mE
HEIGHT:	10.0 m	

Stack 1: PACKAGE BOILER

LOCATION:	30.0 mN	65.0 mE
HEIGHT:	34.00 m	
DIAMETER:	2.10 m	
GAS TEMPERATURE:	230.00 xC	= 503.16 K
GAS VELOCITY:	13.00 m/s	
POLLUTANT FLOW:	.230000 G/S	
AT REF. TEMP:	25.00 xC	= 298.16 K

Stack 2: GLYCOL/WATER HEATER

LOCATION:	30.0 mN	65.0 mE
HEIGHT:	34.00 m	
DIAMETER:	.85 m	
GAS TEMPERATURE:	260.00 xC	= 533.16 K
GAS VELOCITY:	12.00 m/s	
POLLUTANT FLOW:	.030000 G/S	
AT REF. TEMP:	25.00 xC	= 298.16 K

SEEC - V1 ALBERTA NEWSPRINT - DOWNWASH EVALUATION (SO2)

SITE: WHITECOURT NEWSPRINT MILL

4

Maximum	Conditions
.64 UG/M3 SO2	WDir = 30x Wind Speed = 1. m/s
	Stability = E
	Location = -2621.0 mN, -1465.5 mE

Contribution of Stacks		
Stack:	Eff.Height	SO2
1:PACKAGE BOILER	120.8 m	.49 UG/M3
2:GLYCOL/WATER HEATER	81.3 m	.14 UG/M3
TOTAL:		.64 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

5

Maximum	Conditions
.64 UG/M3 SO2	WDir = 40x Wind Speed = 1. m/s
	Stability = E
	Location = -2314.9 mN, -1902.6 mE

Contribution of Stacks		
Stack:	Eff.Height	SO2
1:PACKAGE BOILER	120.8 m	.49 UG/M3
2:GLYCOL/WATER HEATER	81.3 m	.14 UG/M3
TOTAL:		.64 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

SEEC - V1 ALBERTA NEWSPRINT - DOWNWASH EVALUATION (SO2)

SITE: WHITECOURT NEWSPRINT MILL

1

Maximum	Conditions
.64 UG/M3 SO2	WDir = 0x Wind Speed = 1. m/s
	Stability = E
	Location = -3031.1 mN, 65.0 mE

Contribution of Stacks

Stack:	Eff.Height	SO2
1:PACKAGE BOILER	120.8 m	.49 UG/M3
2:GLYCOL/WATER HEATER	81.3 m	.14 UG/M3
TOTAL:		.64 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

2

Maximum	Conditions
.64 UG/M3 SO2	WDir = 10x Wind Speed = 1. m/s
	Stability = E
	Location = -2984.6 mN, -466.6 mE

Contribution of Stacks

Stack:	Eff.Height	SO2
1:PACKAGE BOILER	120.8 m	.49 UG/M3
2:GLYCOL/WATER HEATER	81.3 m	.14 UG/M3
TOTAL:		.64 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

3

Maximum	Conditions
.64 UG/M3 SO2	WDir = 20x Wind Speed = 1. m/s
	Stability = E
	Location = -2846.5 mN, -982.0 mE

Contribution of Stacks

Stack:	Eff.Height	SO2
1:PACKAGE BOILER	120.8 m	.49 UG/M3
2:GLYCOL/WATER HEATER	81.3 m	.14 UG/M3
TOTAL:		.64 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

SEEC - V1 ALBERTA NEWSPRINT - DOWNWASH EVALUATION (SO2)

SITE: WHITECOURT NEWSPRINT MILL

Site Discription:

LATITUDE:	54.25 xN	
AMBIENT TEMP:	10.00 xC	= 283.16 K
ROUGHNESS:	100 cm	
AVERAGING TIME:	1.00 h	
ELEVATION ASL:	732. m	
POLLUTANT MOL WT:	64.1	

Options:

WIND DIRECTIONS:	36	
CALCULATION PLANE:	.00 m	
GRID DENSITY:	1.0DW x 1.0CW	
WINDOW:	from .Auto.	to .Auto.
POLLUTANT:	SO2	

Building 1: OFFICES

CORNERS AT:	48.0 mN	87.0 mE
	78.0 mN	87.0 mE
	78.0 mN	129.0 mE
	48.0 mN	129.0 mE
HEIGHT:	13.0 m	

Stack 1: PACKAGE BOILER

LOCATION:	30.0 mN	65.0 mE
HEIGHT:	34.00 m	
DIAMETER:	2.10 m	
GAS TEMPERATURE:	230.00 xC	= 503.16 K
GAS VELOCITY:	13.00 m/s	
POLLUTANT FLOW:	.230000 G/S	
AT REF. TEMP:	25.00 xC	= 298.16 K

Stack 2: GLYCOL/WATER HEATER

LOCATION:	30.0 mN	65.0 mE
HEIGHT:	34.00 m	
DIAMETER:	.85 m	
GAS TEMPERATURE:	260.00 xC	= 533.16 K
GAS VELOCITY:	12.00 m/s	
POLLUTANT FLOW:	.030000 G/S	
AT REF. TEMP:	25.00 xC	= 298.16 K

SEEC - V1 ALBERTA NEWSPRINT - DOWNWASH EVALUATION (SO2)

SITE: WHITECOURT NEWSPRINT MILL

4

Maximum	Conditions
.93 UG/M3 SO2	WDir = 80x Wind Speed = 1. m/s
	Stability = F
	Location = -22.6 mN, -233.6 mE

Contribution of Stacks

Stack:	Eff.Height	SO2
1:PACKAGE BOILER	100.6 m	.62 UG/M3
2:GLYCOL/WATER HEATER	70.3 m	.31 UG/M3
TOTAL:		.93 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

5

Maximum	Conditions
.93 UG/M3 SO2	WDir = 100x Wind Speed = 1. m/s
	Stability = F
	Location = 82.6 mN, -233.6 mE

