APPENDIX Q-2

AIR QUALITY MODELLING REPORT – ADDENDUM

RAINY RIVER RESOURCES LTD.
AIR QUALITY ASSESSMENT REPORT
RAINY RIVER PROJECT

ADDENDUM

Submitted to:

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1.0 INTRODUCTION

The Rainy River Project (RRP) is a gold exploration project situated in the Township of Chapple, approximately sixty-five kilometres (by road) northwest of Fort Frances in northwestern Ontario. The RRP site and surrounding lands are dominantly privately held, with Rainy River Resources Ltd. (RRR) holding a considerable private land package. RRR has been exploring the RRP property since 2005, with the objective of constructing, operating and eventually reclaiming a new open pit and underground gold mine and milling complex on the site. RRR is pursuing environmental approvals for the development of open pit and underground gold mine at this location. AMEC Environment & Infrastructure, a division of AMEC Americas Limited, was retained by RRR to prepare an Air Quality Assessment Report for the RRP site.

RRR is required to complete a Standard Environmental Assessment pursuant to the *Canadian Environmental Assessment Act, 2012* and an Individual Environmental Assessment pursuant to the Ontario *Environmental Assessment Act*. In support of the Federal and Provincial environmental assessment, AMEC has completed a study of the potential air quality effects of the Project. The Air Quality Assessment requires the prediction of offsite effects using dispersion modelling, and the comparison of the results to applicable air quality criteria in order to determine whether potential adverse effects on the environment and human health exist.

This addendum has been prepared in response to comments received on the draft EA Report and supporting Air Quality Assessment Report. The comments that required additional information or assessment are:

- Baseline assessment for metals and consideration in the overall effects assessment;
- Inclusion of NO_x, SO_2 and CO emissions for mobile sources in the overall effects assessment;
- Clarification of the wind gusts in Tables 5 and 6 in the Air Quality Assessment;
- Update of Table A3 in the Air Quality Assessment;
- Revise the pit dimensions in Table A7 of the Air Quality Assessment to match the modelling files; and
- Include the $PM_{2.5}$ isopleth.

The following sections address each comment. Table numbers in the Air Quality Assessment and Appendices are the same as previously used. Any tables unique to this addendum are labelled with the prefix ADD.

2.0 BASELINE METALS AND DISCUSSION

Several metal species are present in the ore processed, and are subsequently emitted as trace constituents of the particulate matter. The following were considered in the assessment either as a result of significant levels of the metal or are commonly considered as metals of interest for mining projects:

- Arsenic (As);
- Cadmium (Cd);
- Chromium (Cr);
- Mercury (Hg);
- Magnesium (Mg);
- Manganese (Mn);
- Nickel (Ni);
- Lead (Pb); and
- Zinc (Zn).

There is little background metal data available for northern Ontario, as the Ministry of the Environment (MOE) ceased collecting Total Suspended Particulate (TSP) and metals data in 2002. The 2002 *Air Quality Ontario* report provides the most recent data for some of the key metals identified (MOE 2002; relevant excerpt included in Appendix 2). There is no data available for arsenic or magnesium. Chromium, manganese, nickel, and lead, were measured as constituents of the total particulate matter at Copper Cliff, Ontario; zinc was measured as a constituent of PM_{10} (and not in TSP) at a number of northern Ontario stations; and mercury was measured in Mississauga, Ontario. The Copper Cliff station is anticipated to be highly impacted by the smelting and metals operations in the area. The higher levels measured at this station would not be representative of baseline levels in the RRP area. To account for the industrial activity in the station area, the thirtieth percentile (30%ile) of the measured data was used to represent a baseline level (i.e. representative of levels at the stations when the stations were not impacted by the industrial emissions). The 2002 data is presented in Tables ADD1 and ADD2.

The cadmium standard was recently revised by MOE. In the MOE supporting documentation for setting new standards (MOE 2007), MOE indicated that typical 98%ile background levels for cadmium are in the range of 0.95 to 3.45 ng/m^3 in testing data for Ottawa, Toronto, Hamilton and Windsor. These stations are all influenced by major urban centres and in some cases by significant metal emitting industries. The baseline cadmium level for RRR was considered to be the average of the range of the 98%ile urban levels; 2.2 ng/m^3 (0.0022 ug/m^3)

Table ADD1 provides the overall result of including the baseline metal concentrations with the modelled metal concentrations. In all cases, the combined results are below the Ambient Air Quality (AAQC) criteria (MOE 2012).

Table ADD1: Combined Modelled and Background Concentrations (Metals)
24-hour Averaging Time

Element	CAS Number	Facility Emission Rate (g/s)	Modelled Concentration (µg/m^3)	Background Concentration (µg/m^3)	Modelled + Background Concentration (µg/m^3)	AAQC (µg/m^3)	% of Criteria
As	7440-38-2	1.12E-02	0.012	no data	0.012	0.3	4.0%
Cd	7440-43-9	1.46E-03	0.002	0.0022	0.004	0.025	15.0%
Cr	7440-47-3	1.60E-02	0.017	0.001	0.018	1.5	1.2%
Hg	7439-97-6	8.11E-06	8.60E-06	0.0017	0.0017	0.5	0.3%
Mg	1309-48-4	2.18	2.32	no data	2.32	120	1.9%
Mn	1336-36-3	0.118	0.125	0.001	0.126	0.15	84.2%
Ni	7440-02-0	6.42E-03	0.007	0.022	0.029	2	1.4%
Pb	10099-74-8	0.018	0.019	0.010	0.029	0.5	5.7%
Zn	7440-66-6	0.207	0.219	0.010	0.229	120	0.2%

Table ADD2: Background Concentrations (Metals)

Element	MOE Station	Mean Concentration (µg/m^3)	30th Percentile (µg/m^3)	90th Percentile (µg/m^3)	2002 Baseline Concentration* (µg/m^3)
As	No data available				
Cd	MOE Background report for Cadmium standard	No data available			0.0022
Cr	MOE Copper Cliff	ins.	0.001	0.009	0.001
Hg	Mississauga General Hospital	0.0019	0.00169	0.0024	0.00169
Mg	No data available				
Mn	MOE Copper Cliff	ins.	0.001	0.011	0.001
Ni	MOE Copper Cliff	ins.	0.022	0.502	0.022
Pb	MOE Copper Cliff	ins.	0.010	0.020	0.010
Zn **	MOE Copper Cliff	0.026	0.010	0.050	0.010

ins. Insufficient data collected to calculate a mean value
* The 2002 baseline concentrations presented for Cr, Mn, Hg, Ni, Pb, and Zn are the 30th percentiles for MOE Station in Copper Cliff, Ontario.
** A Zn concentration in TSP was not available; only Zinc in PM10. The total Zn concentration (in TSP) was assumed to be twice that of the concentration in PM_{10}

3.0 ASSESSMENT OF NO_2, SO_2, AND CO FROM MOBILE SOURCES

Dispersion modelling for NO_2, CO, and SO_2 was performed considering emissions from stationary sources at the Site as well as mobile sources such as heavy mining equipment and haul trucks. Tailpipe emissions from mining equipment such as loaders, drills, and graders, used inside the pit were also included in the modelling. Particulate emissions for mobile sources are included in the emission factors developed for roadways and travel areas. The particulate assessment undertaken in the Air Quality Assessment is already inclusive of mobile source emissions.

The tailpipe emissions from haul trucks and dozers were conservatively estimated using Tier 4 emission standards for NO_x and CO as emission factors; SO_2 emissions were estimated using the United States Environmental Protection Agency Non-Road Emissions Model which provides an estimated emission factor according to engine power rating.

The dispersion modelling was performed using recommended practices for source inputs: haul trucks travelling outside the pit were modelled as line volume sources representing haul road routes, area sources were used to model emissions from dozers at the stockpiles, the equipment within the pit and one of the underground portals were combined and modelled as an open pit source, and the generator, fire pump, and second underground portal were modelled as point sources. (Note: the non-mobile emissions and sources were the same as that undertaken for the draft EA and Air Quality Assessment report).

The results of the modelling were compared to the appropriate AAQC. For NO_x, the dispersion modelling was performed to determine the concentration of NO_2 as required for the AAQC. . Conversion of NO_x to NO_2 was carried out by the ozone limiting method with default ratios, with the background ozone concentration taken from the Experimental Lakes Area. The Experimental Lakes Area operates as part of the Environment Canada Atmospheric Environment Service's Canadian Air and Precipitation Monitoring Network (CAPMON). The results of the assessment are provided in Table ADD3.

The assessment of all sources indicates that the key contaminants meet all ambient air quality criteria.

Table ADD3: Emission Summary Table for NO_2, CO, and SO_2 including Mobile Sources

Compounds	CAS Number	Facility Emission Rate (g/s)	Model Used	Modelled Conc. (µg/m^3)	Averaging Period (hr - unless noted otherwise)	AAQC (µg/m^3)	% of Criteria
Nitrogen Dioxide NO_2	10102-44-0	36.5	AERMOD	93.4	24	200	46.7%
		126.4	AERMOD	242	1	400	60.5%
Carbon Monoxide	630-08-0	59.0	AERMOD	2634	0.5	6000	43.9%
		453	AERMOD	2195	1	36200	6.1%
		59.0	AERMOD	423	8	15700	2.7%
Sulfur Dioxide	7446-09-5	2.92	AERMOD	10.8	24	275	3.9%
		29.7	AERMOD	138	1	690	20.1%

Modelled concentrations account for met anomalies as per MOE Modelling Guidance; except for CO. Maxima reported for CO.

