Attachment 2

Request for Additional Information for the Application for Construction Permit AQ0069CPT02, Grayling Platform Responses Specific to Application Attachment F – Ambient Air Quality Impact Assessment

Below are responses to the Alaska Department of Environmental Conservation's (ADEC) request for additional information to complete processing of the application for Construction Permit AQ0069CPT02 specific to Attachment F of the application (Ambient Air Quality Impact Assessment). In addition to providing responses to these requests, this document also provides the results of a revised Ambient Air Quality Impact Analysis (AQIA) prepared to address errors and facilitate responding to several of the requests. ADEC's requests pertaining to application Attachment F are addressed by 11 separate responses provided below.

Overview of Modeling Revisions and Revised Approaches

As a result of the process of addressing ADEC's request for additional information, the following changes have been made to the original AQIA resulting in revised predicted air quality impacts:

(1) **Platform Rotation**: Platform Emissions Units (EUs) were rotated approximately 45 degrees clockwise around the platform center.

(2) **Offsite Inventory**: The modeled offsite inventory was expanded to include all permitted sources in the Kenai Peninsula Borough.

(3) **Coordinate System**: The dispersion modeling simulation was switched from a coordinate system based on distance from the platform center to a Universal Trans Mercator (UTM) system.

(4) **Source Inventory Revision**: Multiple EUs have been removed from the permit and replaced with new units.

Table 1 provides an update to the modeled source parameters and replaces Table F1-4 of the original AQIA. The changes involve adjusting source locations and replacing turbine EU 4 with EU 4a and glycol water heaters EUs 19 and 20 with 19a, 19b, and 20a as part of integrating the changes documented in Hilcorp's December 2022 application to renew Grayling Operating Permit no. AQ0069TVP03. **Table 2** provides an updated table of SO_2 emissions from project EUs. The only updates are associated with the replaced EUs. **Table 3** provides a comprehensive listing of the expanded inventory of non-project sources included in the cumulative and Prevention of Significant Deterioration (PSD) Class I and Class II Increment analyses. **Figure 1** presents a graphical depiction of these same sources overlaid on the modeling domain. Most of these sources are not large enough or close enough to produce a significant concentration gradient in the impact area of the Grayling Platform and are not considered Nearby Sources. Regardless, they are being included to help address ADEC requests.

As a result of the changes in EUs, source layout, and nearby sources, the cumulative ambient air quality and increment impact analyses have been updated under this revised submittal.

Impacts were originally provided in Table F2-6, Table F2-8, Table F2-9, and Table F4-1 of the original AQIA, and those revised predicted impacts are provided in **Table 4** through **Table 7** of this document, respectively.

Like the original AQIA, all cumulative impacts were predicted to be less than 25% of applicable primary health-based ambient air quality standards except for 1-hour SO_2 which was approximately 95% of the ambient standard. The high impact is not only because of conservative modeling assumptions, but also because the reported impact represents the highest-fourth-high impact across all modeled hours since the OCD dispersion model is not capable of generating a proper design value. PSD Increment impacts are less than 90% of the Class II and Class I thresholds. Considering that 100% of the emissions from all modeled offsite sources were assumed to consume increment, this impact is low.

Specific Responses to ADEC Requests

In further detailed response to the review, the following specific analyses address the items and concerns that were cited.

Request 1

> *[with respect to the Ambient Meteorological Data used as input to OCD] The Department is, therefore, requesting Hilcorp revise their site-specific data to address both data quality and freshness concerns or provide a supplemental analysis demonstrating the appropriateness of their current approach.*

Response: A supplemental analysis has been provided to demonstrate that the temperature and wind climatology have not changed materially in the Cook Inlet and is of sufficient quality to demonstrate the appropriateness of conducting modeling with a 5-year data set collected between 2012 and 2019.

Data used for the analysis was either collected by a National Weather Service (NWS) Automated Surface Observing Systems (ASOS) station, or the National Oceanic and Atmospheric Administration (NOAA) National Ocean Service. Based on specifications provided by the NOAA Ocean Service (https://tidesandcurrents.noaa.gov/publications/CO-OPS_Measurement_Spec.pdf), it is understood that all data used is of sufficient quality because 1) it was collected from a nearby NWS or comparable station, and 2) because it was previously approved by ADEC for dispersion modeling in support of this application.

With respect to the age of meteorological input data, USEPA Appendix W Section 8.4.1 simply recommends the data should be climatologically (temporally) representative. Appendix W adds that temporal representativeness is a function of the year-to-year variations in weather conditions (interannual variability) and ensuring that modeling is conducted with enough data so that worst-case meteorological conditions are adequately represented in the predicted results. For decades, USEPA guidance has maintained that 5 years of meteorological data is sufficient to capture worst-case conditions resulting from interannual variability. Therefore, meteorological data used to drive the Grayling dispersion modeling is temporally representative from this perspective.

Data freshness is not addressed by Appendix W unless there are concerns that the differences in worst-case meteorological conditions resulting from long-term climate change are much larger than those resulting from interannual variability which is unlikely on timescales shorter than 30 years. This assertion is based on protocols established by the World Meteorological Organization (WMO) and used by the National Oceanic and Atmospheric Administration for assessing climate change. The WMO recommends using a 30-year average to assess the climatological representatives of current conditions for a period of 10 years before resetting the 30-year period. This is a reputable indicator of the length of time needed before long-term variations may become more important than short-term variations when assessing what is typical. The meteorological data used to support dispersion modeling falls within the current 30-year Normal period (1999-2022) suggesting that interannual variability will dominate long-term variability and data freshness is not a concern provided 5 years are included in the modeling.

NOAA climate Normals for the current period are also useful for assessing what is normal in today's climate which is more important to dispersion modeling than discussing what used to be normal. **Table 8**, **Table 9**, and **Table 10** presents a comparison of monthly temperature, prevailing wind, and windspeed, respectively collected at Anchorage, Alaska (PANC, WBAN 26451) from 2012 through 2023 compared to 1991 to 2020 Normals. Anchorage is the closest location to the project site for which NOAA summarizes climate trends. These tables show that throughout this period mean monthly meteorological values fell within or close to Normal maximums and minimums indicating that there is nothing abnormal about annual measurements since 2012 and no period is more representative of the current climate than another. Therefore, the period of meteorological data used to support dispersion modeling is typical of the current long-term climate indicating that data freshness is not a concern.