Contribution of Stacks

Stack:	Eff.Height	SO2
1:PACKAGE BOILER	100.6 m	.62 UG/M3
2:GLYCOL/WATER HEATER	70.3 m	.31 UG/M3
TOTAL:		.93 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

SEEC - V1 ALBERTA NEWSPRINT - DOWNWASH EVALUATION (SO2)

SITE: WHITECOURT NEWSPRINT MILL

1

Maximum	Conditions
1.07 UG/M3 SO2	WDir = 90x Wind Speed = 1. m/s
	Stability = F
	Location = 30.0 mN, -238.2 mE

Contribution of Stacks

Stack:	Eff.Height	SO2
1:PACKAGE BOILER	100.6 m	.71 UG/M3
2:GLYCOL/WATER HEATER	70.3 m	.36 UG/M3
TOTAL:		1.07 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

2

Maximum	Conditions
1.07 UG/M3 SO2	WDir = 270x Wind Speed = 1. m/s
	Stability = F
	Location = 30.0 mN, 368.2 mE

Contribution of Stacks

Stack:	Eff.Height	SO2
1:PACKAGE BOILER	100.6 m	.71 UG/M3
2:GLYCOL/WATER HEATER	70.3 m	.36 UG/M3
TOTAL:		1.07 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

3

Maximum	Conditions
.93 UG/M3 SO2	WDir = 260x Wind Speed = 1. m/s
	Stability = F
	Location = 82.6 mN, 363.6 mE

Contribution of Stacks

Stack:	Eff.Height	SO2
1:PACKAGE BOILER	100.6 m	.62 UG/M3
2:GLYCOL/WATER HEATER	70.3 m	.31 UG/M3
TOTAL:		.93 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

SEEC - V1 ALBERTA NEWSPRINT - DOWNWASH EVALUATION (SO2) NO_x

SITE: WHITECOURT NEWSPRINT MILL

Site Discription:

LATITUDE:	54.25	xN	
AMBIENT TEMP:	10.00	xC	= 283.16 K
ROUGHNESS:	100	cm	
AVERAGING TIME:	1.00	h	
ELEVATION ASL:	732.	m	
POLLUTANT MOL WT:	46.0		

Options:

WIND DIRECTIONS:	36		
CALCULATION PLANE:	.00	m	
GRID DENSITY:	1.0DW x 1.0CW		
WINDOW:	from .Auto. to .Auto.		
POLLUTANT:	NOX		

NOx to NO2 conversion enabled.

Building 1: CTMP

CORNERS AT:	42.0	mN	10.0	mE
	78.0	mN	10.0	mE
	78.0	mN	87.0	mE
	42.0	mN	87.0	mE
HEIGHT:	30.2	m		

Stack 1: PACKAGE BOILER

LOCATION:	30.0	mN	65.0	mE
HEIGHT:	34.00	m		
DIAMETER:	2.10	m		
GAS TEMPERATURE:	230.00	xC	= 503.16 K	
GAS VELOCITY:	13.00	m/s		
POLLUTANT FLOW:	54.200000	G/S		
AT REF. TEMP:	25.00	xC	= 298.16 K	

Stack 2: GLYCOL/WATER HEATER

LOCATION:	30.0	mN	65.0	mE
HEIGHT:	34.00	m		
DIAMETER:	.85	m		
GAS TEMPERATURE:	260.00	xC	= 533.16 K	
GAS VELOCITY:	12.00	m/s		
POLLUTANT FLOW:	6.400000	G/S		
AT REF. TEMP:	25.00	xC	= 298.16 K	

SEEC - V1 ALBERTA NEWSPRINT - DOWNWASH EVALUATION ~~(SO2)~~ NO_x

SITE: WHITECOURT NEWSPRINT MILL

1

Maximum	Conditions
134.62 UG/M3 NO2	WDir = 90x Wind Speed = 1. m/s
	Stability = F
	Location = 30.0 mN, -238.2 mE

Contribution of Stacks

Stack:	Eff.Height	NOX
1:PACKAGE BOILER	100.6 m	167.24 UG/M3
2:GLYCOL/WATER HEATER	70.3 m	76.44 UG/M3
TOTAL:		243.68 UG/M3
TOTAL NO2:		134.62 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

2

Maximum	Conditions
134.62 UG/M3 NO2	WDir = 270x Wind Speed = 1. m/s
	Stability = F
	Location = 30.0 mN, 368.2 mE

Contribution of Stacks

Stack:	Eff.Height	NOX
1:PACKAGE BOILER	100.6 m	167.24 UG/M3
2:GLYCOL/WATER HEATER	70.3 m	76.44 UG/M3
TOTAL:		243.68 UG/M3
TOTAL NO2:		134.62 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

3

Maximum	Conditions
120.98 UG/M3 NO2	WDir = 260x Wind Speed = 1. m/s
	Stability = F
	Location = 82.6 mN, 363.6 mE

Contribution of Stacks

Stack:	Eff.Height	NOX
1:PACKAGE BOILER	100.6 m	145.81 UG/M3
2:GLYCOL/WATER HEATER	70.3 m	66.07 UG/M3
TOTAL:		211.88 UG/M3
TOTAL NO2:		120.98 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

SEEC - V1 ALBERTA NEWSPRINT - DOWNWASH EVALUATION ~~(SO2)~~ NO_x

SITE: WHITECOURT NEWSPRINT MILL

4

Maximum	Conditions
120.98 UG/M3 NO2	WDir = 80x Wind Speed = 1. m/s
	Stability = F
	Location = -22.6 mN, -233.6 mE

Contribution of Stacks

Stack:	Eff.Height	NOX
1:PACKAGE BOILER	100.6 m	145.81 UG/M3
2:GLYCOL/WATER HEATER	70.3 m	66.07 UG/M3
TOTAL:		211.88 UG/M3
TOTAL NO2:		120.98 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