4.0 CLARIFICATION OF REGIONAL WIND DATA

A summary of the Climate Normal wind speed and wind direction data is provided in Tables 5 and 6, for the 30-year period 1971 to 2000 (EC 2012). The tables present both the average wind speed and the maximum daily wind speed, both in kilometres per hour (kph).

This data was provided as representative of regional meteorological conditions; however the dispersion modelling conducted used five years of hourly wind data provided by the MOE from a station located in International Falls, Minnesota.

Table 5: Climate Normals (Wind Speed) Kenora, Ontario 1971 to 2000

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Wind speed (kph)	13.3	13.3	14.1	14.4	14.3	13.5	13.1	12.9	14.2	14.8	13.9	13.2	13.8
Direction	NW	S	NW	S	S	S	S	S	S	S	S	S	S
Maximum Hourly Wind Speed (kph)	58	51	56	53	56	68	64	64	57	64	58	59	

Climate ID: 6034075, http://climate.weatheroffice.gc.ca/climate_normals/index_e.html

Table 6: Climate Normals (Wind Speed) Atikokan, Ontario 1971-2000

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Wind speed (kph)	7.2	6.9	8.3	8.6	8.3	8.2	7.1	6.8	7.8	8.5	7.9	6.9	7.7
Direction	W	W	W	NW	NW	NW	W	S	W	S	W	W	W
Maximum Hourly Wind Speed (kph)	42	42	52	44	42	43	45	42	39	58	46	42	

Climate ID: 6020379, http://climate.weatheroffice.gc.ca/climate_normals/index_e.html

5.0 TABLE A3 (AIR QUALITY ASSESSMENT)

Table A3 of the Air Quality Assessment has been revised and is provided in Appendix 1 of this addendum.

6.0 TABLE A7 (PIT DIMENSIONS)

The source input parameters for the point, volume, area, and open pit sources included in the dispersion modelling are summarized in Table A7. The pit dimensions from the modelling files have been corrected in the revised table.

Table A7: Summary of Source Input Parameters for AERMOD Dispersion Model

Type	ID	Base_Elev [m]	Height [m]	Diam [m]	Exit_Vel [m/s]	Exit_Temp [K]	Release_Type	SigmaY [m]	SigmaZ [m]	Length_X [m]	Length_Y [m]	Pit_Volume [m^3]	X1 [m]	Y1 [m]
POINT	GEN4	371	4.4	0.31	123.3	921	VERTICAL						426657	5411199
POINT	PORT2	354.48	1	4.5	11.6	290	VERTICAL						425125	5410209
VOLUME	PLANT	371.4	35					40.7	16.28	174.9			426582	5411041
VOLUME	CRUSHER	369.97	41					6.4	19.07	27.68			426779	5410179
POINT	FIREPUMP	369.79	5	0.15	41.3	740	VERTICAL						426353	5410915
AREA	PAG	381	7.37						3.43	100	100		428789	5408783
AREA	ORE	373.27	7.37						3.43	100	100		428196	5409848
AREA	NPAG	352.55	7.37						3.43	100	100		422627	5410239
AREA	PAGN	386	7.37						3.43	100	100		428441	5410558
OPEN_PIT	PIT	349	33				PIT			1360	1100	100,000,000	424841	5409109

7.0 RESULTS OF $PM_{2.5}$ DISPERSION MODELLING

The isopleth for $PM_{2.5}$ was not included in the Air Quality Assessment. The $PM_{2.5}$ isopleth plot has been appended to this addendum (Appendix 3).

8.0 REVISED DISPERSION MODELLING ISOPLETH PLOTS

The results of the dispersion modelling for TSP, NO_x, and HCN were presented in the Draft EA and the Air Quality Assessment as isopleth plots that show contours lines of equal modelled concentration. The isopleth lines shown were shown as continuous lines across the entire RRP Site, implying that onsite concentrations were also modelled. There were no receptors located on the site, and the onsite isopleths were artificially generated by the graphics software by interpolating the data for receptors located along the site boundary.

Revised plots have been prepared that present the offsite modelled concentrations offsite. The revised figures have been appended to this addendum (Appendix 3).

9.0 SUMMARY OF ADDENDUM

This Air Quality Assessment Report has been prepared in support of the EA for the RRP, a proposed new open pit and underground gold mine. During the construction and operations phase, the facility will be operated in accordance with all regulatory requirements, which include the requirements of the Environmental Compliance Approvals (Air).

This addendum was prepared in response to comments received on the draft EA report and the supporting Air Quality Assessment.

There were no changes to the conclusions of the assessment resulting from the additional information and revisions detailed in this addendum.

10.0 REFERENCES

Ministry of the Environment (MOE). 2002. Air Quality in Ontario Reports. Accessed from http://www.airqualityontario.com/press/publications.php.

Ministry of the Environment (MOE). 2007. Ontario Air Standards for Cadmium and Cadmium Compounds. Standards Development Branch, June.

Ministry of the Environment (MOE). 2012. Ontario's Ambient Air Quality Criteria.

APPENDIX 1

TABLE A3: SOURCE SUMMARY EMISSIONS (G/S)

RAINYRIVER

Table A3: Source Summary - Emissions (g/s)

Operations Phase

Source	Source ID	Description	Emissions (g/s)										
			PM	$PM_{2.5}$	NOx		CO		SO_2		HCN	$CuSO_4$	CaO
			24-hr	24-hr	1-hr	24-hr	1-hr	24-hr	1-hr	24-hr	24-hr	24-hr	24-hr
TOTAL			81.08	4.77	126.40	36.55	495.30	59.00	29.71	2.92	0.15	0.09	0.09
Drill	PIT	Open Pit Mining - Drilling	0.27	0.14									
Blast	PIT	Open Pit Mining - Blasting	5.76	0.17	86	4	453	19	28	1			
Load	PIT	Open Pit Mining - Load Haul Truck (Shovel)	7.0	0.8									
In Pit Road	PIT	Open Pit Mining - Haul trucks	23.5	0.6	11.23	11.23	11.23	11.23	0.02	0.02			
Haul Roads	Roads (various)**	Road Emissions	33.1	0.9									
Dozers/Graders in pit	PIT	Dozers and Graders in pit	0.5	0.1	17.3	16.6	19.58	18.8	0.03	0.03			
Concrete 1	BATCH1	Batch Plant 1	1.291	0.060									
BagHouse2	BH2 - under crushed ore pile	baghouse for conveyor drop under stockpile feed conveyor	0.255	0.255									
Reclaim	RECLAIM	Discharge to stockpile	0.571	0.065									
Unload 1	PAG (and PAGN)	Drop at PAG	1.89	0.21									
Dozer WR	PAG (and PAGN)	Dozer use at PAG	0.25	0.03	1.34	0.67	1.34	0.67	0.0023	0.001			
Unload 2	NPAG/OB	NPAG/OB drop	3.83	0.43									
Dozer NPAG	NPAGDoz	Dozer use at NPAG and OB	0.50	0.05	0.67	0.67	0.67	0.67	0.0011	0.001			
Unload 3	ORE	Ore stockpile unloading	0.68	0.08									
Dozer Ore	OREDoz	Dozer at Ore stockpile	0.25	0.03	0.67	0.67	0.67	0.67	0.0011	0.001			
Ex Portal 1	Port1	UG exhaust portal in pit	0.10	0.10	0.53	0.53	2.02	2.02	0.040	0.040			
Ex Portal 2	Port2	UG exhaust portal west of pit	0.29	0.29	1.58	1.58	6.07	6.07	0.119	0.040			
Unload Crusher	CRUSH	Fugitive Primary Crusher Feed	0.57	0.06									
BagHouse1	BH1 PCRUSH	baghouse for crusher	0.14	0.14									
Leach	LEACH	Leach Tanks - LT1 to LT8									0.15		
SpaceHeat	SPACEHEAT	space heating in process building			0.77	0.77							
Induction Furances	IND1	dust collector / scrubber to control furnace exhaust	0.06	0.06									
Lime Baghouse	BH11 Lime	exhaust for lime bin dust collector	0.032	0.032									0.032
Scrubber lime slaker	LS1	scrubber for lime slaker	0.0570	0.0570									0.057
Flocculant Dust collector	FLOC1	flocculant handling cartridge filter	0.0076	0.0076									
CuSO4 scrubber	EF11CuSO4	scrubber to control CuSO4 from loading and mixing tank	0.088	0.088								0.088	
CN-Dest 1	HCND1	CN Destruction Tank 1							1.63	1.63			
Emerg Gen 1	EGEN1	Emergency Diesel Generator 1	0.0504	0.0504	6.0672	0.2528	0.7390	0.0308	0.0018	0.0001			
Emerg Gen 2	EGEN2	Emergency Diesel Generator 2	only one operating during testing; largest unit assumed										
Emerg Gen 3	EGEN3	Emergency Diesel Generator 3											
Emerg Gen 4	EGEN4	Emergency Diesel Generator 4											
Emerg Gen 5	EGEN5	Emergency Diesel Generator 5											
FirePump1	FP1	Diesel Fire Pump 1	0.018	0.018	0.400	0.02	0.08	0.003	0.002	0.00008			

