TABLE 1a
EMISSION ESTIMATES FOR THE PROPOSED ORION AND CMB PULP MILLS

Emission Calculations for the Orion Pulp Mill:

SULFUR (S)				SO_2				NO_x				TSP				TRS			
Emission Factor (kg/ADT)	Hourly Emissions (kg/hr)	Hourly Emissions (lbs/hr)	Emission Rate (g/sec)	Emission Factor (kg/ADT)	Hourly Emissions (kg/hr)	Hourly Emissions (lbs/hr)	Emission Rate (g/sec)	Emission Factor (kg/ADT)	Hourly Emissions (kg/hr)	Hourly Emissions (lbs/hr)	Emission Rate (g/sec)	Emission Factor (kg/ADT)	Hourly Emissions (kg/hr)	Hourly Emissions (lbs/hr)	Emission Rate (g/sec)	Emission Factor (kg/ADT)	Hourly Emissions (kg/hr)	Hourly Emissions (lbs/hr)	Emission Rate (g/sec)
0.4	47.62	104.981	13.23	0.8	95.24	209.962	26.46	1.4	166.67	367.433	46.3	0.4	47.62	104.981	13.23	0.1	11.905	26.25	3.31
	Modeled Emission Rates	**Recovery Boiler**	**10.5821**		**Modeled Emission Rates**	**Recovery Boiler**	**21.1642**		**Modeled Emission Rates**	**Recovery Boiler**	**41.67**		**Modeled Emission Rates**	**Recovery Boiler**	**11.2435**		**Modeled Emission Rates**	**Recovery Boiler**	**2.65**
		Lime Kiln	**2.65**			**Lime Kiln**	**5.29104**			**Lime Kiln**	**4.63**			**Lime Kiln**	**2.0**			**Lime Kiln**	**0.6614**

Pulp Production (ADT/year): **1,000,000**
Annual hours of operation: **8,400**

Emission Calculations for the CMB Pulp Mill:

SULFUR (S)				SO_2				NO_x				TSP				TRS			
Emission Factor (kg/ADT)	Hourly Emissions (kg/hr)	Hourly Emissions (lbs/hr)	**Modeled Emission Rate (g/sec)**	Emission Factor (kg/ADT)	Hourly Emissions (kg/hr)	Hourly Emissions (lbs/hr)	**Modeled Emission Rate (g/sec)**	Emission Factor (kg/ADT)	Hourly Emissions (kg/hr)	Hourly Emissions (lbs/hr)	**Modeled Emission Rate (g/sec)**	Emission Factor (kg/ADT)	Hourly Emissions (kg/hr)	Hourly Emissions (lbs/hr)	**Modeled Emission Rate (g/sec)**	Emission Factor (kg/ADT)	Hourly Emissions (kg/hr)	Hourly Emissions (lbs/hr)	**Modeled Emission Rate (g/sec)**
0.4	23.81	52.49	**6.614**	0.8	47.62	104.98	**13.23**	1.2	71.43	157.5	**19.8414**	0.5	29.762	65.6131	**8.27**	0.04	2.381	5.25	**0.6614**

Pulp Production (ADT/year): **500,000**
Annual hours of operation: **8,400**

TABLE 1b
EMISSION INVENTORY OF THE PROPOSED ORION AND CMB PULP MILLS - NORMAL OPERATION

SOURCE DESCRIPTION	ISC SOURCE #[a]	SOURCE LOCATION COORDINATES[b]		STACK HEIGHT (m)	STACK EXIT TEMPERTURE (K)	STACK EXIT VELOCITY (m/s)	STACK DIAMETER (m)	EMISSION RATES (g/s)			
		EAST (m)	NORTH (m)					TSP	SO_2	TRS	NO_x
ORION MAIN CHIMNEY (Recovery Boiler)	1	0.0	0.0	120.0	433.2	22.1	4.6	11.2435	21.1642	2.65	41.67
ORION MAIN CHIMNEY (Lime Kiln)	2	0.0	0.0	120.0	503.2	14.4	2.5	2.0	5.29104	0.6614	4.63
CMB MAIN CHIMNEY	3	7,150.0	350.0	100.0	423.2	28.0	1.50	8.27	13.23	0.6614	19.8414

Building Dimensions: Each stack is influenced by a worst case building with the following dimensions:
Height = 85 m
Length = 40 m
Width = 40 m
Maximum projected width = 56.6 m

Notes:

The modeling coordinate system is based on a 0, 0 center point (Botnia Mill's main chimney).

[a] The Industrial Source Complex Short Term 3 (ISCST3 or ISC) dispersion model was used for the analyses.
[b] The modeling analyses were performed over a 20 km square area. The center of this area is the location of the Botnia mill's main chimney. The location of the CMB mill is provided in the table above. The center, or origin of this area is represented in the ISC model as coordinates x= 0 and y= 0 (0,0).