5

Maximum	Conditions
120.98 UG/M3 NO2	WDir = 100x Wind Speed = 1. m/s
	Stability = F
	Location = 82.6 mN, -233.6 mE

Contribution of Stacks

Stack:	Eff.Height	NOX
1:PACKAGE BOILER	100.6 m	145.81 UG/M3
2:GLYCOL/WATER HEATER	70.3 m	66.07 UG/M3
TOTAL:		211.88 UG/M3
TOTAL NO2:		120.98 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

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SEEC - V1   ALBERTA NEWSPRINT - DOWNWASH EVALUATION ~~(SO2)~~ NOx
     ==================================================

     SITE:       WHITECOURT NEWSPRINT MILL
      ------------------------------------------------

Site Discription:
          LATITUDE:             54.25 xN
          AMBIENT TEMP:         10.00 xC    = 283.16 K
          ROUGHNESS:           100    cm
          AVERAGING TIME:        1.00  h
          ELEVATION ASL:       732.    m
          POLLUTANT MOL WT:     46.0

Options:
          WIND DIRECTIONS:      36
          CALCULATION PLANE:      .00 m
          GRID DENSITY:        1.0DW x 1.0CW
          WINDOW:               from   .Auto. to  .Auto.
          POLLUTANT:            NOX
          NOx to NO2 conversion enabled.

Building  1:      OFFICES
          CORNERS AT:           48.0 mN        87.0 mE
                                78.0 mN        87.0 mE
                                78.0 mN       129.0 mE
                                48.0 mN       129.0 mE
          HEIGHT:               13.0 m
     Stack  1:    PACKAGE BOILER
          LOCATION:             30.0 mN        65.0 mE
          HEIGHT:              34.00 m
          DIAMETER:             2.10 m
          GAS TEMPERATURE:    230.00 xC  =   503.16 K
          GAS VELOCITY:        13.00 m/s
          POLLUTANT FLOW:   54.200000 G/S
            AT REF. TEMP:      25.00 xC    = 298.16 K
     Stack  2:    GLYCOL/WATER HEATER
          LOCATION:             30.0 mN        65.0 mE
          HEIGHT:              34.00 m
          DIAMETER:              .85 m
          GAS TEMPERATURE:    260.00 xC  =   533.16 K
          GAS VELOCITY:        12.00 m/s
          POLLUTANT FLOW:    6.400000 G/S
            AT REF. TEMP:      25.00 xC    = 298.16 K
      ==================================================
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SEEC - V1 ALBERTA NEWSPRINT - DOWNWASH EVALUATION ~~ISO2~~ NO_x

SITE: WHITECOURT NEWSPRINT MILL

1

Maximum	Conditions
91.25 UG/M3 NO2	WDir = 0x Wind Speed = 1. m/s
	Stability = E
	Location = -3031.1 mN, 65.0 mE

Contribution of Stacks		
Stack:	Eff.Height	NOX
1:PACKAGE BOILER	120.8 m	116.15 UG/M3
2:GLYCOL/WATER HEATER	81.3 m	30.84 UG/M3
TOTAL:		146.99 UG/M3
TOTAL NO2:		91.25 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

2

Maximum	Conditions
91.25 UG/M3 NO2	WDir = 10x Wind Speed = 1. m/s
	Stability = E
	Location = -2984.6 mN, -466.6 mE

Contribution of Stacks		
Stack:	Eff.Height	NOX
1:PACKAGE BOILER	120.8 m	116.15 UG/M3
2:GLYCOL/WATER HEATER	81.3 m	30.84 UG/M3
TOTAL:		146.99 UG/M3
TOTAL NO2:		91.25 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

3

Maximum	Conditions
91.25 UG/M3 NO2	WDir = 20x Wind Speed = 1. m/s
	Stability = E
	Location = -2846.5 mN, -982.0 mE

Contribution of Stacks		
Stack:	Eff.Height	NOX
1:PACKAGE BOILER	120.8 m	116.15 UG/M3
2:GLYCOL/WATER HEATER	81.3 m	30.84 UG/M3
TOTAL:		146.99 UG/M3
TOTAL NO2:		91.25 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

SEEC - V1 ALBERTA NEWSPRINT - DOWNWASH EVALUATION ~~1992~~ NO_x

SITE: WHITECOURT NEWSPRINT MILL

4

Maximum	Conditions
91.25 UG/M3 NO2	WDir = 30x Wind Speed = 1. m/s
	Stability = E
	Location = -2621.0 mN, -1465.5 mE

Contribution of Stacks

Stack:	Eff.Height	NOX
1:PACKAGE BOILER	120.8 m	116.15 UG/M3
2:GLYCOL/WATER HEATER	81.3 m	30.84 UG/M3
TOTAL:		146.99 UG/M3
TOTAL NO2:		91.25 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

5

Maximum	Conditions
91.25 UG/M3 NO2	WDir = 40x Wind Speed = 1. m/s
	Stability = E
	Location = -2314.9 mN, -1902.6 mE

Contribution of Stacks

Stack:	Eff.Height	NOX
1:PACKAGE BOILER	120.8 m	116.15 UG/M3
2:GLYCOL/WATER HEATER	81.3 m	30.84 UG/M3
TOTAL:		146.99 UG/M3
TOTAL NO2:		91.25 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

SEEC - V1 ALBERTA NEWSPRINT - DOWNWASH EVALUATION ~~(SO2)~~ NO_x

SITE: WHITECOURT NEWSPRINT MILL

Site Discription:

LATITUDE:	54.25 xN	
AMBIENT TEMP:	10.00 xC	= 283.16 K
ROUGHNESS:	100 cm	
AVERAGING TIME:	1.00 h	
ELEVATION ASL:	732. m	
POLLUTANT MOL WT:	46.0	

Options:

WIND DIRECTIONS:	36
CALCULATION PLANE:	.00 m
GRID DENSITY:	1.0DW x 1.0CW
WINDOW:	from .Auto. to .Auto.
POLLUTANT:	NOX

NOx to NO2 conversion enabled.