APPENDIX 2

BACKGROUND DATA FOR KEY METALS
(MOE 2002; EXCERPTS OF PUBLISHED DATA)

Appendix: RRGP Background Concentrations

Summary of MOE Measurements at Copper Cliff (Sudbury), 2002

	Pb (ug/m3)				Cr (ug/m3)			
	Mean	30th Percentile (Median)	90th Percentile	2002 Baseline	Mean	30th Percentile (Median)	90th Percentile	2002 Baseline
Copper Cliff	ins.	0.010	0.020	0.010	ins.	0.001	0.009	0.001

	Mn (ug/m3)				Ni (ug/m3)			
	Mean	30th Percentile (Median)	90th Percentile	2002 Baseline	Mean	30th Percentile (Median)	90th Percentile	2002 Baseline
Copper Cliff	ins.	0.001	0.011	0.001	ins.	0.022	0.502	0.022

	Zinc (in PM10) (ug/m3)				Zinc (in TSP) (ug/m3)			
	Mean	30th Percentile (Median)	90th Percentile	2002 Baseline	Mean	30th Percentile (Median)	90th Percentile	2002 Baseline
Copper Cliff	0.013	0.005	0.025	0.005	0.026	0.010	0.050	0.010

	Hg (ug/m3)			
	Mean	30th Percentile (Median)	90th Percentile	2002 Baseline
Mississauga	0.0019	0.0017	0.0024	0.0017

Air Quality in Ontario 2002
Appendix

ONTARIO

Ministry of the
Environment

Table 26: Cadmium (Cd) in TSP Statistics (2002)

Unit: micrograms per cubic metre (µg/m^3)

ID	City	Location	# of Samples	PERCENTILES						Max.	Arith. Mean	Geom. Mean
				10%	30%	50%	70%	90%	99%			
12007	Windsor	Wright/Water St.	41	0.100	0.100	0.100	0.100	0.190	0.359	0.400	0.122	0.113
12008	Windsor Downtown	467 University Ave. W.	44	0.100	0.100	0.100	0.100	0.100	0.256	0.300	0.109	0.106
12011	Windsor	Drouillard Rd./Richmond St.	38	0.100	0.100	0.100	0.100	0.200	0.200	0.200	INS	INS
12013	Windsor	3665 Wyandotte St. E., Filtration Plant	38	0.100	0.100	0.100	0.100	0.100	0.300	0.300	INS	INS
12016	Windsor West	College/South St.	40	0.100	0.100	0.100	0.100	0.200	0.260	0.300	0.118	0.112
12038	Windsor	2885 Howard Ave.	46	0.100	0.100	0.100	0.100	0.200	0.254	0.300	0.117	0.112
12058	Windsor	Columbus Ctr.	42	0.100	0.100	0.100	0.100	0.100	0.200	0.200	0.105	0.103
14016	Courtright	HWY40 (opposite OPG)	37	0.100	0.100	0.100	0.100	0.130	0.200	0.200	INS	INS
15025	London	900 Highbury Ave.	45	0.100	0.100	0.100	0.100	0.100	0.155	0.200	0.102	0.102
27052	Thorold	185 Queen St. S.	41	0.100	0.100	0.100	0.100	0.100	0.200	0.200	0.105	0.103
27057	St. Catharines	27 Plymouth Ave.	46	0.100	0.100	0.100	0.100	0.100	0.254	0.300	0.107	0.104
27081	Thorold	Beaverdams/Collier	43	0.100	0.100	0.100	0.100	0.100	0.300	0.300	0.109	0.105
27082	Niagara Falls	7401 Portage Rd.	41	0.100	0.100	0.100	0.100	0.100	0.259	0.300	0.100	0.100
27083	Port Colborne	Rodney/Davis	46	0.100	0.100	0.100	0.100	0.100	0.200	0.200	0.104	0.103
27084	St. Catharines	10 Hemlock St.	16	0.100	0.100	0.100	0.100	0.100	0.268	0.300	INS	INS
27085	St. Catharines	St. Lawrence Seaway Authority	16	0.100	0.100	0.100	0.100	0.100	0.184	0.200	INS	INS
29011	Hamilton	Burlington/Leeds	39	0.100	0.100	0.100	0.100	0.100	0.261	0.300	INS	INS
29025	Hamilton	Barton/Sanford	43	0.100	0.100	0.100	0.100	0.100	0.314	0.400	0.102	0.102
29102	Hamilton	467 Beach Blvd.	42	0.100	0.100	0.100	0.100	0.100	0.300	0.300	0.110	0.110
29114	Hamilton Mountain	Vickers Rd./E. 18th St.	39	0.100	0.100	0.100	0.100	0.200	0.300	0.300	INS	INS
29568	Hamilton	1 Hillyard St.	41	0.100	0.200	0.400	0.770	1.480	2.018	2.100	0.595	0.385
29569	Hamilton	Hillyard/Brant	47	0.100	0.100	0.100	0.200	0.300	0.559	0.700	0.170	0.147
46117	Mississauga	Apple Lane, Meadowood Park	21	0.100	0.100	0.100	0.100	0.100	0.179	0.200	INS	INS
71042	Sault Ste. Marie	Bonney St., Pumphouse	47	0.100	0.100	0.100	0.100	0.200	0.253	0.300	0.115	0.110
77614	Copper Cliff	Nickel St.	14	0.100	0.100	0.100	0.100	0.100	0.100	0.100	INS	INS

***Notes* :**

- Majority of the 'Samples' measured below the detection limit.

Table 27: Chromium (Cr) in TSP Statistics (2002)

Unit: micrograms per cubic metre (µg/m^3)

Cr 24-hour AAQC is 1.5 µg/m^3

ID	City	Location	# of Samples	PERCENTILES 10%	30%	50%	70%	90%	99%	Max.	Arith. Mean	Geom. Mean	# of Times Above Criterion
12007	Windsor	Wright/Water St.	41	0.001	0.001	0.004	0.007	0.015	0.028	0.028	0.006	0.003	0
12008	Windsor Downtown	467 University Ave. W.	44	0.001	0.001	0.003	0.007	0.011	0.017	0.018	0.005	0.003	0
12011	Windsor	Drouillard Rd./Richmond St.	38	0.001	0.002	0.005	0.009	0.016	0.043	0.051	INS	INS	0
12013	Windsor	3665 Wyandotte St. E., Filtration Plant	38	0.001	0.001	0.007	0.021	0.063	0.136	0.140	INS	INS	0
12016	Windsor West	College/South St.	40	0.001	0.001	0.001	0.006	0.012	0.018	0.020	0.005	0.003	0
12038	Windsor	2885 Howard Ave.	46	0.001	0.007	0.021	0.035	0.064	0.120	0.140	0.029	0.013	0
12058	Windsor	Columbus Ctr.	42	0.001	0.001	0.001	0.002	0.011	0.017	0.019	0.003	0.002	0
14016	Courtright	HWY40 (opposite OPG)	37	0.001	0.001	0.001	0.001	0.001	0.030	0.045	INS	INS	0
15025	London	900 Highbury Ave.	45	0.001	0.001	0.001	0.005	0.008	0.024	0.026	0.004	0.002	0
27052	Thorold	185 Queen St. S.	41	0.001	0.004	0.110	0.028	0.072	0.200	0.220	0.031	0.010	0
27057	St. Catharines	27 Plymouth Ave.	46	0.001	0.002	0.004	0.008	0.017	0.056	0.075	0.009	0.004	0
27081	Thorold	Beaverdams/Collier	43	0.001	0.001	0.001	0.006	0.017	0.033	0.036	0.006	0.003	0
27082	Niagara Falls	7401 Portage Rd.	41	0.001	0.013	0.027	0.053	0.264	0.498	0.600	0.079	0.024	0
27083	Port Colborne	Rodney/Davis	46	0.001	0.002	0.005	0.010	0.017	0.029	0.032	0.008	0.005	0
27084	St. Catharines	10 Hemlock St.	16	0.001	0.001	0.003	0.010	0.018	0.034	0.035	INS	INS	0
27085	St. Catharines	St. Lawrence Seaway Authority	16	0.001	0.008	0.014	0.036	0.043	0.100	0.110	INS	INS	0
29011	Hamilton	Burlington/Leeds	39	0.009	0.017	0.024	0.035	0.056	0.084	0.098	INS	INS	0
29025	Hamilton	Barton/Sanford	43	0.001	0.004	0.010	0.017	0.040	0.059	0.062	0.015	0.008	0
29102	Hamilton	467 Beach Blvd.	42	0.001	0.007	0.014	0.026	0.044	0.076	0.079	0.020	0.010	0
29114	Hamilton Mountain	Vickers Rd./E. 18th St.	39	0.001	0.001	0.003	0.007	0.012	0.018	0.020	INS	INS	0
29568	Hamilton	1 Hillyard St.	47	0.095	0.212	0.500	1.100	2.500	3.259	3.400	0.905	0.505	8
29569	Hamilton	Hillyard/Brant	47	0.013	0.031	0.050	0.072	0.160	0.257	0.280	0.068	0.045	0
46117	Mississauga	Apple Lane, Meadowood Park	21	0.001	0.001	0.001	0.002	0.004	0.008	0.009	INS	INS	0
71042	Sault Ste. Marie	Bonney St., Pumphouse	47	0.001	0.003	0.014	0.026	0.043	0.092	0.120	0.020	0.009	0
77614	Copper Cliff	Nickel St.	14	0.001	0.001	0.001	0.001	0.009	0.017	0.018	INS	INS	0