TABLE 2a
EMISSION INVENTORY OF THE PROPOSED ORION AND CMB PULP MILLS - STARTUP

SOURCE DESCRIPTION	ISC SOURCE #[a]	SOURCE LOCATION COORDINATES[b] EAST (m)	NORTH (m)	STACK HEIGHT (m)	STACK EXIT TEMPERTURE (K)	STACK EXIT VELOCITY (m/s)	STACK DIAMETER (m)	EMISSION RATES (g/s) TRS
ORION MAIN CHIMNEY	1	0.0	0.0	120.0	373.2	26.5	4.6	4.30
CMB MAIN CHIMNEY (Recovery Boiler)	2	7,150.0	350.0	100.0	443.2	20.0	4.0	2.22
CMB MAIN CHIMNEY (Lime Kiln)	3	7,150.0	350.0	100.0	378.2	20.0	1.50	0.56

Building Dimensions: Each stack is influenced by a worst case building with the following dimensions:
Height = 85 m
Length = 40 m
Width = 40 m
Maximum projected width = 56.6 m

Notes:

The modeling coordinate system is based on a 0, 0 center point (Botnia Mill's main chimney).

[a] The Industrial Source Complex Short Term 3 (ISCST3 or ISC) dispersion model was used for the analyses.
[b] The modeling analyses were performed over a 20 km square area. The center of this area is the location of the Botnia mill's main chimney. The location of the CMB mill is provided in the table above. The center, or origin of this area is represented in the ISC model as coordinates x= 0 and y= 0 (0,0).

TABLE 2b
EMISSION INVENTORY OF THE PROPOSED ORION AND CMB PULP MILLS - STARTUP

SOURCE DESCRIPTION	ISC SOURCE #[a]	SOURCE LOCATION COORDINATES[b]		STACK HEIGHT (m)	STACK EXIT TEMPERTURE (K)	STACK EXIT VELOCITY (m/s)	STACK DIAMETER (m)	EMISSION RATES (g/s)		
		EAST (m)	NORTH (m)					TSP	SO_2	NOx
ORION MAIN CHIMNEY (Recovery Boiler)	1	0.0	0.0	120.0	388.7	4.21	4.6	9.80	142.38	7.11
ORION MAIN CHIMNEY (Lime Kiln)	2	0.0	0.0	120.0	441.2	1.02	2.5	0.60	8.902	0.441

Building Dimensions: Each stack is influenced by a worst case building with the following dimensions:
Height = 85 m
Length = 40 m
Width = 40 m
Maximum projected width = 56.6 m

Notes:

The modeling coordinate system is based on a 0, 0 center point (Botnia Mill's main chimney).

[a] The Industrial Source Complex Short Term 3 (ISCST3 or ISC) dispersion model was used for the analyses.
[b] The modeling analyses were performed over a 20 km square area. The center of this area is the location of the Botnia mill's main chimney. The location of the CMB mill is provided in the table above. The center, or origin of this area is represented in the ISC model as coordinates x= 0 and y= 0 (0,0).

TABLE 3

IDENTIFICATION AND CLASSIFICATION OF LAND USE TYPES

TYPE	USE AND STRUCTURES	VEGETATION
I1	**Heavy Industrial** Major chemical, steel and fabrication industries; generally 3-5 story buildings, flat roofs	Grass and tree growth extremely rare; <5% vegetation
I2	**Light-Moderate Industrial** Railyards, truck depots, warehouses, industrial parks, minor fabrications; generally 1-3 story buildings, flat roofs	Very limited grass, trees almost totally absent; <5% vegetation
C1	**Commercial** Office and apartment buildings, hotels; >10 story heights, flat roofs	Limited grass and trees; <15% vegetation
R1	**Common Residential** Single-family dwellings with normal easements; generally one story, pitched roof structures; frequent driveways	Abundant grass lawns and lightly to moderately wooded; >70% vegetation
R2	**Compact Residential** Single, some multiple, family dwellings with close spacing; generally <2 story, pitched roof structures; garages (via alley), no driveways	Limited lawn sizes and shade trees; <30% vegetation
R3	**Compact Residential** Old multi-family dwellings with close (<2 m) lateral separation; generally 2 story, flat roof structures; garages (via alley) and ash pits, no driveways	Limited lawn sizes, old established shade trees; <35% vegetation
R4	**Estate Residential** Expensive family dwellings on multi-acre tracts	Abundant grass lawns and lightly wooded; >80% vegetation
A1	**Metropolitan Natural** Major municipal, state, or federal parks, golf courses, cemeteries, campuses; occasional single-story structures	Nearly total grass and lightly wooded; >95% vegetation
A2	**Agricultural Rural**	Local crops (e.g., corn, soybeans); 95% vegetation
A3	**Undeveloped** Uncultivated, wasteland	Mostly wild grasses and weeds, lightly wooded; >90% vegetation
A4	**Undeveloped Rural**	Heavily wooded; 95% vegetation
A5	**Water Surface** Rivers, lakes	