To reinforce what the data collected at Anchorage shows, **Figure 2** presents a 30-year Normal wind climatology in the form of a windrose for the Kenai Municipal (PAEN) ASOS station. This Normal windrose can be compared to windroses collected from 2012 through 2017 (**Figure 3**) and 2018 through 2023 (**Figure 4**). All annual windroses show strong, prevailing north through northeasterly winds in the winter and slower and less dominant south-southeasterly through southwesterly winds in the summer months. Furthermore, all windroses consistently show about 17% calm winds. Once again, the comparison of these windroses shows nothing abnormal about the annual measurements since 2012 and no period is more representative of the current long-term climate than another. Therefore, the period of meteorological data used to support the dispersion modeling completed to support this permit application is typical of the current long-term climate indicating that data freshness is not a concern.

Request 2

> *[with respect to ambient pollutant measurements **used as background concentrations**] The Department is, therefore, requesting Hilcorp revise their site-specific data to address both data quality and freshness concerns or provide a supplemental analysis demonstrating the appropriateness of their current approach.*

Response: Hilcorp is not aware of more appropriate ambient background measurements to use in place of those described in the original AQIA; therefore, the ambient background measurements have not been revised. However, the Nearby Source inventory included in the revised dispersion modeling has been expanded to ensure the 2015 data is unquestionably representative of current conditions.

As described in Section F1.6.2 (Background Concentration Values) of the original AQIA, all ambient pollutant measurements used as background concentrations to predict cumulative impacts satisfy quality criteria because they were collected by a program that met the quality assurance requirements of ADEC's PSD permit program as affirmed in the State's industrial data summary - (https://dec.alaska.gov/media/9162/industrial-data-summary052218.xlsx).

USEPA Appendix W Section 8.3 addresses ambient background concentrations and does not place recommendations on freshness because ambient background concentrations do not need to be fresh to be representative. Appendix W instead indicates, background concentrations should be representative of non-modeled sources which consist of 1) natural sources, 2) nearby sources other than those modeled explicitly, and 3) unidentified sources. 10-year-old data can be representative of these non-modeled sources particularly if the modeled nearby source inventory is current and comprehensive, and there has been little change in regional emissions.

Therefore, to justify the use of 10-year-old background SO_2 data for this AQIA, the inventory of modeled nearby permitted stationary sources was expanded and we show that the background data is representative of the current inventory of natural and non-permitted sources. This is done by showing there has been minimal regional growth in regional emissions in the last decade. This is because changes in emissions correlate with changes in ambient background measurements and a minimal change in emissions since the measurements were collected demonstrates that freshness is not a concern.

For the first part, we have expanded the project dispersion modeling simulation to include the most recent reported actual emissions from every major permitted stationary source in the Kenai Peninsula Borough, the potential impacts from all permitted minor sources in the Kenai Peninsula Borough, and the potential emissions from permitted major and minor sources that have not begun to operate. This data was obtained from ADEC and consists of actual emissions from major sources reporting in 2021 and 2022, and potential emissions from all point sources with permits in 2020. Since the impact of these sources are now included in the model predicted impacts presented in the revised cumulative impact analysis (reference **Table 4**, **Table 5**, **Table 6**, and **Table 7**) the ambient background data does not need to represent the impact from these sources and likely double counts for them. As such the freshness of ambient background SO_2 measurements is not a concern from the perspective of permitted sources.

To understand if there are freshness concerns with respect to other non-modeled sources, the change in regional SO_2 emissions has been examined for trends. **Figure 5** presents the trend in Kenai Peninsula Borough SO_2 emissions from all source categories tracked by the USEPA National Emissions Inventory (NEI). This figure clearly shows a decreasing trend in SO_2 emissions since 2015. This is a clear indication that the contribution to ambient measurements from non-modeled sources is expected to be the same or lower now compared to 2015, thus leading to the conclusion that ambient background measurements collected in 2015 are representative of the impacts from the current inventory of non-modeled sources and freshness is not a concern for ambient SO_2 concentrations.

Background ambient $PM_{2.5}$ measurements were not used to predict cumulative impacts but only to demonstrate that it is acceptable to rely on a Significant Impact Level (SIL) analysis to show that the project will not cause or contribute to a violation of the Alaska Ambient Air Quality Standards (AAAQS) and Prevention of Significant Deterioration Class II Increments (Increments). In this case, it remains important that the data be regionally representative, but the focus is on showing that the level of the SIL is not significant compared to the change in impacts required before the local attainment status changes. The 2015 ambient background concentrations were less than 40% of the AAAQS. Because compliance with the AAAQS is not threatened, and the SILs are less than 5% of the AAAQS, the ambient background today could be more than twice as high as it was in 2015 before the possibility of non-attainment might be a concern. Trends in $PM_{2.5}$ emissions provide an indication of how representative the 2015 measurements are with respect to the current attainment status. **Figure 6** presents the trend in Kenai Peninsula Borough $PM_{2.5}$ emissions from all source categories tracked by the USEPA NEI. Different from SO_2, **Figure 6** shows an approximate 30% increase in emissions over time.

Therefore, it can be inferred that ambient background data measured today could be as much as 30% higher if all the emissions growth occurred in one place. A 30% increase in concentrations measured in 2015 is not of sufficient magnitude to consider the AAAQS threatened. Because the AAAQS should remain far from being threatened even with an increase in $PM_{2.5}$ concentrations on the order of the growth in emissions, and the SILs are less than 5% of the AAAQS, the 10-year-old data is still sufficient to show that the SIL is an appropriate screening tool to use to demonstrate the project will not cause or contribute to a violation of the $PM_{2.5}$ standards. Therefore, the freshness of the $PM_{2.5}$ data is not a concern.