Table 30: Manganese (Mn) in TSP Statistics (2002)

Unit: micrograms per cubic metre (µg/m^3)

Mn 24-hour AAQC is 2.5 µg/m^3

ID	City	Location	# of Samples	PERCENTILES 10%	30%	50%	70%	90%	99%	Max.	Arith. Mean	Geom. Mean	# of Times Above Criterion
12007	Windsor	Wright/Water St.	41	0.007	0.017	0.029	0.044	0.090	0.173	0.210	0.042	0.026	0
12008	Windsor Downtown	467 University Ave. W.	44	0.002	0.011	0.019	0.026	0.050	0.075	0.075	0.023	0.015	0
12011	Windsor	Drouillard Rd./Richmond St.	38	0.011	0.017	0.028	0.040	0.069	0.163	0.210	INS	INS	0
12013	Windsor	3665 Wyandotte St. E., Filtration Plant	38	0.001	0.016	0.033	0.116	0.198	0.365	0.430	INS	INS	0
12016	Windsor West	College/South St.	40	0.001	0.010	0.022	0.051	0.072	0.090	0.096	0.033	0.017	0
12038	Windsor	2885 Howard Ave.	46	0.004	0.022	0.064	0.096	0.160	0.261	0.270	0.076	0.039	0
12058	Windsor	Columbus Ctr.	42	0.001	0.004	0.010	0.020	0.041	0.089	0.110	0.018	0.008	0
14016	Courtright	HWY 40 (opposite OPG)	37	0.001	0.001	0.002	0.004	0.010	0.039	0.053	INS	INS	0
15025	London	900 Highbury Ave.	45	0.001	0.005	0.012	0.017	0.030	0.046	0.048	0.013	0.007	0
27052	Thorold	185 Queen St. S.	41	0.001	0.004	0.012	0.015	0.031	0.042	0.043	0.013	0.007	0
27057	St. Catharines	27 Plymouth Ave.	46	0.015	0.037	0.070	0.124	0.226	0.386	0.400	0.103	0.061	0
27081	Thorold	Beaverdams/Collier St.	43	0.001	0.003	0.010	0.015	0.023	0.069	0.087	0.013	0.007	0
27082	Niagara Falls	7401 Portage Rd.	41	0.001	0.011	0.021	0.034	0.049	0.101	0.110	0.027	0.016	0
27083	Port Colborne	Rodney/Davis	46	0.005	0.011	0.018	0.025	0.043	0.080	0.097	0.022	0.016	0
27084	St. Catharines	10 Hemlock St.	16	0.002	0.008	0.015	0.024	0.045	0.050	0.050	INS	INS	0
27085	St. Catharines	St. Lawrence Seaway Authority	16	0.015	0.031	0.045	0.070	0.154	0.291	0.310	INS	INS	0
29011	Hamilton	Burlington/Leeds	39	0.068	0.110	0.190	0.240	0.312	0.495	0.530	INS	INS	0
29025	Hamilton	Barton/Sanford	43	0.030	0.054	0.079	0.140	0.370	1.132	1.300	0.167	0.091	0
29102	Hamilton	467 Beach Blvd.	42	0.014	0.061	0.120	0.214	0.368	0.521	0.580	0.163	0.098	0
29114	Hamilton Mountain	Vickers Rd./E. 18th St.	39	0.004	0.015	0.021	0.040	0.082	0.166	0.170	INS	INS	0
29568	Hamilton	1 Hillyard St.	47	0.167	0.360	0.950	1.690	3.560	4.365	4.600	1.342	0.815	7
29569	Hamilton	Hillyard/Brant	47	0.054	0.081	0.165	0.238	0.841	1.659	1.800	0.316	0.177	0
46117	Mississauga	Apple Lane, Meadowood Park	21	0.001	0.002	0.007	0.010	0.017	0.034	0.038	INS	INS	0
71042	Sault Ste. Marie	Bonney St., Pumphouse	47	0.024	0.079	0.180	0.289	0.522	0.736	0.750	0.226	0.141	0
77614	Copper Cliff	Nickel St.	14	0.001	0.001	0.001	0.003	0.011	0.017	0.017	INS	INS	0

Table 31: Nickel (Ni) in TSP Statistics (2002)

Unit: micrograms per cubic metre (µg/m^3)

Ni 24-hour AAQC is 2.0 µg/m^3

ID	City	Location	# of Samples	PERCENTILES 10%	30%	50%	70%	90%	99%	Max.	Arith. Mean	Geom. Mean	# of Times Above Criteria
12007	Windsor	Wright/Water St.	41	0.001	0.001	0.001	0.003	0.008	0.013	0.015	0.003	0.002	0
12008	Windsor Downtown	467 University Ave. W.	44	0.001	0.001	0.001	0.002	0.004	0.011	0.015	0.002	0.002	0
12011	Windsor	Drouillard Rd./Richmond St.	38	0.001	0.001	0.001	0.002	0.006	0.010	0.010	INS	INS	0
12013	Windsor	3665 Wyandotte St. E., Filtration Plant	38	0.001	0.001	0.001	0.004	0.011	0.015	0.016	INS	INS	0
12016	Windsor West	College/South St.	40	0.001	0.001	0.001	0.002	0.005	0.019	0.027	0.003	0.002	0
12038	Windsor	2885 Howard Ave.	46	0.001	0.001	0.006	0.012	0.038	0.070	0.077	0.014	0.005	0
12058	Windsor	Columbus Ctr.	42	0.001	0.001	0.001	0.001	0.006	0.014	0.014	0.002	0.002	0
14016	Courtright	HWY40 (opposite OPG)	37	0.001	0.001	0.001	0.001	0.003	0.017	0.024	INS	INS	0
15025	London	900 Highbury Ave.	45	0.001	0.001	0.001	0.001	0.002	0.012	0.013	0.002	0.001	0
27052	Thorold	185 Queen St. S.	41	0.001	0.001	0.001	0.001	0.006	0.011	0.012	0.002	0.002	0
27057	St. Catharines	27 Plymouth Ave.	46	0.001	0.001	0.001	0.003	0.006	0.017	0.020	0.003	0.002	0
27081	Thorold	Beaverdams/Collier	43	0.001	0.001	0.001	0.001	0.005	0.008	0.008	0.002	0.001	0
27082	Niagara Falls	7401 Portage Rd.	41	0.001	0.001	0.001	0.003	0.007	0.014	0.018	0.003	0.002	0
27083	Port Colborne	Rodney/Davis	46	0.001	0.005	0.008	0.017	0.056	0.555	0.950	0.038	0.010	0
27084	St. Catharines	10 Hemlock St.	16	0.001	0.001	0.001	0.002	0.006	0.009	0.009	INS	INS	0
27085	St. Catharines	St. Lawrence Seaway Authority	16	0.001	0.002	0.004	0.005	0.012	0.021	0.022	INS	INS	0
29011	Hamilton	Burlington/Leeds	39	0.001	0.002	0.006	0.009	0.017	0.040	0.047	INS	INS	0
29025	Hamilton	Barton/Sanford	43	0.001	0.001	0.002	0.006	0.014	0.020	0.020	0.005	0.003	0
29102	Hamilton	467 Beach Blvd.	42	0.001	0.001	0.004	0.009	0.020	0.031	0.037	0.007	0.005	0
29114	Hamilton Mountain	Vickers Rd./E. 18th St.	39	0.001	0.001	0.001	0.001	0.004	0.007	0.008	INS	INS	0
29568	Hamilton	1 Hillyard St.	47	0.024	0.070	0.145	0.390	1.060	1.353	1.400	0.348	0.163	0
29569	Hamilton	Hillyard/Brant	47	0.001	0.001	0.008	0.027	0.063	0.116	0.130	0.022	0.007	0
46117	Mississauga	Apple Lane, Meadowood Park	21	0.001	0.001	0.001	0.001	0.003	0.005	0.005	INS	INS	0
71042	Sault Ste. Marie	Bonney St., Pumphouse	47	0.001	0.001	0.005	0.008	0.022	0.036	0.038	0.008	0.004	0
77614	Copper Cliff	Nickel St.	14	0.007	0.022	0.046	0.070	0.502	1.298	1.400	INS	INS	0

Table 32: Lead (Pb) in TSP Statistics (2002)

Unit: micrograms per cubic metre (µg/m^3)

