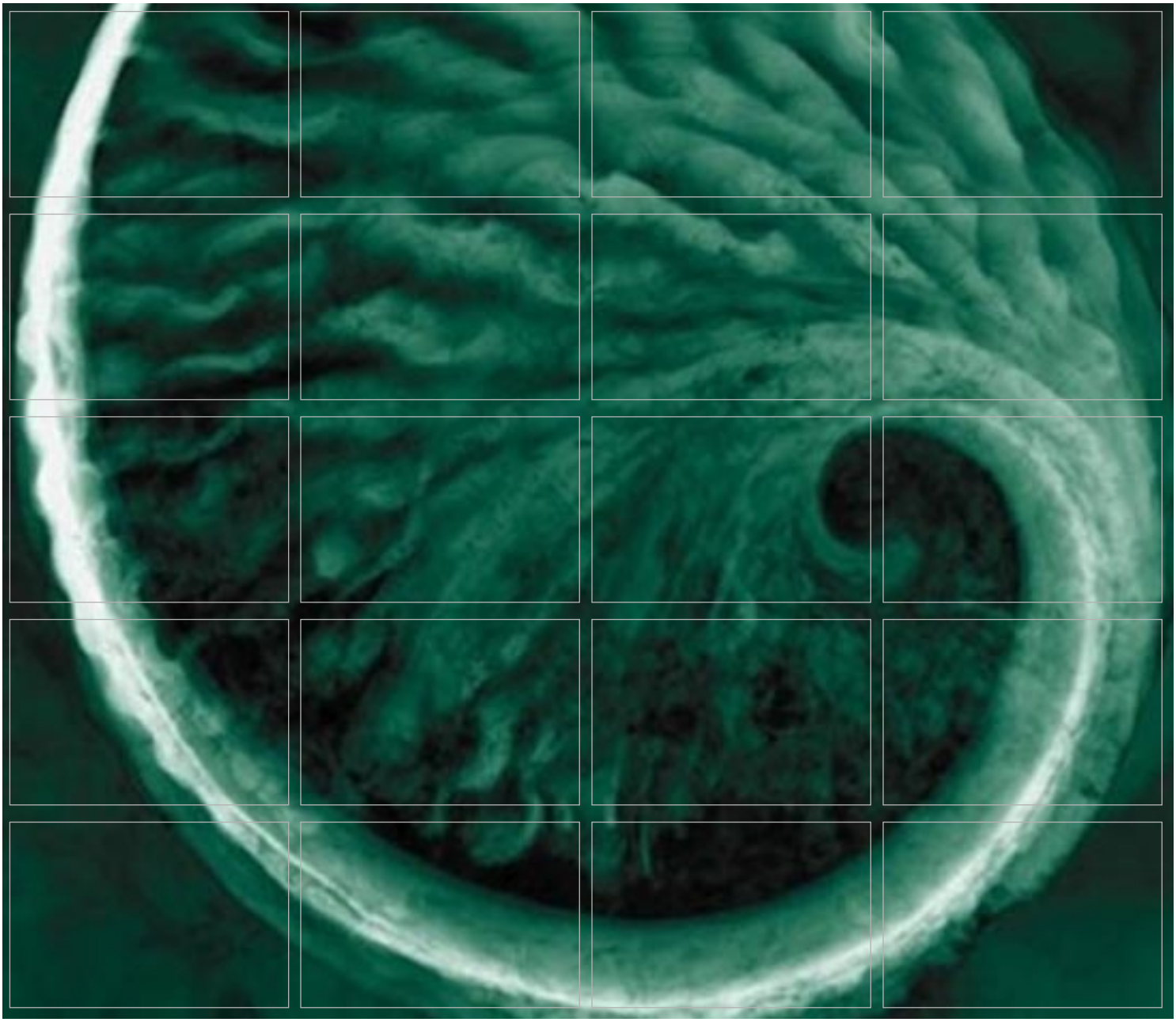

Dispersion Modeling Analysis Addendum

Agrium KNO Facility

May 2020 (Revision 1.0)

ERM

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1.0 PROJECT DESCRIPTION

This report provides an addendum to the Dispersion Modeling Analysis for a Prevention of Significant Deterioration (PSD) Construction Permit application for the Agrium Kenai Nitrogen Operations (KNO) that was submitted in May 2019. This analysis is provided as an update to the Dispersion Modeling Analysis performed for the original PSD Construction Permit application for KNO, submitted in October 2014. This analysis provides updated modeling results that incorporates comments received on the Dispersion Modeling Analysis submitted in May 2019. The modeling results are prepared in a format consistent with the modeling protocol for this project and consistent with the Alaska Department of Environmental Conservation (ADEC) document "Air Quality Modeling Protocol Outline, PSD Permit Applications", Version 1.6, dated April 19, 2018. (ADEC 2018). This report incorporates specific information from the October 2014 modeling report and the May 2019 modeling report as referenced in this document.