<u>Request 3</u>

> *[with respect to ambient pollutant measurements used as **<u>Preconstruction Monitoring Data</u>**] The Department is, therefore, requesting Hilcorp revise their site-specific data to address both data quality and freshness concerns or provide a supplemental analysis demonstrating the appropriateness of their current approach.*

<u>Response:</u> Hilcorp is not aware of preconstruction monitoring data more current than that described in the original AQIA; therefore, a supplemental analysis has been provided to demonstrate the appropriateness of the current approach.

As described in Section F1.6.1 (Preconstruction Monitoring Requirements) of the original AQIA, all data presented as Preconstruction Monitoring Data satisfy quality criteria because they were collected by a program that met the quality assurance requirements of ADEC's PSD permit program as described in the Technical Analysis Report for the terms and conditions of Construction Permit AQ1539CPT01 (Alaska Gasline Development Corporation [AGDC] Liquefaction [AK LNG] Plant in Nikiski), and disclosed in the State's industrial data summary (https://dec.alaska.gov/media/9162/industrial-data-summary052218.xlsx).

With respect to freshness, the Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD)[1] provides the best discussion of the role of Preconstruction Monitoring Data collected to satisfy 40 CFR 52.21(m). In that document, USEPA articulates that the basic objective of PSD monitoring is to establish background air quality concentrations in the vicinity of the proposed source or modification that can be used to determine whether the air quality before construction is or will be approaching or exceeding the applicable ambient standards.

As described in the response to **Request 2**, 10^{+}-year-old data can easily meet this objective if the older data shows concentrations are not approaching or exceeding the AAAQS, and there has been little growth in regional emissions. The preconstruction monitoring data provided in Table F1-5 of the original AQIA shows that measured SO_2 concentrations are at most less than 2% of any standard, i.e., significantly below the AAAQS. It also shows that $PM_{2.5}$ concentrations are at most 40% of any standard which is generally low for Alaska given the stringency of the standard and the possibility for elevated concentrations from a combination of stagnant weather conditions and the combustion of solid and liquid fuels for power and heat. Regardless, these concentrations are not approaching or exceeding the AAAQS.

As fully described in the response to **Request 2**, SO_2 emissions in the Kenai Peninsula Borough have decreased since the preconstruction monitoring data was collected. Therefore, there is no reason to believe that the concentrations measured more than 10 years ago would be materially

1 Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD), EPA-450/4-87-007, United States Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC 27711. May 1987.

different than those measured more recently. Knowing this, and the fact that the concentrations measured 10 years ago were well below the standards, provides justification for using the 10-year-old data to determine whether regional SO_2 concentrations before construction are or will be approaching or exceeding the applicable ambient standards consistent with the objective of PSD preconstruction monitoring. Therefore, data freshness is not a concern for characterizing the existing SO_2 attainment status.

The response to **Request 2** describes that $PM_{2.5}$ emissions in the Kenai Peninsula Borough have increased by about 30% since the preconstruction monitoring data was collected. Assuming all the increase occurred in one place, 24-hour $PM_{2.5}$ concentrations could be as high as 30% of the standard and annual concentrations could be as high as 52% of the standard. The facts that concentrations measured 10^+ years ago were low and emissions growth has been moderate, demonstrate with a high degree of certainty that regional $PM_{2.5}$ concentrations before implementation of our project remain relatively low and are not approaching or exceeding the applicable ambient standards, which is consistent with the objective of collecting PSD preconstruction monitoring data. Therefore, data freshness is not a concern for characterizing the existing $PM_{2.5}$ attainment status.

Adding to the assertion that data freshness is not a concern for the $PM_{2.5}$ preconstruction monitoring data, is a recognition that this project does not increase direct $PM_{2.5}$ emissions. While there is not currently a de minimis impact threshold (Significant Monitoring Concentration) for $PM_{2.5}$ that would waive preconstruction monitoring requirements, please note that Table F2-2 of the original AQIA shows that project impacts are predicted to be less than 10% of the $PM_{2.5}$ 24-hour significant impact levels and less than 2.5% of the level USEPA originally proposed as a de minimis level (75 Fed. Reg. at 64864). This combined with historically low measured ambient concentrations and minimal change in regional emissions supports the idea that knowing the precise level of current $PM_{2.5}$ concentrations is not vital to supporting conclusions presented in the original AQIA.

Though the freshness of the preconstruction monitoring data should not be a concern in this case, we understand the potential sensitivity surrounding the determination given the language in 40 CFR 52.21(m). Hilcorp has initiated an ambient air quality monitoring program to support potential PSD projects in the Cook Inlet. ADEC has been introduced to the project, equipment has been mobilized, and official monitoring and data collection is expected to begin in July. Therefore, it is anticipated that by the time the permit is issued for this project, at least 4 months of current data collected at a regionally representative preconstruction monitoring location will be available to confirm that ambient data freshness is not a concern for this project.

Request 4

> *The current version of AERMET is 23132. Please review the Model Change Bulletin for AERMET version 23132 and provide an explanation that AERMET version 19191 will be sufficient or process using version 23132.*

Response: The revised cumulative impacts presented in this response have been predicted with meteorological data processed as described in Section F1.3.1.2 (AERMET) using version 23132 rather than providing a justification for using version 19191.

Request 5

The Department notes that the 2013-2014 [Kenai] dataset is also subject to the aforementioned concerns regarding the use of legacy data. For PM concentration, the Department proposes using the 2015 AGDC LNG Air Quality Monitoring Program dataset, which Hilcorp currently used for background concentration values.

Response: Refer to the response to **Request 3**. If the 2015 AGDC LNG Air Quality Monitoring Program dataset is acceptable to use in place of the 2013-2014 [Kenai] dataset, Hilcorp accepts this proposal.

Request 6

Please provide a culpability analysis or modeling demonstration to support limiting the offsite inventory to Steelhead, Dolly Varden, and King Salmon platforms.

Response: The revised cumulative impacts presented in this response have been predicted with an expanded offsite inventory as described in **Request 2**. Because the offsite inventory is no longer limited, no further demonstration or analysis is being provided in response to this request.

Request 7

[with respect to the SO_2 Increment Analysis] Please explain why emission increases from these projects were not included in the incremental analysis (Beluga River and Swanson River)

Response: The revised cumulative impacts presented in this response have been predicted with an expanded offsite inventory as described in **Request 2**. Because the Beluga River and Swanson River projects are now included, no further demonstration or analysis is being provided in response to this request.