TABLE 4
AIR QUALITY STANDARDS FOR COUNTRIES AROUND THE WORLD

SO_2 AIR QUALITY STANDARDS

Country	Annual Average	24-Hour Max	Daily Average
China	0.06 mg/m³	0.50 mg/m³	0.15 mg/m³
India	-	0.03-0.12 mg/m³	
Indonesia	-	-	0.26 mg/m³ (0.1 ppm)
Philippines	-	0.85 mg/m³ (0.3 ppm)[a]	0.37 mg/m³ (0.14 ppm)
Poland	0.032 mg/m³	-	0.2 mg/m³
Thailand	0.10 mg/m³	-	0.30 mg/m³
World Bank Standard	0.05 mg/m³	0.125 mg/m³	
USA	0.06 mg/m³ (0.02 ppm)[b] 0.08 mg/m³ (0.03 ppm)[c]	0.26 mg/m³ (0.1 ppm)[b] 0.365 mg/m³ (0.14 ppm)[c] 1.3 mg/m³ (0.5 ppm)[b,d]	-
WHO	0.050 mg/m³	0.125 mg/m³	0.5 mg/m³ (10 minute average)
Germany	0.14 mg/m³(0.05 ppm)	-	0.40 mg/m³ (0.14 ppm)
Japan	0.26 mg/m³	0.11 mg/m³ (0.04 ppm)	
Canada	-	0.275 mg/m³	0.690 mg/m³ (1-hour) 0.830 mg/m³ (1/2-hour)

Notes:
(a) 1-hour average
(b) Secondary based on environmental effects
(c) Primary based on health effects on humans
(d) Maximum of 3 hours once yearly

NO_X AIR QUALITY STANDARDS

Country	Annual Average	24-Hour Max	Daily Average
China	0.12 mg/m³	0.15 mg/m³	0.1 - 0.15 mg/m³
India	0.03 – 0.12 mg/m³ (a)	-	0.0925 mg/m³
Indonesia	-	-	0.093 mg/m³ (0.05 ppm)
Philippines	-	0.19 mg/m³ (0.1 ppm) (b)	-
Poland	0.05 mg/m³	-	0.15 mg/m³
Thailand	-	0.32 mg/m³	-
World Bank Standard		0.150 mg/m³	
USA	0.10 mg/m³ (0.05 ppm)	-	-
WHO	0.04 mg/m³	0.150 mg/m³	
Germany	0.10 mg/m³ (0.05 ppm)	-	0.30 mg/m³ (0.15 ppm)
Japan	-	-	0.04-0.06 mg/m³
EU	0.2 mg/m³	-	
Canada	-	0.2 mg/m³	0.4 mg/m³ (1-hour) 0.5 mg/m³ (1/2-hour)

Notes:

(a) 0.03 mg/m^3 for sensitive areas and 0.08mg/m^3 for residential areas

(b) One-hour average

PM AIR QUALITY STANDARDS

Country	Annual Average	24-Hour Max	Daily Average
China	-	1.00 mg/m^3 (a) and 0.5 mg/m^3 (b)	0.30 mg/m^3 (a) and 0.15 mg/m^3 (b)
India	0.1-0.5 mg/m^3 (c)	-	-
Indonesia	-	-	0.26 mg/m^3
Philippines	-	0.25 mg/m^3(d)	0.15 mg/m^3
Poland	0.05 mg/m^3	-	0.12 mg/m^3
Thailand	0.10 mg/m^3	-	0.33 mg/m^3
World Bank Standard	0.050 mg/m^3	-	0.070 mg/m^3
USA	0.065 mg/m^3 (e) and 0.075 mg/m^3 (f)	0.15 mg/m^3 (e) and 0.26 mg/m^3 (f)	-
WHO	0.02 mg/m^3 (PM10)	0.050 mg/m^3 (PM10)	
Germany	0.1 mg/m^3 (g) and 0.2 mg/m^3 (g)	-	0.2 mg/m^3 (g) and 0.4 mg/m^3 (g)
Japan	-	0.20 mg/m^3	0.1 mg/m^3
Canada	-	0.120 mg/m^3	0.1 mg/m^3 (1/2-hour)

Notes:

(a) Total suspend
(b) Fly dust
(c) 0.1 mg/m^3 for sensitive areas and 0.2mg/m^3 for residential areas and rural areas and 0.2mg/m^3 for industrial and mixed used areas.
(d) One-hour average
(e) Secondary based on environmental effects
(f) Primary based on health effects on humans
(g) < 10 um