Pb 24-hour AAQC is 2.0 µg/m^3

ID	City	Location	# of Samples	PERCENTILES 10%	30%	50%	70%	90%	99%	Max.	Arith. Mean	Geom. Mean	# of Times Above Criterion
12007	Windsor	Wright/Water St.	41	0.01	0.01	0.01	0.01	0.03	0.05	0.05	0.01	0.01	0
12008	Windsor Downtown	467 University Ave. W.	44	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0
12011	Windsor	Drouillard Rd./Richmond St.	38	0.01	0.01	0.01	0.01	0.02	0.02	0.02	INS	INS	0
12013	Windsor	3665 Wyandotte St. E., Filtration Plant	38	0.01	0.01	0.01	0.01	0.01	0.02	0.02	INS	INS	0
12016	Windsor West	College/South St.	40	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.01	0.01	0
12038	Windsor	2885 Howard Ave.	46	0.01	0.01	0.01	0.01	0.03	0.14	0.20	0.02	0.01	0
12058	Windsor	Columbus Ctr.	42	0.01	0.01	0.01	0.01	0.02	0.03	0.03	0.01	0.01	0
14016	Courtright	HWY40 (opposite OPG)	37	0.01	0.01	0.01	0.01	0.01	0.06	0.07	INS	INS	0
15025	London	900 Highbury Ave.	45	0.01	0.01	0.01	0.01	0.02	0.03	0.03	0.01	0.01	0
27052	Thorold	185 Queen St. S.	41	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.01	0.01	0
27057	St. Catharines	27 Plymouth Ave.	46	0.01	0.01	0.01	0.01	0.02	0.05	0.05	0.01	0.01	0
27081	Thorold	Beaverdams/Collier	43	0.01	0.01	0.01	0.01	0.03	0.04	0.04	0.01	0.01	0
27082	Niagara Falls	7401 Portage Rd.	41	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.01	0.01	0
27083	Port Colborne	Rodney/Davis	46	0.01	0.01	0.02	0.04	0.05	0.09	0.11	0.03	0.02	0
27084	St. Catharines	10 Hemlock St.	16	0.01	0.01	0.01	0.01	0.02	0.02	0.02	INS	INS	0
27085	St. Catharines	St. Lawrence Seaway Authority	16	0.01	0.01	0.01	0.02	0.03	0.04	0.04	INS	INS	0
29011	Hamilton	Burlington/Leeds	39	0.01	0.01	0.01	0.02	0.04	1.08	1.70	INS	INS	0
29025	Hamilton	Barton/Sanford	43	0.01	0.01	0.01	0.01	0.02	0.03	0.03	0.01	0.01	0
29102	Hamilton	467 Beach Blvd.	42	0.01	0.01	0.01	0.01	0.03	0.06	0.07	0.02	0.02	0
29114	Hamilton Mountain	Vickers Rd./E. 18th St.	39	0.01	0.01	0.01	0.01	0.01	0.05	0.06	INS	INS	0
29568	Hamilton	1 Hillyard St.	47	0.01	0.01	0.04	0.53	5.60	12.53	13.00	1.57	0.12	8
29569	Hamilton	Hillyard/Brant	47	0.01	0.01	0.01	0.02	0.04	0.19	0.20	0.03	0.02	0
31045	Toronto	51 Larchmount Ave., Bruce P.S.	98	0.01	0.01	0.01	0.01	0.03	0.07	0.08	0.02	0.01	0
31058	Toronto	Mosley/Leslie St. S.	93	0.01	0.02	0.04	0.07	0.14	0.27	0.52	0.06	0.04	0
31065	Toronto	633 Eastern Ave., A.R. Clarke Co.	92	0.01	0.01	0.02	0.03	0.06	0.12	0.66	0.03	0.02	0
31082	Toronto	138 Hamilton Ave., Works Dept.	75	0.01	0.01	0.01	0.01	0.02	0.05	0.12	0.01	0.01	0
46047	Mississauga	2360 Dixie Rd.	46	0.16	0.49	0.75	0.99	2.68	21.40	26.00	1.92	0.75	6
46117	Mississauga	Apple Lane, Meadowood Park	50	0.01	0.01	0.01	0.01	0.03	0.04	0.04	0.01	0.01	0
46152	Mississauga	John XXIII Catholic School	35	0.01	0.01	0.01	0.01	0.01	0.01	0.01	INS	INS	0
71042	Sault Ste. Marie	Bonney St., Pumphouse	47	0.01	0.01	0.01	0.01	0.02	0.03	0.03	0.01	0.01	0
77614	Copper Cliff	Nickel St.	14	0.01	0.01	0.01	0.01	0.02	0.03	0.03	INS	INS	0

Table 46: Zinc (Zn) in PM_{10} Statistics (2002)

Unit: micrograms per cubic metre ($\mu g/m^3$)

ID	City	Location	# of Samples	PERCENTILES 10%	30%	50%	70%	90%	99%	Max.	Arith. Mean	Geom. Mean
12507	Windsor	Wright/Water St.	45	0.015	0.035	0.053	0.095	0.205	0.582	0.640	0.101	0.058
12508	Windsor	467 University Ave.	48	0.005	0.025	0.040	0.068	0.108	0.270	0.280	0.059	0.038
12513	Windsor	3665 Wyandotte St. E.	47	0.005	0.030	0.058	0.109	0.276	0.492	0.520	0.108	0.054
12556	Windsor	St. Gabriel S.S.	43	0.010	0.020	0.030	0.045	0.067	0.091	0.100	0.036	0.028
12559	Windsor	St. Alexander S.S.	42	0.005	0.015	0.025	0.044	0.099	0.142	0.150	0.040	0.025
12583	Windsor	St. Gregorys S.S.	46	0.005	0.010	0.015	0.035	0.067	0.085	0.090	0.028	0.020
14550	Sarnia	6th Line, Moore Township	39	0.005	0.005	0.015	0.027	0.042	0.078	0.080	INS	INS
14564	Sarnia	Front St./CN Tracks, Centennial Park	47	0.005	0.016	0.033	0.045	0.088	0.307	0.420	0.050	0.029
15525	London	900 Highbury Ave.	44	0.005	0.010	0.015	0.020	0.040	0.077	0.090	0.019	0.014
17550	Beachville	Earl Lantz Property	39	0.005	0.005	0.005	0.020	0.031	0.045	0.045	INS	INS
22304	Nanticoke	Sandusk Rd., Walpole South P.S.	55	0.005	0.010	0.020	0.028	0.090	0.353	0.540	0.042	0.019
27308	St. Catharines	71 King St.	46	0.005	0.010	0.015	0.021	0.035	0.048	0.050	0.018	0.015
27352	Thorold	185 Queen St. S.	44	0.005	0.010	0.020	0.025	0.035	0.058	0.060	0.020	0.015
27383	Port Colborne	Rodney/Davis	41	0.005	0.015	0.018	0.025	0.035	0.062	0.070	0.021	0.017
29300	Hamilton	Elgin/Kelly St.	49	0.005	0.019	0.028	0.052	0.144	0.331	0.380	0.060	0.031
29302	Hamilton	467 Beach Blvd.	45	0.010	0.030	0.093	0.140	0.205	0.303	0.330	0.101	0.060
29313	Hamilton	Gertrude/Depew St.	40	0.020	0.040	0.065	0.095	0.180	0.424	0.520	0.090	0.064
29314	Hamilton	Vickers Rd./E. 18th St.	42	0.005	0.013	0.020	0.032	0.072	0.106	0.110	0.031	0.020
35127	Etobicoke	185 Judson St.	38	0.005	0.015	0.030	0.058	0.120	0.389	0.530	INS	INS
44127	Oakville	Bronte Rd./Woburn Cres.	51	0.005	0.010	0.015	0.025	0.050	0.085	0.100	0.023	0.016
46127	Mississauga	Apple Lane, Meadowood Park	51	0.005	0.010	0.015	0.020	0.040	0.072	0.080	0.020	0.015
63201	Thunder Bay	615 James St. S., MTO	52	0.005	0.005	0.010	0.020	0.025	0.050	0.060	0.015	0.012
63246	Thunder Bay	Montreal St., Can-Car	49	0.005	0.005	0.013	0.020	0.046	0.093	0.095	0.021	0.013
71342	Sault Ste. Marie	Bonney St., Pumphouse	47	0.005	0.010	0.020	0.045	0.103	0.155	0.160	0.041	0.022
71368	Sault Ste. Marie	Patrick St., Wm. Merrifield P.S.	41	0.005	0.005	0.015	0.024	0.045	0.072	0.080	0.020	0.013
77326	Sudbury	19 Lisgar St.	49	0.005	0.005	0.005	0.010	0.020	0.028	0.030	0.010	0.008
77570	Copper Cliff	Market St.	48	0.005	0.005	0.010	0.015	0.025	0.056	0.075	0.013	0.010
77611	Timmins	Baker Lake	14	0.005	0.005	0.005	0.005	0.005	0.009	0.010	INS	INS
77613	Falconbridge	Edison Building	23	0.005	0.005	0.005	0.010	0.024	0.097	0.100	INS	INS

Table 7: Inhalable Particles (PM_{10}) Statistics (2002)

Unit: micrograms per cubic metre ($\mu g/m^3$)
PM_{10} 24-hour interim AAQC is 50 $\mu g/m^3$

				PERCENTILES							Maximum		# of Times
ID	City	Location	Valid h	10%	30%	50%	70%	90%	99%	Mean	1 h	24 h	Above Criterion
15025	London	900 Highbury Ave.	4430	6	12	17	25	41	79	INS	145	59	4
22907	Nanticoke	Rainham Rd., Near Stelco Gate	6253	9	13	18	29	52	91	INS	183	84	19
29565	Hamilton	Homeside II, Stratherne Ave. N	7347	8	13	17	24	42	73	21.6	172	64	8
29567	Hamilton	Niagara/Land St.	7353	6	12	19	31	58	126	27.5	385	151	24

Notes:

- Measurements taken by Tapered Element Oscillating Microbalance (TEOM) sampler.