Request 8

The Department points out that the Trading Bay facility coordinates are not correct.

Response: The Trading Bay facility has been included in the revised cumulative impact analysis with corrected coordinates.

Request 9

The Department is requesting a scaled topographic map or aerial photograph with annotated meteorological and pollutant monitoring stations and receptor locations where the models predicted high concentrations of SO_2.

Response: Refer to **Figure 7** and **Figure 8** for the requested information.

<u>Request 10</u>

The Department is requesting a scaled topographic map or aerial photograph with annotated meteorological and pollutant monitoring stations and receptor locations where the models predicted high concentrations of secondary formation of $PM_{2.5}$.

<u>Response:</u> Refer to **Figure 7** for the requested information. Note that impacts of secondary formation of $PM_{2.5}$ were predicted using a highly conservative implementation of USEPA's MERPs approach which relies on surrogate sources. Therefore, it is only possible to provide an approximate distance to the location of maximum impact without taking wind direction into consideration.

<u>Request 11</u>

In addition, please provide a site plan showing emission release locations and dispersion obstructing equipment if applicable.

<u>Response:</u> Refer to **Figure 9** for the requested information.

Tables

Response to Request for Additional Information for the Application for Construction Permit AQ0069CPT02, Grayling Platform

Table 1: Modeled Source Parameters (Revised)

EU ID/ Model ID	Make	Relative to…	UTM X-Coord (m) [1]	UTM Y-Coord (m) [1]	Bldg Top (m)	Stack Height (m)	Stack Temp (K)	Stack Dia (m)	Exit Velocity (m/s)	Stack Angle (deg) [3]	Deck Elev (m)	Deck Width (m)
Gas-Fired Grayling Platform Emissions Units Affected by the H_2S Increase												
GRY1	Solar Centaur T4500	Production Deck	575255	6745626	25.8	3.25	783	0.914	20.0	90	17.2	34.7
GRY3	Solar Centaur T4500	Production Deck	575237	6745637	25.8	3.25	783	0.914	20.0	90	17.2	34.7
~~04~~	~~Solar Centaur T4500~~	~~Production Deck~~	NA	NA	~~25.8~~	~~11.8~~	~~783~~	~~0.914~~	~~20.0~~	~~0~~	~~17.2~~	~~34.7~~
GRY4a	Solar Centaur T4500	Production Deck	575239	6745630	25.8	11.8	783	0.914	20.0	0	17.2	34.7
GRY14	Solar Saturn T1200	Sub Deck	575249	6745658	31.5	0.136	720	0.457	32.8	0	11.4	34.7
GRY15	Solar Saturn T1200	Prod. Deck Mezzanine	575276	6745632	22.3	0.691	720	0.762	11.8	90	20.6	34.7
GRY16	Solar Saturn T1200	Production Deck	575277	6745635	25.8	4.17	720	0.762	11.8	90	17.2	34.7
GRY17	Solar Saturn T1200	Prod. Deck Mezzanine	575278	6745637	22.3	0.691	720	0.762	11.8	90	20.6	34.7
GRY18	Solar Saturn T1200	Production Deck	575278	6745638	25.8	4.17	720	0.762	11.8	90	17.2	34.7
~~19~~	~~Continental Boiler~~	~~Sub Deck~~	NA	NA	~~31.5~~	~~3.80~~	~~500~~	~~0.356~~	~~23.8~~	~~0~~	~~11.4~~	~~34.7~~
~~20~~	~~Continental Boiler~~	~~Sub Deck~~	NA	NA	~~31.5~~	~~3.80~~	~~500~~	~~0.356~~	~~23.8~~	~~0~~	~~11.4~~	~~34.7~~
GRY19a	Riello AR 400 Boiler	Sub Deck	575269	6745621	31.5	3.80	500	0.356	23.8	0	11.4	34.7
GRY19b	Riello AR 400 Boiler	Sub Deck	575268	6745619	31.5	3.80	500	0.356	23.8	0	11.4	34.7
GRY20a	Riello AR 400 Boiler	Sub Deck	575268	6745617	31.5	3.80	500	0.356	23.8	0	11.4	34.7
GRY28	Flare	Production Deck	575243	6745607	25.8	16.7	1,273	1.53	20.0	0	17.2	34.7
GRY29	Flare	Production Deck	575204	6745624	25.8	16.7	1,273	1.53	20.0	0	17.2	34.7
GRY31	Solar Taurus 60	Drill Deck	575278	6745672	18.7	9.52	783	1.23	11.0	135	24.3	34.7
Grayling Platform Emissions Units Unaffected by the H_2S Increase												
GRY24	Cat 3406 Engine	Drill Deck	575237	6745655	18.7	9.52	662	0.102	159	0	24.3	34.7
GRY25	Cat 3208 Engine	Drill Deck	575279	6745646	18.7	9.52	728	0.102	93.9	0	24.3	34.7
GRY26a	Detroit Diesel Series 60	Production Deck	575278	6745640	25.8	5.39	800	0.127	50.0	90	17.2	34.7
GRY27	Cat D-330C Engine	Sub-Sub Deck	575250	6745653	34.8	7.07	783	0.102	36.6	0	8.17	34.7

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Table 1: Modeled Source Parameters (Revised)(CONTINUED)