Building 1: SHOPS/STORES

CORNERS AT:	48.0 mN	129.0 mE
	78.0 mN	129.0 mE
	78.0 mN	255.0 mE
	48.0 mN	255.0 mE
HEIGHT:	10.0 m	

Stack 1: PACKAGE BOILER

LOCATION:	30.0 mN	65.0 mE
HEIGHT:	34.00 m	
DIAMETER:	2.10 m	
GAS TEMPERATURE:	230.00 xC	= 503.16 K
GAS VELOCITY:	13.00 m/s	
POLLUTANT FLOW:	54.200000 G/S	
AT REF. TEMP:	25.00 xC	= 298.16 K

Stack 2: GLYCOL/WATER HEATER

LOCATION:	30.0 mN	65.0 mE
HEIGHT:	34.00 m	
DIAMETER:	.85 m	
GAS TEMPERATURE:	260.00 xC	= 533.16 K
GAS VELOCITY:	12.00 m/s	
POLLUTANT FLOW:	6.400000 G/S	
AT REF. TEMP:	25.00 xC	= 298.16 K

SEEC - V1 ALBERTA NEWSPRINT - DOWNWASH EVALUATION ~~1992~~ NOx

SITE: WHITECOURT NEWSPRINT MILL

1

Maximum	Conditions
91.23 UG/M3 NO2	WDir = 0x Wind Speed = 1. m/s
	Stability = E
	Location = -3022.1 mN, 65.0 mE

Contribution of Stacks

Stack:	Eff.Height	NOX
1:PACKAGE BOILER	120.8 m	116.06 UG/M3
2:GLYCOL/WATER HEATER	81.3 m	30.89 UG/M3
TOTAL:		146.95 UG/M3
TOTAL NO2:		91.23 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

2

Maximum	Conditions
91.23 UG/M3 NO2	WDir = 10x Wind Speed = 1. m/s
	Stability = E
	Location = -2975.7 mN, -465.0 mE

Contribution of Stacks

Stack:	Eff.Height	NOX
1:PACKAGE BOILER	120.8 m	116.06 UG/M3
2:GLYCOL/WATER HEATER	81.3 m	30.89 UG/M3
TOTAL:		146.95 UG/M3
TOTAL NO2:		91.23 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

3

Maximum	Conditions
91.23 UG/M3 NO2	WDir = 20x Wind Speed = 1. m/s
	Stability = E
	Location = -2838.0 mN, -978.9 mE

Contribution of Stacks

Stack:	Eff.Height	NOX
1:PACKAGE BOILER	120.8 m	116.06 UG/M3
2:GLYCOL/WATER HEATER	81.3 m	30.89 UG/M3
TOTAL:		146.95 UG/M3
TOTAL NO2:		91.23 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

SEEC - V1 ALBERTA NEWSPRINT - DOWNWASH EVALUATION ~~(SO2)~~ NO_x

SITE: WHITECOURT NEWSPRINT MILL

4

Maximum	Conditions
91.23 UG/M3 NO2	WDir = 30x Wind Speed = 1. m/s
	Stability = E
	Location = -2613.2 mN, -1461.0 mE

Contribution of Stacks

Stack:	Eff.Height	NOX
1:PACKAGE BOILER	120.8 m	116.06 UG/M3
2:GLYCOL/WATER HEATER	81.3 m	30.89 UG/M3
TOTAL:		146.95 UG/M3
TOTAL NO2:		91.23 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

5

Maximum	Conditions
91.23 UG/M3 NO2	WDir = 40x Wind Speed = 1. m/s
	Stability = E
	Location = -2308.0 mN, -1896.8 mE

Contribution of Stacks

Stack:	Eff.Height	NOX
1:PACKAGE BOILER	120.8 m	116.06 UG/M3
2:GLYCOL/WATER HEATER	81.3 m	30.89 UG/M3
TOTAL:		146.95 UG/M3
TOTAL NO2:		91.23 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

SEEC - V1 ALBERTA NEWSPRINT - DOWNWASH EVALUATION ~~ISO2T~~ NO_x

SITE: WHITECOURT NEWSPRINT MILL

Site Discription:

LATITUDE:	54.25 xN	
AMBIENT TEMP:	10.00 xC	= 283.16 K
ROUGHNESS:	100 cm	
AVERAGING TIME:	1.00 h	
ELEVATION ASL:	732. m	
POLLUTANT MOL WT:	46.0	

Options:

WIND DIRECTIONS:	36
CALCULATION PLANE:	.00 m
GRID DENSITY:	1.00W x 1.0CN
WINDOW:	from .Auto. to .Auto.
POLLUTANT:	NOX

NOx to NO2 conversion enabled.