1.1 PROJECT CLASSIFICATION

KNO has determined that the restart of its facility will be regulated as a major source under PSD rules for NO_X, PM_{10}, $PM_{2.5}$, CO, and volatile organic compounds (VOC). The site will also have ammonia (NH_3) emissions which are not identified as a regulated air pollutant under Prevention of Significant Deterioration (PSD) rules, but are regulated under State of Alaska rules. The site will also be regulated as a major source of greenhouse gas (GHG) emissions under PSD rules, however no air quality assessment is required to address GHG emissions.

2.0 OFF-SITE EMISSION UNITS AND BACKGROUND AIR QUALITY DATA

Following its review of the Dispersion Modeling Analysis, ADEC staff notified Agrium that EPA Region 10 staff have recently indicated that a PSD increment analysis must account for all increment-consuming sources in the vicinity of the proposed source. This is to include any existing sources that have had actual emissions changes since the minor source baseline date. While the Agrium modeling analysis accounted for sources that were permitted since the minor source baseline date, it did not account for existing sources that experienced an increase or decrease in actual emissions from the minor source baseline date until now.

PSD rules in 40 CFR §52.21(k)(1) specify the following:

> (k) Source impact analysis--(1) Required demonstration. The owner or operator of the proposed source or modification shall demonstrate that allowable emission increases from the proposed source or modification, in conjunction with all other applicable emissions increases or reductions (including secondary emissions), would not cause or contribute to air pollution in violation of:
>
> (k)(1)(i) Any national ambient air quality standard in any air quality control region; or
>
> (k)(1)(ii) Any applicable maximum allowable increase over the baseline concentration in any area.

Although the analysis of increment consumption under §52.21(k)(1)(ii) has historically been focused on sources that were constructed or modified after the minor source baseline date as defined within the rule, EPA Region 10 staff indicated that this analysis must account for increases and decreases in actual emissions of all sources to verify that PSD air quality increments are not exceeded. This is based on the following language in PSD rules related to the definition of "baseline concentration":

> (b)(13)(ii) The following will not be included in the baseline concentration and will affect the applicable maximum allowable increase(s):
>
> (b)(13)(ii)(a) Actual emissions, as defined in paragraph (b)(21) of this section, from any major stationary source on which construction commenced after the major source baseline date; and
>
> (b)(13)(ii)(b) Actual emissions increases and decreases, as defined in paragraph (b)(21) of this section, at any stationary source occurring after the minor source baseline date.

Thus actual emission increases and decreases in emissions from all existing stationary sources must be considered as a part of the increment analysis.

After discussions with the ADEC, it was determined that PSD increment modeling for Annual NO_2, Annual PM_{10}, and Annual $PM_{2.5}$ should be revised to include any sources of NO_2, PM_{10}, or $PM_{2.5}$ that existed as of the minor source baseline date within 50 kilometers (km) of the KNO significant impact area (SIA) as established in the 2014 modeling analysis. 2018 actual emissions were provided by ADEC to be used in the analysis.

As noted above, the analysis focused only on annual increment consumption. Although PSD rules include 24-hour increment values for PM_{10} and $PM_{2.5}$, Agrium concluded that an analysis of existing source impact on short-term increment consumption was not appropriate since available emissions data are provided on a tons per year basis only. Sources do not provide information on maximum 24-hour emission rates as a part of periodic emission inventories. As such, it is not possible to correlate changes in annual emissions to changes in short-term actual emission rates. Agrium believes that a change to a facility that would alter its short term emission rate is one that would trigger the need for a permit modification. Since permit modifications to nearby sources have already been accounted for in the previous increment consumption analysis, no further consideration of short-term increment consumption should be necessary.

All off-site sources within 10 km of the SIA were included in the revised modeling analysis. All off-site sources between 10 and 50 km from the SIA that emitted 1 ton per year (tpy) or more of each respective pollutant in 2018 were also included. Each source that is located between 10 and 50 km from the SIA was modeled as a single point source using facility-wide actual 2018 emissions. Due to the difficulty in obtaining unit specific stack parameters for use in the model, ADEC provided default source parameters provided by ADEC, as shown in Table 1.