EU ID/ Model ID	Make	Relative to…	X-Coord (m) [1]	Y-Coord (m) [1]	Bldg Top (m)	Stack Height (m)	Stack Temp (K)	Stack Dia (m)	Exit Velocity (m/s)	Stack Angle (deg) [3]	Deck Elev (m)	Deck Width (m)
Kuukpik V Transportable Drill Rig												
GRYK1a [2]	Hydraulic Power Unit	Drill Deck	575274	6745634	34.8	33.2	658	0.153	64.3	0	24.3	34.7
GRYK1b [2]			575273	6745633	34.8	33.2	658	0.153	64.3	0	24.3	34.7
GRYK2a [2]	Hydraulic Power Unit	Drill Deck	575272	6745631	34.8	33.2	658	0.153	64.3	0	24.3	34.7
GRYK2b [2]			575272	6745630	34.8	33.2	658	0.153	64.3	0	24.3	34.7
GRYK3	Light Plant Generator	Drill Deck	575265	6745622	34.8	25.0	780	0.153	82.8	45	24.3	34.7
GRYK4	Light Plant Generator	Drill Deck	575267	6745621	34.8	25.0	780	0.153	82.8	45	24.3	34.7
GRYK5	Portable Hydraulic Generator	Drill Deck	575252	6745628	34.8	28.0	728	0.0760	39.7	0	24.3	34.7
GRYK6	Boiler	Drill Deck	575263	6745623	34.8	25.9	550	0.305	0.00100	0	24.3	34.7
GRYK7	Boiler	Drill Deck	575264	6745625	34.8	25.9	550	0.305	0.00100	0	24.3	34.7
Platform Service Vessel												
GRYRESUPPLY	Resupply Ship	MSL	575269	6745617	14.5	15.2	700	0.650	40.5	0	0	34.1

<u>Table Notes</u>

1 UTM Zone 5, NAD 83

2 EU IDs K1a/b and K2a/b have dual stacks per emissions unit.

3 Stack Angle: vertical = 0 degrees, horizontal = 90 degrees, and downward = 180 degrees.

Table 2: Grayling Platform Cumulative Impact Emission Rates (Revised)

EU ID	Make/Model	Short-Term SO_2 Emission Rate (g/s)
Grayling Platform Emissions Units Affected by H_2S Increase		
GRY1	Solar Centaur T4500	1.05
GRY3	Solar Centaur T4500	1.05
~~04~~	~~Solar Centaur T4500~~	~~1.05~~
GRY4a	Solar Centaur T4500	1.05
GRY14	Solar Saturn T1200	0.319
GRY15	Solar Saturn T1200	0.336
GRY16	Solar Saturn T1200	0.336
GRY17	Solar Saturn T1200	0.315
GRY18	Solar Saturn T1200	0.336
~~19~~	~~Continental Boiler~~	~~0.194~~
~~20~~	~~Continental Boiler~~	~~0.194~~
GRY19a	Riello AR 400 Boiler	0.104
GRY19b	Riello AR 400 Boiler	0.104
GRY20a	Riello AR 400 Boiler	0.104
GRY28	Flare	0.00597
GRY29	Flare	0.00597
GRY31	Solar Taurus 60	2.05
Grayling Platform Emissions Units Unaffected by H_2S Increase		
GRY24	Cat 3406 Engine	0.151
GRY25	Cat 3208 Engine	0.109
GRY26a	Detroit Diesel Series 60	0.271
GRY27	Cat D-330C Engine	0.0420
GRYK1a	Hydraulic Power Unit	5.74E-04
GRYK1b		5.74E-04
GRYK2a	Hydraulic Power Unit	5.74E-04
GRYK2b		5.74E-04
GRYK3	Light Plant Generator	8.58E-04
GRYK4	Light Plant Generator	8.58E-04
GRYK5	Portable Hydraulic Generator	1.36E-04
GRYK6	Boiler	6.90E-04
GRYK7	Boiler	6.90E-04
GRYRESUPPLY	Resupply Ship	0.00159

Table 3: Off-site Inventory and Model Inputs (Revised)

EU ID/ Model ID	Make	Relative to…	UTM X-Coord (m) [1]	UTM Y-Coord (m) [1]	Short-Term SO_2 ER (g/s)	Bldg Top (m)	Stack Height (m)	Stack Temp (K)	Stack Dia (m)	Exit Velocity (m/s)	Stack Angle (deg) [2]	Deck Elev (m)	Deck Width (m)
Steelhead													
ST4	Solar Taurus 70-10302S Turbine	Pipe Rack - Lower Deck	575916	6744766	6.91	19.8	15.8	775	1.47	13.0	0	29.0	38.1
ST5	Solar Taurus T-7000 Turbine	Pipe Rack - Lower Deck	575900	6744759	4.66	19.8	0.914	775	1.07	21.2	0	29.0	38.1
ST14	Solar Saturn T1200 Turbine	Pipe Rack - Lower Deck	575893	6744743	1.28	19.8	4.57	694	0.635	20.0	0	41.5	38.1
ST15	Solar Saturn T1200 Turbine	Pipe Rack - Lower Deck	575896	6744741	1.28	19.8	4.57	694	0.635	20.0	0	41.5	38.1
ST12	HP/LP Flare/Pilot	Helipad Deck	575944	6744742	1.76	7.32	4.88	1,273	1.22	39.1	0	29.0	38.1
ST13	HP/LP Flare/Pilot	Helipad Deck	575924	6744717	1.76	7.32	4.88	1,273	1.22	39.1	0	29.0	38.1
ST1	Allison 501KB Turbine	Production Deck - Lower	575899	6744755	0.0265	27.4	21.3	785	1.22	16.2	0	21.3	38.1
ST2	Allison 501KB Turbine	Production Deck - Lower	575902	6744758	0.0265	27.4	23.5	7855	1.22	16.2	0	21.3	38.1
ST3	Allison 501KB Turbine	Production Deck - Lower	575906	6744761	0.0265	27.4	23.5	785	1.22	16.2	0	21.3	38.1
ST6	Caterpillar D3516-TA	Production Deck - Upper	575923	6744771	0.316	21.9	3.05	528	0.305	18.3	90	26.8	38.1
ST7	Caterpillar D399	Pipe Rack Level - Upper	575871	6744762	0.3156	15.2	6.10	528	0.305	18.3	90	33.5	38.1
ST8	Caterpillar C13	Helipad Deck	575900	6744796	0.213	7.32	5.79	747	0.305	10.3	0	41.5	38.1
ST9	Caterpillar 3408 DITA	Helipad Deck	575864	6744753	0.116	7.32	5.79	755	0.305	20.0	0	41.5	38.1
ST10	Detroit Diesel 12V71	Production Deck - Lower	575883	6744804	0.113	27.4	3.66	528	0.305	18.3	90	21.3	38.1
ST11	Detroit Diesel 12V71	Production Deck - Lower	575878	6744749	0.11	27.4	3.66	528	0.305	18.3	90	21.3	38.1
ST18	Caterpillar C9.3	Production Deck - Upper	575861	6744765	0.0655	21.9	1.00	711	0.300	12.2	90	26.8	38.1
STRESUPPLY	Platform Resupply Ship	MSL	575855	6744769	0.00158	14.5	15.2	700	0.650	40.5	0	0	34.1