Building 1: PAPER MACHINE

CORNERS AT:	78.0 mN	52.0 mE
	118.0 mN	52.0 mE
	118.0 mN	255.0 mE
	78.0 mN	255.0 mE
HEIGHT:	26.0 m	

Stack 1: PACKAGE BOILER

LOCATION:	30.0 mN	65.0 mE
HEIGHT:	34.00 m	
DIAMETER:	2.10 m	
GAS TEMPERATURE:	230.00 xC	= 503.16 K
GAS VELOCITY:	13.00 m/s	
POLLUTANT FLOW:	54.200000 G/S	
AT REF. TEMP:	25.00 xC	= 298.16 K

Stack 2: GLYCOL/WATER HEATER

LOCATION:	30.0 mN	65.0 mE
HEIGHT:	34.00 m	
DIAMETER:	.85 m	
GAS TEMPERATURE:	260.00 xC	= 533.16 K
GAS VELOCITY:	12.00 m/s	
POLLUTANT FLOW:	6.400000 G/S	
AT REF. TEMP:	25.00 xC	= 298.16 K

SEEC - V1 ALBERTA NEWSPRINT - DOWNWASH EVALUATION (S821 ~ σ_x

SITE: WHITECOURT NEWSPRINT MILL

1

Maximum	Conditions
155.79 UG/M3 NO2	WDir = 40x Wind Speed = 1. m/s
	Stability = F
	Location = -192.6 mN, -121.8 mE

Contribution of Stacks

Stack:	Eff.Height	NOX
1:PACKAGE BOILER	100.6 m	180.67 UG/M3
2:GLYCOL/WATER HEATER	70.3 m	114.69 UG/M3
TOTAL:		295.36 UG/M3
TOTAL NO2:		155.79 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

2

Maximum	Conditions
155.79 UG/M3 NO2	WDir = 30x Wind Speed = 1. m/s
	Stability = F
	Location = -221.6 mN, -80.3 mE

Contribution of Stacks

Stack:	Eff.Height	NOX
1:PACKAGE BOILER	100.6 m	180.67 UG/M3
2:GLYCOL/WATER HEATER	70.3 m	114.69 UG/M3
TOTAL:		295.36 UG/M3
TOTAL NO2:		155.79 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

3

Maximum	Conditions
155.79 UG/M3 NO2	WDir = 0x Wind Speed = 1. m/s
	Stability = F
	Location = -260.6 mN, 65.0 mE

Contribution of Stacks

Stack:	Eff.Height	NOX
1:PACKAGE BOILER	100.6 m	180.67 UG/M3
2:GLYCOL/WATER HEATER	70.3 m	114.69 UG/M3
TOTAL:		295.36 UG/M3
TOTAL NO2:		155.79 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

SEEC - V1 ALBERTA NEWSPRINT - DOWNWASH EVALUATION ~~1982~~ NO_x

SITE: WHITECOURT NEWSPRINT MILL

4

Maximum	Conditions
155.79 UG/M3 NO2	WDir = 10x Wind Speed = 1. m/s
	Stability = F
	Location = -256.2 mN, 14.5 mE

Contribution of Stacks

Stack:	Eff.Height	NOX
1:PACKAGE BOILER	100.6 m	180.67 UG/M3
2:GLYCOL/WATER HEATER	70.3 m	114.69 UG/M3

TOTAL:		295.36 UG/M3
TOTAL NO2:		155.79 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

5

Maximum	Conditions
155.79 UG/M3 NO2	WDir = 20x Wind Speed = 1. m/s
	Stability = F
	Location = -243.1 mN, -34.4 mE

Contribution of Stacks

Stack:	Eff.Height	NOX
1:PACKAGE BOILER	100.6 m	180.67 UG/M3
2:GLYCOL/WATER HEATER	70.3 m	114.69 UG/M3

TOTAL:		295.36 UG/M3
TOTAL NO2:		155.79 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

SEEC - V1 ALBERTA NEWSPRINT - DOWNWASH EVALUATION ~~SO2~~ NO_x

SITE: WHITECOURT NEWSPRINT MILL

Site Discription:

LATITUDE:	54.25 xN	
AMBIENT TEMP:	10.00 xC	= 283.16 K
ROUGHNESS:	100 cm	
AVERAGING TIME:	1.00 h	
ELEVATION ASL:	732. m	
POLLUTANT MOL WT:	46.0	

Options:

WIND DIRECTIONS:	36
CALCULATION PLANE:	.00 m
GRID DENSITY:	1.0DW x 1.0CW
WINDOW:	from .Auto. to .Auto.
POLLUTANT:	NOX

NOx to NO2 conversion enabled.

Building 1: WAREHOUSE

CORNERS AT:	27.0 mN	255.0 mE
	131.0 mN	255.0 mE
	131.0 mN	365.0 mE
	27.0 mN	365.0 mE
HEIGHT:	9.1 m	

Stack 1: PACKAGE BOILER

LOCATION:	30.0 mN	65.0 mE
HEIGHT:	34.00 m	
DIAMETER:	2.10 m	
GAS TEMPERATURE:	230.00 xC	= 503.16 K
GAS VELOCITY:	13.00 m/s	
POLLUTANT FLOW:	54.200000 G/S	
AT REF. TEMP:	25.00 xC	= 298.16 K

Stack 2: GLYCOL/WATER HEATER

LOCATION:	30.0 mN	65.0 mE
HEIGHT:	34.00 m	
DIAMETER:	.85 m	
GAS TEMPERATURE:	260.00 xC	= 533.16 K
GAS VELOCITY:	12.00 m/s	
POLLUTANT FLOW:	6.400000 G/S	
AT REF. TEMP:	25.00 xC	= 298.16 K

SEEC - VI ALBERTA NEWSPRINT - DOWNWASH EVALUATION ~~1982~~ NO_x

SITE: WHITECOURT NEWSPRINT MILL

1

Maximum	Conditions
91.22 UG/M3 NO2	WDir = 0x Wind Speed = 1. m/s
	Stability = E
	Location = -3019.4 mN, 65.0 mE

Contribution of Stacks		
Stack:	Eff.Height	NOX
1:PACKAGE BOILER	120.8 m	116.03 UG/M3
2:GLYCOL/WATER HEATER	81.3 m	30.91 UG/M3
TOTAL:		146.94 UG/M3
TOTAL NO2:		91.22 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

2

Maximum	Conditions
91.22 UG/M3 NO2	WDir = 10x Wind Speed = 1. m/s
	Stability = E
	Location = -2973.1 mN, -464.5 mE