Table 1 Default Stack Parameters for Off-Site Sources

Source Parameter	Default Parameter Value
Stack Height	7.6 meters
Stack Diameter	1.07 meters
Exit Temperature	777 Kelvin
Exit Velocity	52.1 meters/second
Flow Rate	46.85 acm/s

All off-site sources included in the original increment consumption modeling analyses were included with no changes to the site layouts, source parameters, or emission rates. For these sources, the facility-wide point source with default parameters was not included.

Note that this approach provides an overly conservative methodology to analyze potential increment consumption from existing sources in that it models the impact from current actual emissions but does not account for baseline actual emissions that existed at the minor source baseline date. In reality, the model should only consider the change in emissions between the baseline date and current operating conditions. Due to the limited availability of baseline actual emissions for all sources within 50 km of the SIA, this methodology was utilized as a conservative approach to demonstrate that these sources would not result in the consumption of available increment. There were no other changes to the modeling methodology, as described in Section 3.0 of the Dispersion Modeling Analysis submitted in May 2019.

3.0 MODELING RESULTS

3.1 SIGNIFICANT IMPACT LEVEL (SIL)

No revisions were made to this section. See Section 16.1 of the October 2014 report for the initial modeling analysis completed for KNO. The results of that analysis are also included as Table 2.

3.2 INCREMENT CONSUMPTION

Revised modeling was performed to determine the extent to which emissions from the project, in combination with other increment-consuming sources identified, will consume air quality increment permitted for Class II areas. The results of this analysis are provided in Table 3. Though there were slight increases in the maximum impact for Annual NO_2, Annual PM_{10}, and Annual $PM_{2.5}$, these results show that emissions from increment consuming sources in the vicinity of the plant will not exceed allowable Class II increments. No further analysis is required.

Table 2 SIL Summary
(All concentrations are in µg/m³)

Agrium KNO
SIL Summary

				Ammonia Ship at Dock Short-term					Urea Ship at Dock Short-term				
		Annual	SIL	S1 normal	S2 CT in bypass	S3 startup	S4 turnaround	Class II SIL	S1 normal	S2 CT in bypass	S3 startup	S4 turnaround	Class II SIL
NO_2													
	Tier 3 OLM	7.01	1	416.1	416.1	416.1	416.1	8	298.2	298.2	298.2	298.2	8
PM_{10}		1.49	1	17.6	17.6	17.6	17.6	5	21.6	21.6	21.7	21.6	5
$PM_{2.5}$		0.89	0.3	7.69	7.69	7.70	7.67	1.2	7.69	7.69	7.70	7.67	1.2
CO													
	1-hr	- -	- -	995.7	995.7	10244.9	995.7	2000	996.0	996.0	10243.5	996.0	2000
	8-hr	- -	- -	278.5	278.5	3566.2	278.5	500	274.3	274.3	3566.2	274.3	500

Note: This Table is the same as was provided in the October 2014 modeling report. It has been provided again here for continuity.

Table 3 Increment Summary
(All concentrations are in µg/m³)

Agrium KNO

INCREMENT Summary	Annual		Ammonia Ship at Dock Short-term					Urea Ship at Dock Short-term				
		Increment	S1 normal	S2 CT in bypass	S3 startup	S4 turnaround	Class II Increment	S1 normal	S2 CT in bypass	S3 startup	S4 turnaround	Class II Increment
NO_2 Tier 2 ARM2	8.16	25	--	--	--	--	--	--	--	--	--	--
PM_{10}	1.51	17	15.1	15.1	15.1	21.7	30	18.6	18.6	18.7	21.7	30
$PM_{2.5}$	1.51	4	8.29	8.29	8.39	6.62	9	8.29	8.29	8.39	7.45	9

Note: This Ammonia Ship at Dock and Urea Ship at Dock sections of the Table are the same as was provided in the May 2019 modeling report. They have been provided again here for continuity.

4.0 SUMMARY

The increment analysis for the Agrium KNO PSD permit application was revised to account for any possible increment consumed by existing sources in the vicinity of KNO. The analysis considered all sources located within 50 km of the significant impact area as defined in earlier modeling analyses. The methodology involved the use of default stack parameters for more distant sources to characterize the potential impact of these sources on increment consumption from KNO. As a conservative approach to the analysis, sources were modeled at their actual annual emission rate as provided in most current available emissions inventory reports. The results of this analysis demonstrated that emissions from KNO in combination with other increment consuming sources will not result in an increase in ambient NO_x, PM_{10}, or $PM_{2.5}$ concentrations above available Class II increments.