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Table 3: Off-site Inventory and Model Inputs (Revised)(CONTINUED)

EU ID/ Model ID	Make	Relative to…	UTM X-Coord (m) [1]	UTM Y-Coord (m) [1]	Short-Term SO_2 ER (g/s)	Bldg Top (m)	Stack Height (m)	Stack Temp (K)	Stack Dia (m)	Exit Velocity (m/s)	Stack Angle (deg) [2]	Deck Elev (m)	Deck Width (m)
Dolly Varden													
DV1	Solar Saturn T-1200 Turbine	Sub-Sub-Deck	574248	6742084	0.278	26.6	0.200	701	0.457	61.3	180	11.2	34.1
DV2	Solar Saturn T-1200 Turbine	Sub-Sub-Deck	574251	6742084	0.278	26.6	0.200	701	0.457	61.3	180	11.2	34.1
DV5	Solar Saturn T-1200 Turbine	Sub-Sub-Deck	574228	6742070	0.278	26.6	12.4	701	0.610	52.8	90	11.2	34.1
DV6	Solar Saturn T-1200 Turbine	Sub-Sub-Deck	574228	6742068	0.278	26.6	12.4	701	0.610	52.8	90	11.2	34.1
DV7	Solar Saturn T-1200 Turbine	Sub-Sub-Deck	574228	6742069	0.00	26.6	11.8	701	0.508	61.3	90	11.2	34.1
DV8	Solar Saturn T-1200 Turbine	Sub-Sub-Deck	574272	6742062	0.278	26.6	2.00	598	0.457	61.3	180	11.2	34.1
DV9	Solar Saturn T-1200 Turbine	Sub-Sub-Deck	574272	6742064	0.278	26.6	12.4	598	0.508	56.8	90	11.2	34.1
DV10	Solar Saturn T-1200 Turbine	Sub-Sub-Deck	574272	6742066	0.444	26.6	12.4	598	0.508	53.2	90	11.2	34.1
DV12	Solar Centaur T-4500 Turbine	Sub-Sub-Deck	574230	6742063	0.872	26.6	18.0	529	0.762	60.5	90	11.2	34.1
DV13	Solar Centaur T-5900 Turbine	Sub-Sub-Deck	574231	6742039	0.102	26.6	16.8	710	1.22	13.0	90	11.2	34.1
DV16	Bryan Boiler	Sub-Sub-Deck	574233	6742065	0.183	26.6	9.30	561	0.457	10.0	0	11.2	34.1
DV17	Bryan Boiler	Sub-Sub-Deck	574233	6742063	0.183	26.6	9.30	561	0.457	10.0	0	11.2	34.1
DV20	Detroit Diesel 8V71 Engine (NE)	Sub-Sub-Deck	574271	6742064	0.00665	26.6	19.5	705	0.330	9.90	0	11.2	34.1
DV21	Detroit Diesel 8V71 Engine (SW)	Sub-Sub-Deck	574232	6742061	0.00665	26.6	19.5	705	0.330	9.90	0	11.2	34.1
DV22	Detroit Diesel Engine	Sub-Sub-Deck	574233	6742060	0.00874	26.6	0	728	0.203	54.1	180	11.2	34.1
DV23	Detroit Diesel Engine	Sub-Sub-Deck	574244	6742058	0.00874	26.6	0	741	0.203	59.9	180	11.2	34.1
DV24	Caterpillar 3306B Engine	Sub-Sub-Deck	574245	6742051	0.00525	26.6	25.2	713	0.127	66.3	0	11.2	34.1
DV25	Flare (SF/HP/LP) and Pilot	Sub-Sub-Deck	574213	6742040	1.48	26.6	19.5	1,273	1.53	20.0	0	11.2	34.1
DV26	Solar Taurus Turbine	Sub-Sub-Deck	574231	6742075	0.114	26.6	16.8	783	1.22	15.2	90	11.2	34.1
DVRESUPPLY	Platform Resupply Ship	MSL	574272	6742041	0.00159	14.5	15.2	700	0.650	40.5	0	0	34.1

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Table 3: Off-site Inventory and Model Inputs (Revised)(CONTINUED)