Contribution of Stacks		
Stack:	Eff.Height	NOX
1:PACKAGE BOILER	120.8 m	116.03 UG/M3
2:GLYCOL/WATER HEATER	81.3 m	30.91 UG/M3
TOTAL:		146.94 UG/M3
TOTAL NO2:		91.22 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

3

Maximum	Conditions
91.22 UG/M3 NO2	WDir = 20x Wind Speed = 1. m/s
	Stability = E
	Location = -2835.5 mN, -978.0 mE

Contribution of Stacks		
Stack:	Eff.Height	NOX
1:PACKAGE BOILER	120.8 m	116.03 UG/M3
2:GLYCOL/WATER HEATER	81.3 m	30.91 UG/M3
TOTAL:		146.94 UG/M3
TOTAL NO2:		91.22 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

SEEC - V1 ALBERTA NEWSPRINT - DOWNWASH EVALUATION ~~(SO2)~~ NO_x

SITE: WHITECOURT NEWSPRINT MILL

4

Maximum	Conditions
91.22 UG/M3 NO2	WDir = 30x Wind Speed = 1. m/s
	Stability = E
	Location = -2610.9 mN, -1459.7 mE

Contribution of Stacks

Stack:	Eff.Height	NOX
1:PACKAGE BOILER	120.8 m	116.03 UG/M3
2:GLYCOL/WATER HEATER	81.3 m	30.91 UG/M3
TOTAL:		146.94 UG/M3
TOTAL NO2:		91.22 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

5

Maximum	Conditions
91.22 UG/M3 NO2	WDir = 40x Wind Speed = 1. m/s
	Stability = E
	Location = -2306.0 mN, -1895.1 mE