Table 8: Suspended Particles (SP) Statistics (2002)

Unit: COHS/1000 FT
COH 24-hour AAQC is 1.0 COH unit
COH 1-year AAQC is 0.5 COH unit

				PERCENTILES							Maximum		# of Times	
ID	City	Location	Valid h	10%	30%	50%	70%	90%	99%	Mean	1h	24h	24h	1y
29000	Hamilton Downtown	Elgin/Kelly	7409	0.0	0.1	0.1	0.2	0.3	0.7	0.2	1.9	0.7	0	0
29565	Hamilton	Homeside II, Stratherne Ave. N	7000	0.1	0.1	0.2	0.3	0.5	1.2	0.3	3.1	1.1	2	0
35033	Etobicoke South	185 Judson St.	7472	0.1	0.1	0.2	0.3	0.7	1.4	0.3	2.8	1.0	1	0
36030	York	Clearview Hts./Keele St.	7111	0.0	0.1	0.1	0.2	0.5	1.1	0.2	2.7	0.8	0	0
46110	Mississauga	Mississauga General Hospital	6987	0.1	0.1	0.2	0.2	0.5	1.0	0.2	2.0	0.7	0	0
71068	Sault Ste. Marie	Patrick St., Wm. Merrifield School	7106	0.0	0.1	0.1	0.2	0.4	0.9	0.2	2.1	0.7	0	0

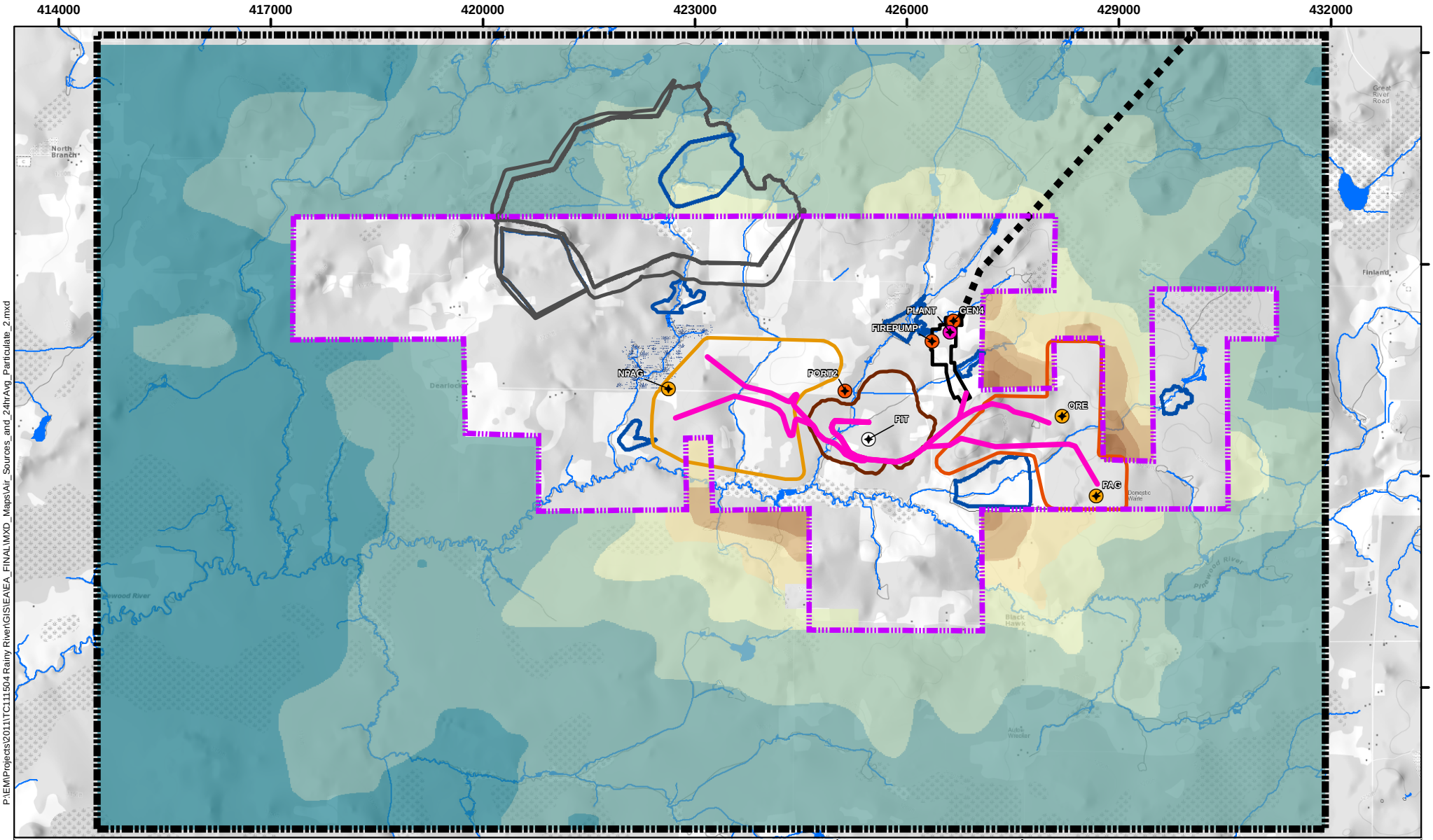
Table 9: Mercury (Hg) Statistics (2002)

Unit: nanograms per cubic metre (ng/m^3)
Hg 1-hour AAQC is 5000 ng/m^3

				PERCENTILES							Maximum		# of Times
ID	City	Location	Valid h	10%	30%	50%	70%	90%	99%	Mean	1h	24h	Above Criterion
46110	Mississauga	Mississauga General Hospital	6605	1.50	1.69	1.81	1.97	2.40	3.79	1.91	26.06	3.43	0

APPENDIX 3

REVISED ISOPLETHS: DISPERSION MODELLING (INCLUDING NEW $PM_{2.5}$ ISOPLETH)



LEGEND

Modelling Property Extent

Sources (labelled with ID)

- Area
- Open Pit
- Point
- Volume
- Line Source (haul roads)

Proposed Site Features

- Open Pit (Feb. 2013)
- Tailings Management Area
- Overburden / West Mine Rock Stockpile (Feb. 2013)
- Ore / East Mine Rock Stockpile (Feb. 2013)
- Plant Site / Ancillary Facilities
- Ponds
- Transmission Line