EU ID/ Model ID	Make	Relative to…	UTM X-Coord (m) [1]	UTM Y-Coord (m) [1]	Short-Term SO_2 ER (g/s)	Bldg Top (m)	Stack Height (m)	Stack Temp (K)	Stack Dia (m)	Exit Velocity (m/s)	Stack Angle (deg) [2]	Deck Elev (m)	Deck Width (m)
Other Regional Sources													
OFF_33	Kenai Pipeline (KPL) Facility	MSL	588494	6727523	4.89E-05	10.0	7.00	700	1.00	50.0	0	50.0	40.0
OFF_35	Kenai Refinery	MSL	589019	6728840	0.372	10.0	7.00	700	1.00	50.0	0	50.0	40.0
OFF_36	Nikiski Terminal	MSL	589198	6728751	0.00	10.0	7.00	700	1.00	50.0	0	50.0	40.0
OFF_40	Alaska Oil Sales Soldotna Bulk Sales Facility	MSL	601131	6707555	0.00	10.0	7.00	700	1.00	50.0	0	50.0	40.0
OFF_43	Petro Marine Services Homer Bulk Plant	MSL	589238	6608317	1.15	10.0	7.00	700	1.00	50.0	0	50.0	40.0
OFF_49	Seward Terminal	MSL	698290	6670505	3.62	10.0	7.00	700	1.00	50.0	0	50.0	40.0
OFF_58	Trading Bay	MSL	565868	6742912	0.767	10.0	7.00	700	1.00	50.0	0	50.0	40.0
OFF_59	Swanson River Field	MSL	616688	6734525	0.0129	10.0	7.00	700	1.00	50.0	0	50.0	40.0
OFF_62	Anna Platform	MSL	591286	6761389	0.00476	15.3	6.70	777	1.07	52.1	0	11.2	33.5
OFF_63	Baker Platform	MSL	582435	6744712	0.308	10.0	7.00	750	1.00	50.0	0	10.0	35.0
OFF_64	Bruce Platform	MSL	590606	6744903	0.00358	12.5	10.1	777	0.490	39.3	0	10.7	29.4
OFF_66	Granite Point Platform	MSL	590360	6759297	0.00230	15.0	15.2	777	0.580	36.5	90	10.2	36.6
OFF_67	Monopod Platform	MSL	577095	6752139	0.266	14.1	6.70	777	1.07	52.1	0	10.4	32.9
OFF_68	King Salmon Platform	MSL	575722	6748578	0.304	9.18	6.70	777	1.07	52.1	0	13.9	33.5
OFF_70	Beaver Creek Production Facility	MSL	607811	6725644	1.15E-05	10.0	7.60	777	1.02	52.1	0	50.0	36.6
OFF_83	Nutrien Kenai Nitrogen Operations	MSL	588474	6727678	0.293	10.0	7.00	700	1.00	50.0	0	50.0	40.0
OFF_84	Platform A	MSL	581889	6740970	0.0373	10.0	6.70	777	1.07	52.1	0	11.2	36.6
OFF_85	Platform C, Middle Ground Shoal, Cook Inlet	MSL	581606	6737421	0.0689	10.0	7.00	750	1.00	50.0	0	10.0	35.0
OFF_86	Bernice Lake Combustion Turbine (BCT) Plant	MSL	588067	6729763	0.00525	10.0	7.00	700	1.00	50.0	0	50.0	40.0
OFF_87	Kenai Gas Field Pad 34-31	MSL	594931	6705569	0.000308	10.0	7.60	777	1.02	52.1	0	50.0	36.6

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Table 3: Off-site Inventory and Model Inputs (Revised)(CONTINUED)

EU ID/ Model ID	Make	Relative to…	UTM X-Coord (m) [1]	UTM Y-Coord (m) [1]	Short-Term SO_2 ER (g/s)	Bldg Top (m)	Stack Height (m)	Stack Temp (K)	Stack Dia (m)	Exit Velocity (m/s)	Stack Angle (deg) [2]	Deck Elev (m)	Deck Width (m)
OFF_90	Kenai Liquefied Natural Gas (LNG) Plant	MSL	588229	6728096	0.000175	10.0	7.00	700	1.00	50.0	0	50.0	40.0
OFF_91	Tyonek Platform	MSL	610716	6773063	0.000216	16.6	14.0	750	0.530	40.0	90	10.7	40.1
OFF_94	Kenai Gas Field 14-6 Pad	MSL	595407	6703776	0.00105	10.0	7.00	700	1.00	50.0	0	50.0	40.0
OFF_106	Beluga River Power Plant	MSL	605562	6785012	0.00150	10.0	7.00	700	1.00	50.0	0	50.0	40.0
OFF_165	Kenai Gas Field Pad 41-18	MSL	594590	6709913	3.99	10.0	7.00	700	1.00	50.0	0	50.0	40.0
OFF_206	Electrical Dept.	MSL	697762	6668802	2.87	10.0	7.00	700	1.00	50.0	0	50.0	40.0
OFF_276	West McArthur River Unit	MSL	568062	6739457	0	10.0	7.00	700	1.00	50.0	0	50.0	40.0
OFF_326	Granite Point Tank Farm	MSL	585259	6765791	0.00132	10.0	7.60	777	1.02	52.1	0	50.0	36.6
OFF_514	Nikiski Incinerator	MSL	593031	6733551	0.285	10.0	7.00	700	1.00	50.0	0	50.0	40.0
OFF_534	Seward Terminal	MSL	699100	6669805	4.54	10.0	7.00	700	1.00	50.0	0	50.0	40.0
OFF_696	Osprey Platform	MSL	572648	6729675	0	10.0	7.00	750	1.00	50.0	0	10.0	35.0
OFF_741	Kustatan Production Facility	MSL	568179	6732706	0.0403	10.0	7.00	700	1.00	50.0	0	50.0	40.0
OFF_768	Ivan River Unit Gas Development	MSL	613673	6795694	2.22	10.0	7.00	700	1.00	50.0	0	50.0	40.0
OFF_786	Dowell Kenai District Bulk Facility	MSL	590908	6724583	0.00288	10.0	7.00	700	1.00	50.0	0	50.0	40.0
OFF_796	Falls Creek (FC) Pad, TEG Dehydration Unit	MSL	586770	6674900	0.308	10.0	7.00	700	1.00	50.0	0	50.0	40.0
OFF_797	Grassim Oskolkoff (GO) Pad	MSL	584204	6669269	0.308	10.0	7.00	700	1.00	50.0	0	50.0	40.0
OFF_815	Susan Dionne (SD) Pad, Ninilchik	MSL	579215	6664772	4.19	10.0	7.00	700	1.00	50.0	0	50.0	40.0
OFF_856	Gudenrath Compressor Station	MSL	630601	6715511	3.10	10.0	7.00	700	1.00	50.0	0	50.0	40.0
OFF_895	NNA Grind and Inject Operation	MSL	584983	6653736	2.47	10.0	7.00	700	1.00	50.0	0	50.0	40.0

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Table 3: Off-site Inventory and Model Inputs (Revised)(CONTINUED)