Contribution of Stacks

Stack:	Eff.Height	NOX
1:PACKAGE BOILER	120.8 m	116.03 UG/M3
2:GLYCOL/WATER HEATER	81.3 m	30.91 UG/M3
TOTAL:		146.94 UG/M3
TOTAL NO2:		91.22 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

```
SEEC - V1   ALBERTA NEWSPRINT - DOWNWASH EVALUATION (SO2) NOx
     ====================================================

     SITE:       WHITECOURT NEWSPRINT MILL
      ---------------------------------------------------

Site Discription:
          LATITUDE:             54.25 xN
          AMBIENT TEMP:         10.00 xC    = 283.16 K
          ROUGHNESS:           100    cm
          AVERAGING TIME:        1.00  h
          ELEVATION ASL:       732.    m
          POLLUTANT MOL WT:     46.0

Options:
          WIND DIRECTIONS:      36
          CALCULATION PLANE:      .00 m
          GRID DENSITY:        1.0DW x 1.0CW
          WINDOW:               from   .Auto. to  .Auto.
          POLLUTANT:            NOX
          NOx to NO2 conversion enabled.

Building  1:      UTILITIES
          CORNERS AT:           25.0 mN        10.0 mE
                                42.0 mN        10.0 mE
                                42.0 mN        70.0 mE
                                 .0 mN         70.0 mE
                                 .0 mN         40.0 mE
                                25.0 mN        40.0 mE
          HEIGHT:               30.1 m
     Stack  1:    PACKAGE BOILER
          LOCATION:             30.0 mN        65.0 mE
          HEIGHT:              34.00 m
          DIAMETER:             2.10 m
          GAS TEMPERATURE:    230.00 xC  =   503.16 K
          GAS VELOCITY:        13.00 m/s
          POLLUTANT FLOW:  54.200000 G/S
            AT REF. TEMP:      25.00 xC    = 298.16 K
     Stack  2:    GLYCOL/WATER HEATER
          LOCATION:             30.0 mN        65.0 mE
          HEIGHT:              34.00 m
          DIAMETER:              .85 m
          GAS TEMPERATURE:    260.00 xC  =   533.16 K
          GAS VELOCITY:        12.00 m/s
          POLLUTANT FLOW:   6.400000 G/S
            AT REF. TEMP:      25.00 xC    = 298.16 K
     ====================================================
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SEEC - V1 ALBERTA NEWSPRINT - DOWNWASH EVALUATION ~~1982~~ NO_x

SITE: WHITECOURT NEWSPRINT MILL

1

Maximum	Conditions
126.90 UG/M3 NO2	WDir = 270x Wind Speed = 1. m/s
	Stability = F
	Location = 30.0 mN, 367.9 mE

Contribution of Stacks

Stack:	Eff.Height	NOX
1:PACKAGE BOILER	100.6 m	154.77 UG/M3
2:GLYCOL/WATER HEATER	70.3 m	70.77 UG/M3
TOTAL:		225.53 UG/M3
TOTAL NO2:		126.90 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

2

Maximum	Conditions
126.90 UG/M3 NO2	WDir = 90x Wind Speed = 1. m/s
	Stability = F
	Location = 30.0 mN, -237.9 mE

Contribution of Stacks

Stack:	Eff.Height	NOX
1:PACKAGE BOILER	100.6 m	154.77 UG/M3
2:GLYCOL/WATER HEATER	70.3 m	70.77 UG/M3
TOTAL:		225.53 UG/M3
TOTAL NO2:		126.90 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

3

Maximum	Conditions
122.24 UG/M3 NO2	WDir = 280x Wind Speed = 1. m/s
	Stability = F
	Location = -22.6 mN, 363.3 mE

Contribution of Stacks

Stack:	Eff.Height	NOX
1:PACKAGE BOILER	100.6 m	147.52 UG/M3
2:GLYCOL/WATER HEATER	70.3 m	67.25 UG/M3
TOTAL:		214.77 UG/M3
TOTAL NO2:		122.24 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

SEEC - V1 ALBERTA NEWSPRINT - DOWNWASH EVALUATION ~~(SO2)~~ NO_x

SITE: WHITECOURT NEWSPRINT MILL

4

Maximum	Conditions
122.24 UG/M3 NO2	WDir = 100x Wind Speed = 1. m/s
	Stability = F
	Location = 82.6 mN, -233.3 mE

Contribution of Stacks		
Stack:	Eff.Height	NOX
1:PACKAGE BOILER	100.6 m	147.52 UG/M3
2:GLYCOL/WATER HEATER	70.3 m	67.25 UG/M3
TOTAL:		214.77 UG/M3
TOTAL NO2:		122.24 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

5

Maximum	Conditions
119.24 UG/M3 NO2	WDir = 290x Wind Speed = 1. m/s
	Stability = F
	Location = -73.6 mN, 349.6 mE

Contribution of Stacks		
Stack:	Eff.Height	NOX
1:PACKAGE BOILER	100.6 m	142.88 UG/M3
2:GLYCOL/WATER HEATER	70.3 m	65.02 UG/M3
TOTAL:		207.90 UG/M3
TOTAL NO2:		119.24 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

SEEC - V1 ALBERTA NEWSPRINT - DOWNWASH EVALUATION (SO2)

SITE: WHITECOURT NEWSPRINT MILL

Site Discription:

LATITUDE:	54.25	xN	
AMBIENT TEMP:	10.00	xC	= 283.16 K
ROUGHNESS:	100	cm	
AVERAGING TIME:	1.00	h	
ELEVATION ASL:	732.	m	
POLLUTANT MOL WT:	64.1		

Options:

WIND DIRECTIONS:	36		
CALCULATION PLANE:	.00	m	
GRID DENSITY:	1.0DW x 1.0CW		
WINDOW:	from .Auto. to .Auto.		
POLLUTANT:	SO2		

Building 1: WOOD WASTE INCINERATOR

CORNERS AT:	.0	mN	.0 mE
	17.1	mN	.0 mE
	17.1	mN	17.1 mE
	.0	mN	17.1 mE
HEIGHT:	24.0	m	

Stack 1: WOOD WASTE INCINERATOR

LOCATION:	8.5	mN	8.5 mE
HEIGHT:	26.00	m	
DIAMETER:	8.50	m	
GAS TEMPERATURE:	550.00	xC	= 823.16 K
GAS VELOCITY:	3.90	m/s	
POLLUTANT FLOW:	.320000	G/S	
AT REF. TEMP:	25.00	xC	= 298.16 K

SEEC - V1 ALBERTA NEWSPRINT - DOWNWASH EVALUATION (SO2)

SITE: WHITECOURT NEWSPRINT MILL

1

Maximum	Conditions
.47 UG/M3 SO2	WDir = 320x Wind Speed = 20. m/s
	Stability = D
	Location = -183.0 mN, 169.2 mE

Contribution of Stacks		
Stack:	Eff.Height	SO2
1:WOOD WASTE INCINERATOR	61.7 m	.47 UG/M3
TOTAL:		.47 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

2

Maximum	Conditions
.47 UG/M3 SO2	WDir = 310x Wind Speed = 20. m/s
	Stability = D
	Location = -152.2 mN, 200.0 mE

Contribution of Stacks		
Stack:	Eff.Height	SO2
1:WOOD WASTE INCINERATOR	61.7 m	.47 UG/M3
TOTAL:		.47 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

3

Maximum	Conditions
.47 UG/M3 SO2	WDir = 230x Wind Speed = 20. m/s
	Stability = D
	Location = 169.2 mN, 200.0 mE

Contribution of Stacks		
Stack:	Eff.Height	SO2
1:WOOD WASTE INCINERATOR	61.7 m	.47 UG/M3
TOTAL:		.47 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

SEEC - V1 ALBERTA NEWSPRINT - DOWNWASH EVALUATION (SO2)

SITE: WHITECOURT NEWSPRINT MILL

4

Maximum	Conditions
.47 UG/M3 SO2	WDir = 220x Wind Speed = 20. m/s
	Stability = D
	Location = 200.0 mN, 169.2 mE

Contribution of Stacks		
Stack:	Eff.Height	SO2
1:WOOD WASTE INCINERATOR	61.7 m	.47 UG/M3
TOTAL:		.47 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

5

Maximum	Conditions
.47 UG/M3 SO2	WDir = 140x Wind Speed = 20. m/s
	Stability = D
	Location = 200.0 mN, -152.2 mE

Contribution of Stacks		
Stack:	Eff.Height	SO2
1:WOOD WASTE INCINERATOR	61.7 m	.47 UG/M3
TOTAL:		.47 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

```
 SEED - V1   ALBERTA NEWSPRINT - DOWNWASH EVALUATION (SO2)
     ==================================================

     SITE:       WHITECOURT NEWSPRINT MILL
      ------------------------------------------------

Site Discription:
          LATITUDE:            54.25 xN
          AMBIENT TEMP:        10.00 xC    = 283.16 K
          ROUGHNESS:          100    cm
          AVERAGING TIME:       1.00  h
          ELEVATION ASL:        732. m
          POLLUTANT MOL WT:     46.0

Options:
          WIND DIRECTIONS:     36
          CALCULATION PLANE:     .00 m
          GRID DENSITY:       1.0DW x 1.0CN
          WINDOW:              from   .Auto. to  .Auto.
          POLLUTANT:           NOX
          NOx to NO2 conversion enabled.