CO AIR QUALITY STANDARDS

Country	Annual Average	24-Hour Max	Daily Average
China	-		
India	1.0-5.0 mg/m^3 (c)		
Indonesia	-	22,600 $\mu g/m^3$ (8-hour average)	
Philippines	-		
Poland			
Thailand			
WHO		10 mg/m^3 (8-hour)	30 mg/m^3 (1-hour)
USA		10 mg/m^3 (9 ppm) (8-hour)	40 mg/m^3 (35 ppm) (1-hour)
Germany			
Japan	-		
Canada	-	36.2 mg/m^3 (1-hour)	6 mg/m^3 (1/2-hour)

Notes:

(a) 1 mg/m3 for sensitive areas and 2mg/m3 for residential areas and rural areas and 5mg/m3 for industrial and mixed used areas.
(b) Fly dust
(c) 0.1 mg/m^3 for sensitive areas and 0.2mg/m^3 for residential areas and rural areas and 0.2mg/m^3 for industrial and mixed used areas.
(d) One-hour average
(e) Secondary based on environmental effects
(f) Primary based on health effects on humans
(g) < 10 um

TABLE 5
SUMMARY OF MAXIMUM PREDICTED CUMULATIVE SO_2 CONCENTRATIONS
FROM THE PROPOSED ORION AND CMB PULP MILLS

Cumulative Impacts - Orion and CMB Mills:

AVERAGING PERIOD	DISTANCE FROM THE ORION MILL TO THE MAXIMUM PREDICTED CONCENTRATION (km)	DIRECTION FROM THE ORION MILL TO THE MAXIMUM PREDICTED CONCENTRATION	MAXIMUM PREDICTED CONCENTRATION (ug/m^3)	HEALTH STANDARD* (ug/m^3)	% OF HEALTH STANDARD
ANNUAL	6.50	EAST	2.66	32[a]	8.3%
24-HOUR HIGHEST	6.75	EAST	21.70	30[b]	72.3%
3-HOUR HIGHEST	6.75	EAST	43.90	1300[c]	3.4%
1-HOUR HIGHEST	7.00	EAST	49.70	690[d]	7.2%

The 2001 meteorological data was used for this analysis.

Notes:

* The health standard represents the most conservative health standard identified.

[a] Represents the annual average standard in Poland.

[b] Represents the 24-hour average standard in India.

[c] Represents the United States National Ambient Air Quality Standard - secondary standard over a 3-hour period.

[d] Represents the 1-hour average standard in Canada.

TABLE 6
SUMMARY OF MAXIMUM PREDICTED CUMULATIVE NO_2 CONCENTRATIONS
FROM THE PROPOSED ORION AND CMB PULP MILLS

Cumulative Impacts - ORION and CMB Mills:

AVERAGING PERIOD	DISTANCE FROM THE ORION MILL TO THE MAXIMUM PREDICTED CONCENTRATION (km)	DIRECTION FROM THE ORION MILL TO THE MAXIMUM PREDICTED CONCENTRATION	MAXIMUM PREDICTED CONCENTRATION (ug/m^3)	HEALTH STANDARD* (ug/m^3)	% OF HEALTH STANDARD
ANNUAL	6.50	EAST	4.00	30[a]	13.3%
24-HOUR HIGHEST	6.75	EAST	32.60	150[b]	21.7%
1-HOUR HIGHEST	7.00	EAST	74.60	190[c]	39.3%

The 2001 meteorological data was used for this analysis.

Notes:

* The health standard represents the most conservative health standard identified.

[a] Represents the annual average standard in India for sensitive areas.

[b] Represents the 24-hour average standard in China.

[c] Represents the 1-hour average standard in the Philippines.

TABLE 7
SUMMARY OF MAXIMUM PREDICTED CUMULATIVE PM CONCENTRATIONS
FROM THE PROPOSED ORION AND CMB PULP MILLS

Cumulative Impacts - ORION and CMB Mills:

AVERAGING PERIOD	DISTANCE FROM THE ORION MILL TO THE MAXIMUM PREDICTED CONCENTRATION (km)	DIRECTION FROM THE ORION MILL TO THE MAXIMUM PREDICTED CONCENTRATION	MAXIMUM PREDICTED CONCENTRATION (ug/m^3)	HEALTH STANDARD* (ug/m^3)	% OF HEALTH STANDARD
ANNUAL	6.50	EAST	1.65	50[a]	3.3%
24-HOUR HIGHEST	6.75	EAST	13.60	120[b]	11.3%
1-HOUR HIGHEST	7.00	EAST	31.10	250[c]	12.4%

The 2001 meteorological data was used for this analysis.

Notes:

* The health standard represents the most conservative health standard identified.

[a] Represents the annual average standard in Poland.

[b] Represents the 24-hour average standard in Canada.

[c] Represents the 1-hour average standard in the Philippines.