Attachment A
Off-Site Facility-Wide Sources
Included in Increment Modeling

Facility_ID	Facility_Name	Owner_Name	Operating	Lat	Long	Distance (km)	NEAR_ANGLE	Emission Year	TPY		
									NOX	PM10	PM2.5
36	Nikiski Terminal	Andeavor Logistics, LP	Yes	60.68	-151.38	0.0	0.00	2018	0.0	0.0	0.0
83	Kenai Nitrogen Operations Plant	Agrium US Inc.	Yes	60.68	-151.38	0.0	0.00	2018	0.0	0.0	0.0
90	Kenai Liquefied Natural Gas (LNG) Plant	Tesoro Logistics GP LLC	Yes	60.68	-151.38	0.0	0.00	2018	5.30	0.40	
1190	Nikiski Combined Cycle Plant	Alaska Electric and Energy Cooperative	Yes	60.68	-151.38	0.0	0.00	2018	453.20	13.20	13.20
33	Kenai Pipeline (KPL) Facility	Andeavor	Yes	60.67	-151.38	0.6	90.00	2018	0.10	0.00	0.00
35	Kenai Refinery	Andeavor	Yes	60.69	-151.37	0.9	-135.00	2018	405.40	29.50	29.50
86	Bernice Lake Combustion Turbine (BCT) Plant	Alaska Electric and Energy Cooperative	Yes	60.7	-151.38	1.2	-90.00	2018	1.10	0.10	0.10
1539	Liquefaction Plant	Alaska Gasline Development Corporation	Yes	60.67	-151.36	1.4	153.43	2018	0.00	0.00	0.00
786	Dowell Kenai District Bulk Facility	Schlumberger Technology Corporation	No	60.65	-151.34	3.2	143.13	2018	0.00	0.00	0.00
1374	Kitchen Lights Unit, Onshore Production Facility	Furie Operating Alaska, LLC	Yes	60.74	-151.33	4.3	-129.81	PTE	37.80	0.94	0.94
782	Nikiski Bulk Cement Facility	Halliburton Energy Services, Inc.	No	60.69	-151.29	5.4	-173.66	2018	0.00	0.00	0.00
514	Nikiski Incinerator	Tyonek Native Corporation	No	60.73	-151.29	5.8	-150.95	2018	0.00	0.00	0.00
64	Bruce Platform	Hilcorp Alaska, LLC	Yes	60.83	-151.33	7.4	-108.43	2018	151.90	1.40	1.40
85	Platform C, Middle Ground Shoal, Cook Inlet	Hilcorp Alaska, LLC	Yes	60.76	-151.5	7.7	-33.69	2018	181.80	2.50	2.50
65	Dillon Platform	Hilcorp Alaska, LLC	Yes	60.75	-151.51	8.0	-28.30	2018	0.30	0.00	0.00
63	Baker Platform	Hilcorp Alaska, LLC	Yes	60.83	-151.48	8.4	-56.31	2018	0.00	0.00	0.00
84	Platform A	Hilcorp Alaska, LLC	Yes	60.8	-151.5	8.4	-45.00	2018	350.80	5.40	5.40
326	Granite Point Tank Farm	Hilcorp Alaska, LLC	Yes	61.02	-151.42	9.1	-83.29	2018	24.10	0.80	0.80
66	Granite Point Platform	Hilcorp Alaska, LLC	Yes	60.96	-151.33	9.4	-100.12	2018	97.80	3.20	3.20
61	Cook Inlet Onshore Drilling & Well Testing Operations	Union Oil Company of California (UOCC) (formerly UNOCAL)	No	60.98	-151.31	9.5	-103.13	2018	0.00	0.00	0.00
62	Anna Platform	Hilcorp Alaska, LLC	Yes	60.98	-151.31	9.5	-103.13	2018	51.50	1.80	1.80
67	Monopod Platform	Hilcorp Alaska, LLC	Yes	60.9	-151.58	11.7	-47.73	2018	161.40	4.00	4.00
91	Tyonek Platform	Hilcorp Alaska, LLC	Yes	61.08	-150.95	11.8	-137.07	2018	146.60	4.10	4.10
9	Steelhead Platform	Hilcorp Alaska, LLC	Yes	60.83	-151.6	12.4	-34.29	2018	323.70	8.40	8.40
68	King Salmon Platform	Hilcorp Alaska, LLC	Yes	60.87	-151.61	12.7	-39.56	2018	117.10	5.60	5.60
69	Grayling Platform	Hilcorp Alaska, LLC	Yes	60.84	-151.61	12.7	-34.82	2018	180.60	6.70	6.70