Total Particulate – 24 hour average * Concentrations in ug/m^3

- 5 - 10
- 10 - 20
- 20 - 30
- 30 - 40
- 40 - 50
- 50 - 60
- 60 - 70
- 70 - 80

NOTES:
* Standard is 120 ug/m^3

0 1.25 2.5 5 7.5 10 Kilometres

Datum: NAD83
Projection: UTM Zone 15N

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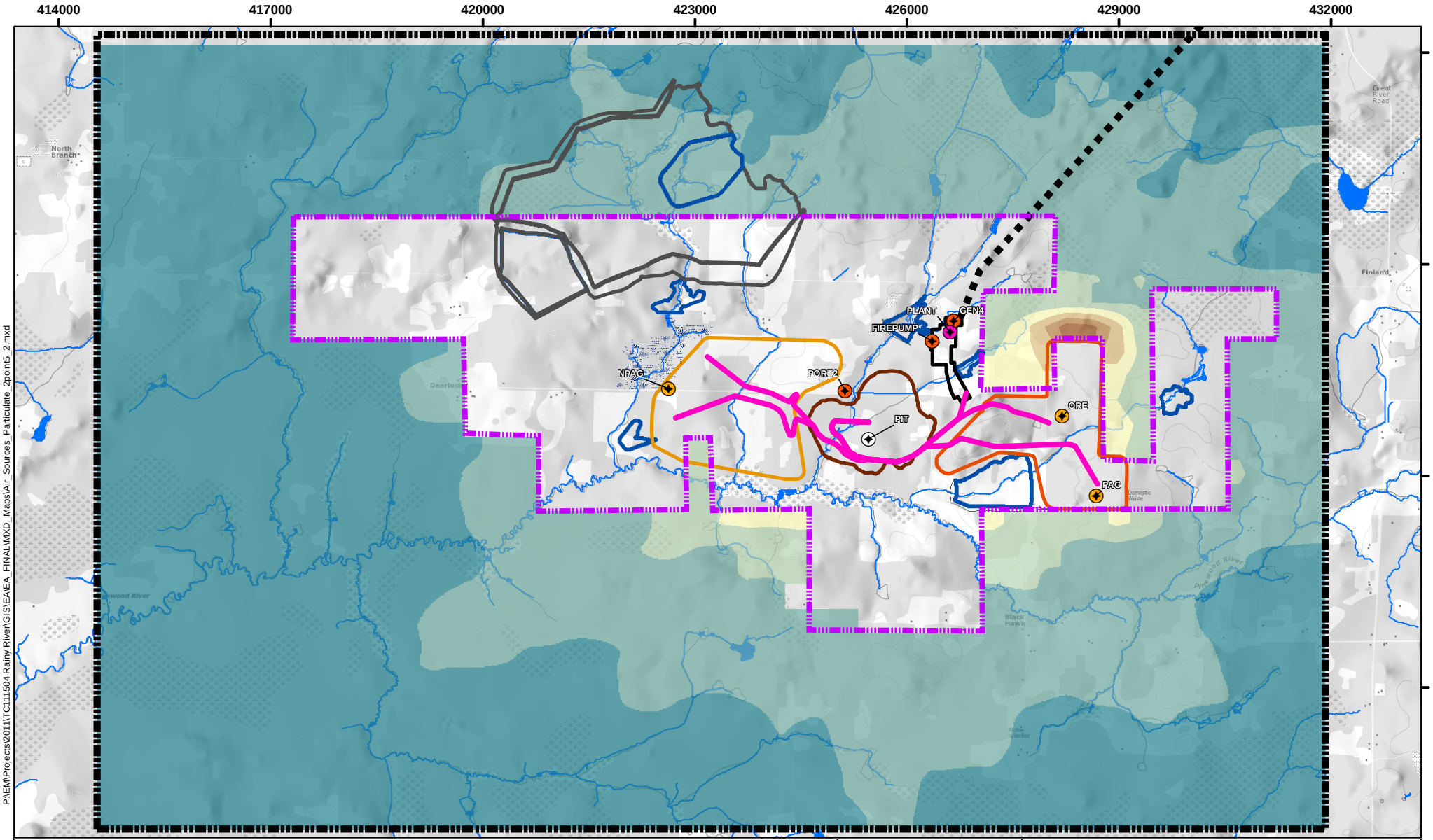
RAINY RIVER PROJECT

Modelled Total Particulate Emissions

PROJECT N^o: TC111504	**FIGURE: 7-1a**
SCALE: 1:75,000	DATE: October 2013



P:\EM\Projects\2011\TC111504 Rainy River\GIS\EA\EA_FINAL\MXD_Maps\Air_Sources_Particulate_2point5_2.mxd

LEGEND

- Modelling Property Extent

Sources (labelled with ID)

- Area
- Open Pit
- Point
- Volume
- Line Source (haul roads)

Proposed Site Features

- Open Pit (Feb. 2013)
- Tailings Management Area
- Overburden / West Mine Rock Stockpile (Feb. 2013)
- Ore / East Mine Rock Stockpile (Feb. 2013)
- Plant Site / Ancillary Facilities
- Ponds
- Transmission Line

$PM_{2.5}$ – 24 hour average * Concentrations in ug/m^3

- 1.06 - 3
- 3 - 6
- 6 - 9
- 9 - 12
- 12 - 15
- 15 - 18
- 18 - 21

NOTES:
* Ambient air quality criterion is 25 ug/m^3

Datum: NAD83
Projection: UTM Zone 15N

0 1.25 2.5 5 7.5 10 Kilometres

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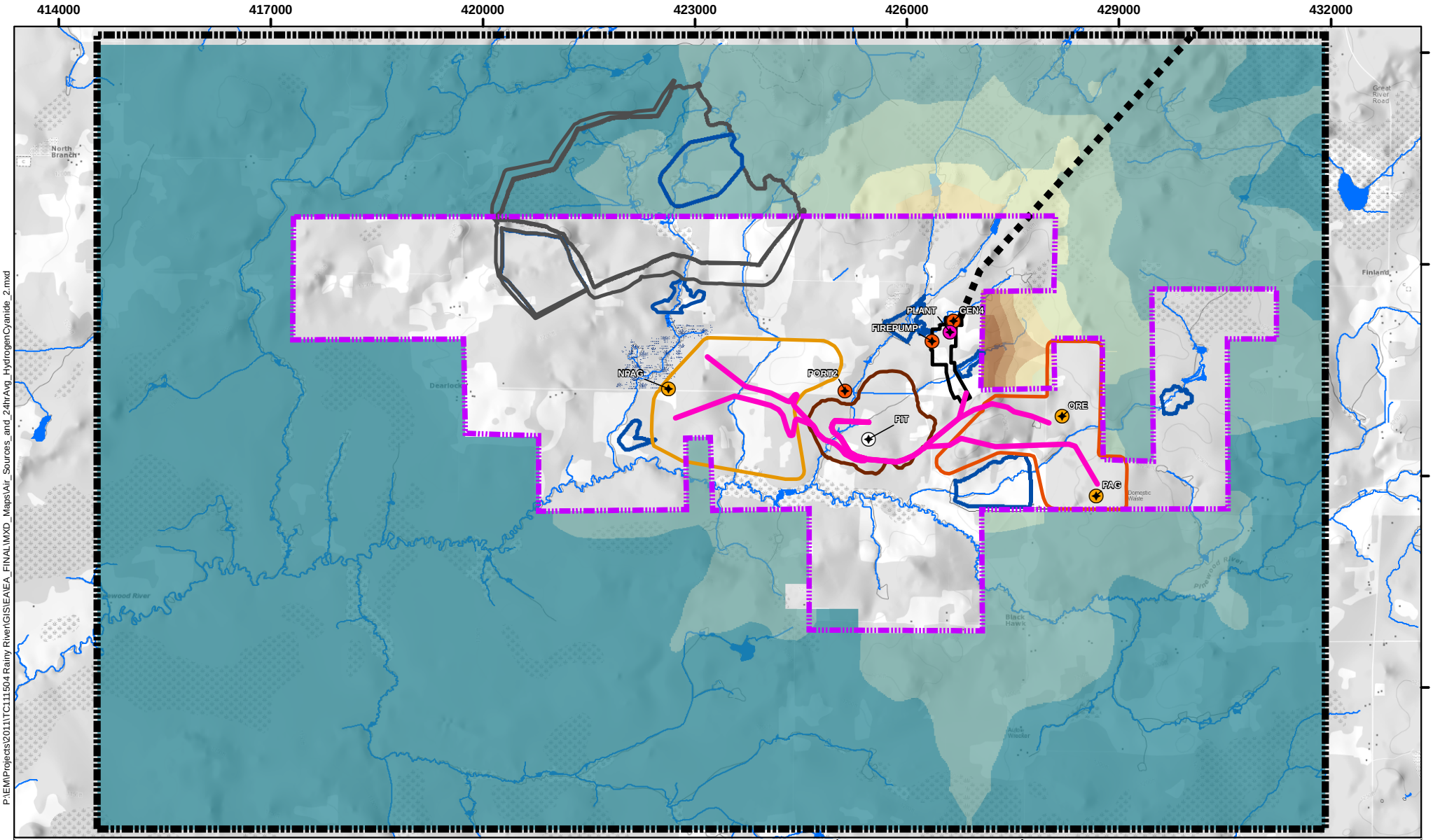
RAINY RIVER PROJECT

Modelled $PM_{2.5}$ Emissions

PROJECT N^o: TC111504 | **FIGURE: 7-1b**

SCALE: 1:75,000 | DATE: October 2013



LEGEND

Modelling Property Extent

Sources (labelled with ID)

- Area
- Open Pit
- Point
- Volume
- Line Source (haul roads)

Proposed Site Features

- Open Pit (Feb. 2013)
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- Plant Site / Ancillary Facilities
- Ponds
- Transmission Line

Hydrogen Cyanide – 24 hour average* Concentrations in ug/m^3

- 0.04 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- 0.8 - 1
- 1 - 1.2
- 1.2 - 1.4
- 1.4 - 1.6