Building  1:      WOOD WASTE INCINERATOR
          CORNERS AT:             .0 mN          .0 mE
                                17.1 mN          .0 mE
                                17.1 mN        17.1 mE
                                  .0 mN        17.1 mE
          HEIGHT:               24.0 m
     Stack  1:    WOOD WASTE INCINERATOR
          LOCATION:              8.5 mN         8.5 mE
          HEIGHT:               26.00 m
          DIAMETER:              8.50 m
          GAS TEMPERATURE:     550.00 xC  =   823.16 K
          GAS VELOCITY:          3.90 m/s
          POLLUTANT FLOW:    3.200000 G/S
            AT REF. TEMP:       25.00 xC    = 298.16 K
     ==================================================
```

SEEC - V1 ALBERTA NEWSPRINT - DOWNWASH EVALUATION (SO2)

SITE: WHITECOURT NEWSPRINT MILL

1

Maximum	Conditions
4.53 UG/M3 NO2	WDir = 320x Wind Speed = 20. m/s
	Stability = D
	Location = -183.0 mN, 169.2 mE

Contribution of Stacks		
Stack:	Eff.Height	NOX
1:WOOD WASTE INCINERATOR	61.7 m	4.71 UG/M3
TOTAL:		4.71 UG/M3
TOTAL NO2:		4.53 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

2

Maximum	Conditions
4.53 UG/M3 NO2	WDir = 310x Wind Speed = 20. m/s
	Stability = D
	Location = -152.2 mN, 200.0 mE

Contribution of Stacks		
Stack:	Eff.Height	NOX
1:WOOD WASTE INCINERATOR	61.7 m	4.71 UG/M3
TOTAL:		4.71 UG/M3
TOTAL NO2:		4.53 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

3

Maximum	Conditions
4.53 UG/M3 NO2	WDir = 230x Wind Speed = 20. m/s
	Stability = D
	Location = 169.2 mN, 200.0 mE

Contribution of Stacks		
Stack:	Eff.Height	NOX
1:WOOD WASTE INCINERATOR	61.7 m	4.71 UG/M3
TOTAL:		4.71 UG/M3
TOTAL NO2:		4.53 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

SEEC - V1 ALBERTA NEWSPRINT - DOWNWASH EVALUATION (SO2)

SITE: WHITECOURT NEWSPRINT MILL

4

Maximum	Conditions
4.53 UG/M3 NO2	WDir = 220x Wind Speed = 20. m/s
	Stability = D
	Location = 200.0 mN, 169.2 mE

Contribution of Stacks		
Stack:	Eff.Height	NOX
1:WOOD WASTE INCINERATOR	61.7 m	4.71 UG/M3
TOTAL:		4.71 UG/M3
TOTAL NO2:		4.53 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

5

Maximum	Conditions
4.53 UG/M3 NO2	WDir = 140x Wind Speed = 20. m/s
	Stability = D
	Location = 200.0 mN, -152.2 mE

Contribution of Stacks		
Stack:	Eff.Height	NOX
1:WOOD WASTE INCINERATOR	61.7 m	4.71 UG/M3
TOTAL:		4.71 UG/M3
TOTAL NO2:		4.53 UG/M3

NOTE: UG/M3 IS REF TO STD COND: 25 C AND 1 ATM

APPENDIX 4

APPLICATION PERMITS FOR REZONING AND DEVELOPMENT

Alberta
MUNICIPAL AFFAIRS

FORM A

Application No. _____

APPLICATION FOR DEVELOPMENT

IMPROVEMENT DISTRICT NO._____

I/WE hereby make application under the provisions of the Land use Order for a Development Permit in accordance with the plans and supporting information submitted herewith and which form part of this application.

Applicant: ALBERTA NEWSPRINT COMPANY LTD. Telephone: (604) 733-0344

Address: 2130 WEST 12TH AVENUE

Address of property to be developed: SEC. 13 TOWNSHIP 60 RANGE 13 WEST OF 5TH

Lot: 1 ;Block 1 Registered Plan or: TO BE REGISTERED

Certificate of Title: _____

Registered Owner PRESENTLY CROWN LAND Telephone: _____

Address: APPLICATION TO PURCHASE HAS BEEN SUBMITTED TO ALBERTA PUBLIC LANDS

Existing Use: RAW LAND

Land Use District WHITECOURT, ALBERTA

Principle Use: PROPOSED SITE FOR NEWSPRINT PLANT

Lot Type: Interior N/A Corner N/A Through N/A

Lot Width N/A Lot Length N/A Lot Area N/A

Front Yard N/A Side Yards N/A Rear Yard N/A

Floor Area N/A Percentage of lot occupied N/A

Off-Street Parking: Size of space N/A Number of spaces: N/A

Off-Street Loading: Size of space N/A Number of spaces: N/A

Accessory Use: N/A

Percentage of lot occupied N/A Height of accessory building N/A

Set back from side lot line N/A Set back from rear lot line N/A

Estimated cost of the project or contract price: $246,000,000

Estimated commencement date: 1 July 1988

Estimated completion date: September 1990

Floor plans showing elevation of sections attached Proposed Plant Layout Attached

Plot plan attached Proposed Legal Subdivision Plan Attached

Date of Application May 4, 1988

Signature of Applicant _____

ALBERTA NEWSPRINT COMPANY LTD
DIRECTOR

Alberta
MUNICIPAL AFFAIRS

FORM G

Application No. _____

APPLICATION FOR AMENDMENT TO THE LAND USE ORDER

IMPROVEMENT DISTRICT NO. 15

I/We hereby make application to amend the Land Use Order

Applicant: Name ALBERTA NEWSPRINT COMPANY LTD.
2130 West 12th Avenue
Address VANCOUVER, B.C. V6K 2N3 Telephone (604) 733-0344

Owner of Land: Name Presently Crown Land·
Application to Purchase has been submitted to
Address Alberta Public Lands Telephone _____

Land Description: Lot 1 Block 1 Reg. Plan To be registered
SEC. 13, TWP. 60, RGE. 13 W5TH MER.
Certificate of Title Presently Crown Land
Application to Purchase has been submitted to Alberta
Amendment Proposed Public Lands

FROM Forestry District TO Rural Industrial District

Reasons in support of Application for Amendment

To provide for the construction and
operation of a mill to manufacture
newsprint paper.

I/We enclose $ 50.00 being the application fee.

May 10, 1988
DATE

SIGNATURE OF APPLICANT