1141	Kenai Terminal	Crowley Fuels LLC (formerly CPD Alaska LLC)	No	60.56	-151.24	13.2	139.40	2018	0.00	0.00	0.00
60	Dolly Varden Platform	Hilcorp Alaska, LLC	Yes	60.81	-151.63	13.7	-27.47	2018	118.60	4.20	4.20
165	Kenai Gas Field Pad 41-18	Hilcorp Alaska, LLC	Yes	60.51	-151.28	15.0	120.47	PTE	42.30		
1242	Cook Inlet Gas Storage Facility	Cook Inlet Natural Gas Storage Alaska, LLC (CINGSA)	Yes	60.55	-151.21	15.5	142.59	PTE	36.10	1.70	1.70
1488	Cook Inlet Energy / Spartan 151 Jack - Up Drilling Rig	Cook Inlet Energy, LLC	Yes	60.82	-151.69	16.2	-24.30	2018	0.00	0.00	0.00
696	Osprey Platform	Cook Inlet Energy, LLC	Yes	60.7	-151.67	17.2	-3.95	2018	0.24	0.02	0.02
87	Kenai Gas Field 34-31 Pad	Hilcorp Alaska, LLC	Yes	60.47	-151.27	18.8	117.65	2018	56.30	1.10	1.10
276	West McArthur River Unit	Pacific Energy Resources, LTD	No	60.78	-151.75	19.7	-15.12	2018	0.00	0.00	0.00
58	Trading Bay	Hilcorp Alaska, LLC	Yes	60.82	-151.78	20.1	-19.29	PTE	87.20	16.80	16.80
94	Kenai Gas Field 14-6 Pad	Hilcorp Alaska, LLC	Yes	60.45	-151.25	21.3	119.48	2018	61.10	2.20	2.20
695	Tomcat Prospect	Forest Oil Corporation	No	60.72	-151.75	21.3	-6.17	2018	0.00	0.00	0.00
741	Kustatan Production Facility	Cook Inlet Energy, LLC	Yes	60.72	-151.75	21.3	-6.17	2018	26.00	2.00	2.00
248	CMI 1900 Asphalt Plant	Colaska Inc, dba QAP	Yes	60.51	-151.15	21.7	143.53	2018	0.70	0.50	0.50
70	Beaver Creek Production Facility	Hilcorp Alaska, LLC	Yes	60.65	-151.04	21.8	174.96	2018	99.70	1.60	1.60
40	Alaska Oil Sales Soldotna Bulk Sales Facility	Petro 49 Inc. dba Petro Marine Services	Yes	60.49	-151.16	22.6	139.18	PTE	0.00	0.00	0.00
1456	Apache Alaska Corporation	Apache Alaska Corporation	No	60.87	-150.8	25.9	-161.86	2018	0.00	0.00	0.00
393	ADM Drum Mix Asphalt Plant	McKenna Brothers Paving Inc.	Yes	60.5	-151.09	26.2	148.17	PTE	22.90	5.00	5.00
392	ARB Crusher	Knik Construction Co., Inc.	Yes	60.5	-151.07	27.5	149.86	2018	6.02	5.93	5.40
1342	Knik Crusher III	Knik Construction Co., Inc.	Yes	60.5	-151.07	27.5	149.86	2018	1.47	3.56	7.40
59	Swanson River Field	Hilcorp Alaska, LLC	Yes	60.73	-150.86	29.5	-174.51	2018	2144.70	28.20	28.20
982	Kitchen Lights Unit Exploration	Furie Operating Alaska, LLC	Yes	60.94	-151.15	31.9	67.52	2018	24.00	1.00	1.00
1189	Soldotna Combustion Turbine Plant	Alaska Electric and Energy Cooperative	Yes	60.5	-151	32.3	154.65	2018	12.30	2.00	2.00
796	Falls Creek (FC) Pad, TEG Dehydration Unit	Hilcorp Alaska, LLC	Yes	60.2	-151.43	46.9	84.05	PTE	6.80	0.00	0.00
190	Drift River Terminal / Christy Lee Platform Aggregated Source	Cook Inlet Pipe Line Company	Yes	60.58	-152.13	53.0	7.59	2018	59.40	0.70	0.70
189	Christy Lee Loading Platform	Cook Inlet Pipe Line Company	No	60.55	-152.13	55.3	9.83	2018	0.00	0.00	0.00
442	X900 Portable Crusher	Granite Construction Company	Yes	60.52	-150.62	58.4	168.11	2018	12.94	8.16	0.00