NOTES:
* Standard is 8 ug/m^3

0 1.25 2.5 5 7.5 10 Kilometres

Datum: NAD83
Projection: UTM Zone 15N

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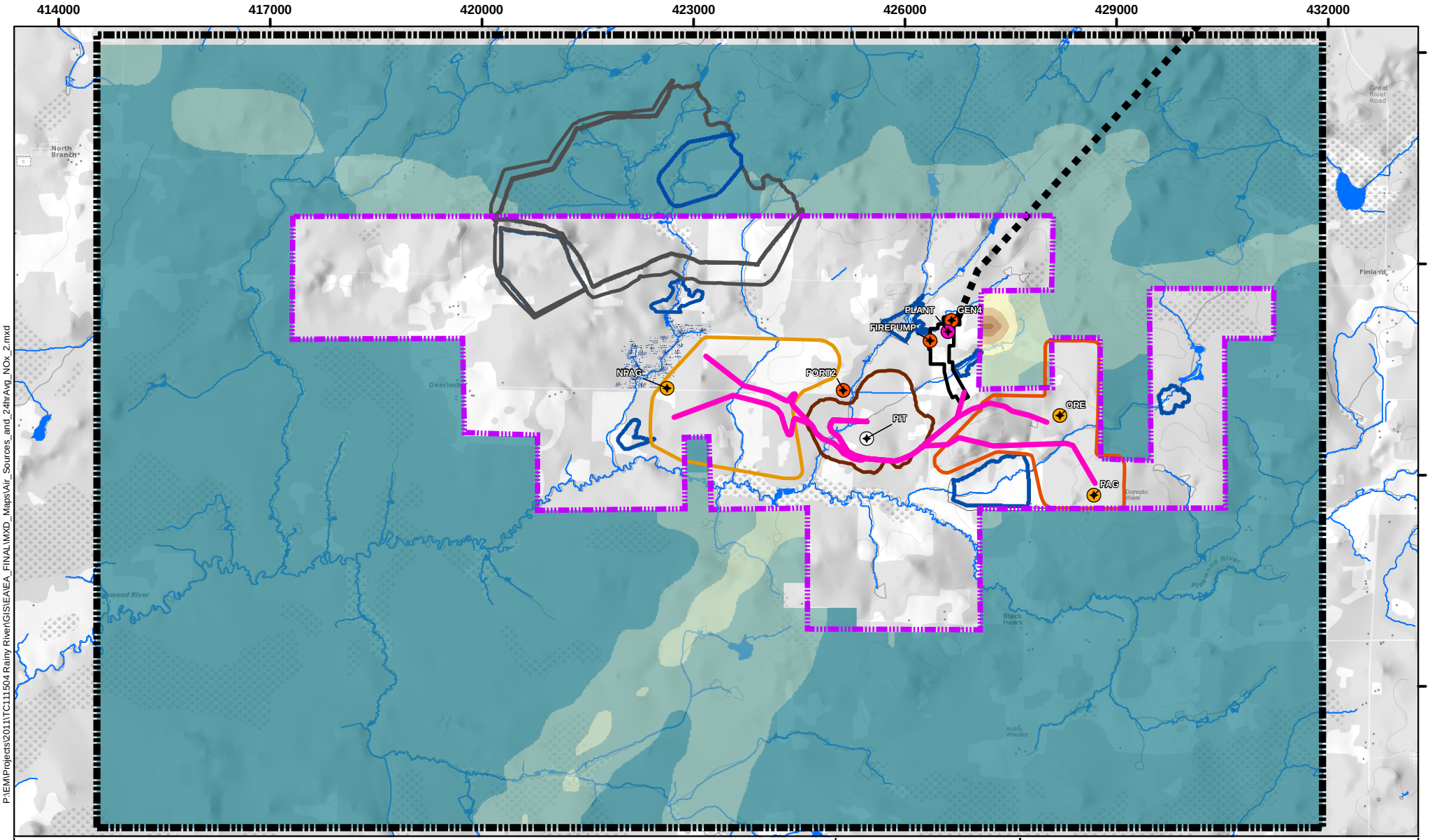
RAINY RIVER PROJECT

Modelled Hydrogen Cyanide Emissions

PROJECT N^o: TC111504	**FIGURE: 7-2**
SCALE: 1:75,000	DATE: October 2013



LEGEND

Modelling Property Extent

Sources (labelled with ID)

- Area
- Open Pit
- Point
- Volume
- Line Source (haul roads)

Proposed Site Features

- Open Pit (Feb. 2013)
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- Overburden / West Mine Rock Stockpile (Feb. 2013)
- Ore / East Mine Rock Stockpile (Feb. 2013)
- Plant Site / Ancillary Facilities
- Ponds
- Transmission Line

Nitrogen Oxides – 24 hour average* Concentrations in ug/m^3

- 0.59 - 4
- 4 - 8
- 8 - 12
- 12 - 16
- 16 - 20
- 20 - 24
- 24 - 28

NOTES:
* Standard is 200 ug/m^3

0 1.25 2.5 5 7.5 10 Kilometres

Datum: NAD83
Projection: UTM Zone 15N

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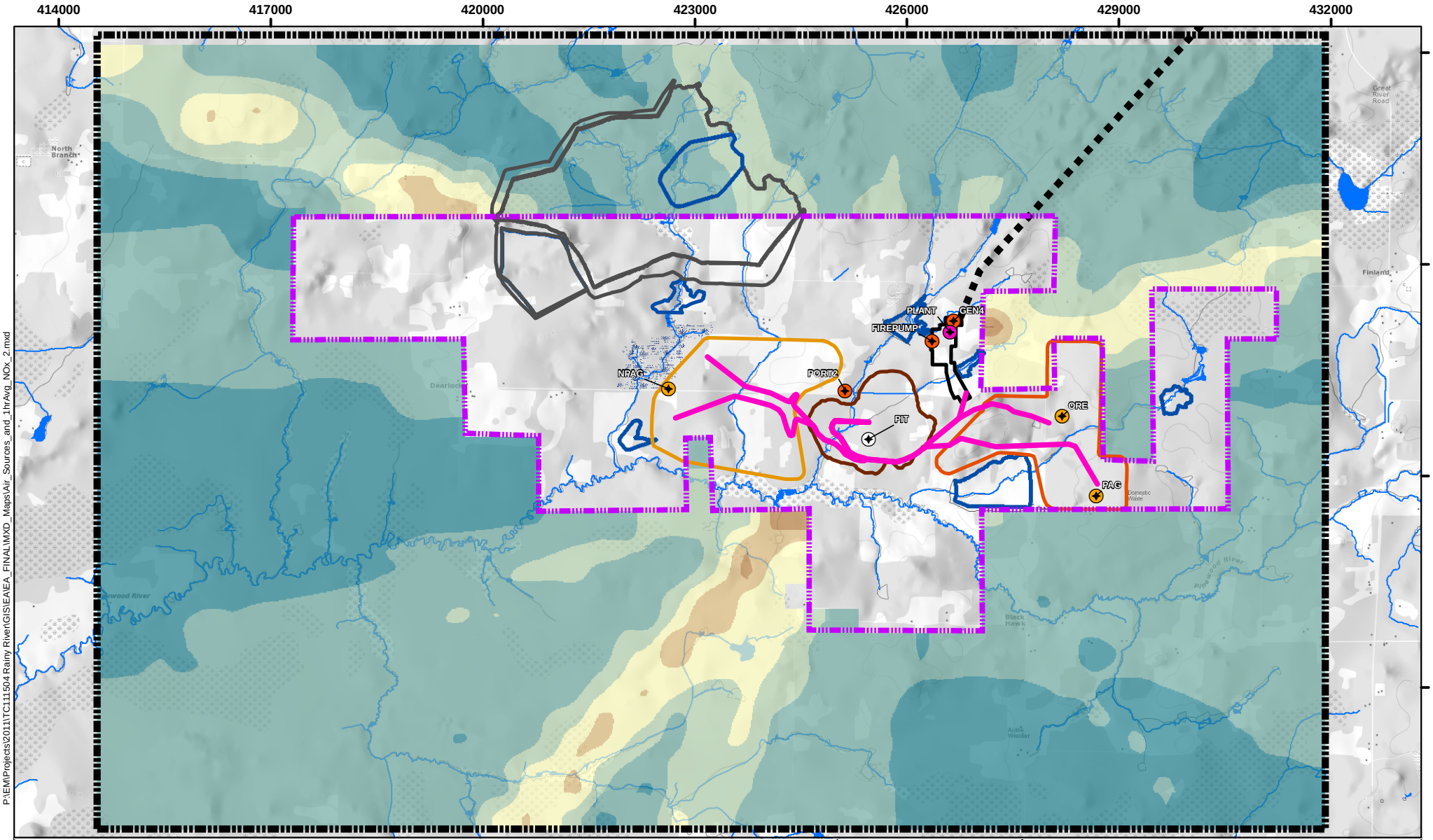
RAINY RIVER PROJECT

Modelled Nitrogen Oxides Emissions - 24 Hour Average

PROJECT N^o: TC111504	**FIGURE: 7-3**
SCALE: 1:75,000	DATE: October 2013



LEGEND

Modelling Property Extent

Sources (labelled with ID)

- Area
- Open Pit
- Point
- Volume
- Line Source (haul roads)

Proposed Site Features

- Open Pit (Feb. 2013)
- Tailings Management Area
- Overburden / West Mine Rock Stockpile (Feb. 2013)
- Ore / East Mine Rock Stockpile (Feb. 2013)
- Plant Site / Ancillary Facilities
- Ponds
- Transmission Line

Nitrogen Oxides – 1 hour average* Concentrations in ug/m^3

- 9.4 - 35
- 35 - 70
- 70 - 105
- 105 - 140
- 140 - 175
- 175 - 210
- 210 - 245

NOTES:
* Standard is 400 ug/m^3

0 1.25 2.5 5 7.5 10 Kilometres

Datum: NAD83
Projection: UTM Zone 15N

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Modelled Nitrogen Oxides Emissions - 1 Hour Average

PROJECT N^o: TC111504	**FIGURE: 7-4**
SCALE: 1:75,000	DATE: October 2013