EU ID/ Model ID	Make	Relative to…	UTM X-Coord (m) [1]	UTM Y-Coord (m) [1]	Short-Term SO_2 ER (g/s)	Bldg Top (m)	Stack Height (m)	Stack Temp (K)	Stack Dia (m)	Exit Velocity (m/s)	Stack Angle (deg) [2]	Deck Elev (m)	Deck Width (m)
OFF_942	Beluga River Unit	MSL	605412	6784974	0.00138	10.0	7.60	777	1.02	52.1	0	50.0	36.6
OFF_982	Kitchen Lights Unit Exploration	MSL	600146	6756959	0.00115	10.0	7.00	750	1.00	50.0	0	10.0	35.0
OFF_1189	Soldotna Combustion Turbine Plant	MSL	610045	6708931	0.0175	10.0	7.60	777	1.02	52.1	0	50.0	36.6
OFF_1190	Nikiski Combined Cycle Plant	MSL	588528	6727794	0.166	10.0	7.60	777	1.02	52.1	0	50.0	36.6
OFF_1242	Cook Inlet Gas Storage Facility	MSL	597982	6713607	2.38	10.0	7.00	700	1.00	50.0	0	50.0	40.0
OFF_1286	Paxton Production Facility	MSL	577220	6662864	0.0144	10.0	7.00	700	1.00	50.0	0	50.0	40.0
OFF_1342	Knik Crusher III	MSL	606185	6708767	3.59	10.0	7.00	700	1.00	50.0	0	50.0	40.0
OFF_1374	Kitchen Lights Unit, Onshore Production Facility	MSL	591309	6734755	0.255	10.0	7.00	700	1.00	50.0	0	50.0	40.0
OFF_1385	Cosmopolitan Project	MSL	567106	6636159	0.000406	10.0	7.00	700	1.00	50.0	0	50.0	40.0
OFF_1465	Eklutna Sand and Gravel Pit	MSL	698930	6739168	0.426	10.0	7.00	700	1.00	50.0	0	50.0	40.0
OFF_1488	Cook Inlet Energy / Spartan 151 Jack - Up Drilling Rig	MSL	571000	6743073	0.637	10.0	7.00	750	1.00	50.0	0	10.0	35.0
OFF_1539	Liquefaction Plant	MSL	589664	6726649	2.64	10.0	7.00	700	1.00	50.0	0	50.0	40.0
OFF_1657	Soil Remediation Unit 01	MSL	594076	6734172	3.13	10.0	7.00	700	1.00	50.0	0	50.0	40.0
OFF_1670	Penpave Rock Crusher	MSL	601967	6708628	1.52	10.0	7.00	700	1.00	50.0	0	50.0	40.0

Table Notes

[1] UTM Zone 5, NAD 8

[2] Stack Angle: vertical = 0 degrees, horizontal = 90 degrees, and downward = 180 degrees.

Table 4: AAAQS Cumulative SO_2 Modeling Results with a Source-Wide Fuel Gas H_2S Concentration of 1,250 ppmv – Full Receptor Grid

Averaging Period	Rank	Modeled Concentration (µg/m³)						Background (µg/m³)	Total (µg/m³)	AAQS (µg/m³)	% AAQS
		2012-13	2013-14	2014-15	2017-18	2019	Design Value				
Annual	Maximum	14.6	14.5	15.6	15.1	13.9	15.6	0	15.6	80	20%
24-hour	Highest 2nd High	87.7	79.6	71.5	72.2	75.9	87.7	0	87.7	365	24%
3-hour	Highest 2nd High	154	133	140	141	146	154	0	154	1,300	12%
1-hour	Highest 4th High	181	180	187	186	190	185 (a)	4.3	189	196	96%

(a) Average of 5 years of results

Table 5: SO_2 PSD Class II Cumulative Increment Impact Analysis with a Source-Wide Fuel Gas H_2S Concentration of 1,250 ppmv – Full Receptor Grid

Averaging Period	Rank	Predicted Concentration (µg/m³)						Background (µg/m³)	Total (µg/m³)	Class II Increment (µg/m³)	% Increment
		2012-13	2013-14	2014-15	2017-18	2019	Design Value				
Annual	Maximum	14.6	1.5	15.6	15.1	13.9	15.6	0	15.6	20	78%
24-hour	Highest 2nd High	87.7	79.6	71.5	72.2	75.9	87.7	0	87.7	91	96%
3-hour	Highest 2nd High	154	133	140	141	146	154	0	154	512	30%

Table 6: SO_2 PSD Class I Cumulative Increment Impact Analysis with a Source-Wide Fuel Gas H_2S Concentration of 1,250 ppmv – Downwind Receptor Arc @ 50 Kilometers

Averaging Period	Rank	Predicted Concentration (µg/m³)						Background (µg/m³)	Total (µg/m³)	Class I Increment (µg/m³)	% Increment
		2012-13	2013-14	2014-15	2017-18	2019	Design Value				
Annual	Maximum	0.500	0.450	0.530	0.500	0.470	0.530	0	0.530	2	27%
24-hour	Highest 2nd High	3.79	3.48	3.44	3.39	4.60	4.60	0	4.60	5	92%
3-hour	Highest 2nd High	10.9	10.1	9.77	10.3	9.95	10.9	0	10.9	25	44%

Table 7: Vegetation Impact Analysis –Receptors Greater than 8 kilometers from the Grayling Platform

Averaging Period	Rank	Predicted Concentration [1] (µg/m³)						Background (µg/m³)	Total (µg/m³)	Vegetation Exposure Threshold (µg/m³)	% Threshold
		2012-13	2013-14	2014-15	2017-18	2019	Design Value				
Annual	Maximum	3.24	3.15	3.53	3.31	3.05	3.53	0	3.53	13 [2]	27%
3-hour	Maximum	66.6	67.0	50.5	54.0	66.7	67.0	0	67.0	1,300 [3]	5%

Table Notes

[1] Maximum annual impact at receptors located 8 kilometers from the platform. Receptors within this distance are over water and do not need to be included in this analysis due to lack of vegetation.

[2] Threshold determined by ADEC to be applicable to lichens which may exist in the Project area (Alaska Department of Environmental Conservation (ADEC). 2018. ADEC Modeling Review Procedures Manual. October 8, 2018. https://dec.alaska.gov/media/10865/modeling-procedures-manual-100818.pdf).

[3] Secondary National Ambient Air Quality Standards – Recommended by ADEC as the appropriate limit to protect against damage to crops and vegetation.

Table 8: Monthly Average Temperatures (°F) Collected from 2012 through 2022 Compared to the Current Climate Normals (1991-2020)

Parameter	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
Normal Daily MAX	22.7	27.3	33.0	45.1	56.3	63.4	66.2	64	55.7	42.0	28.9	25.0	44.1
Normal Monthly AVG	16.9	21.3	25.8	37.5	48.1	55.9	59.6	57.5	49.3	36.3	23.6	19.4	37.6
Normal Daily MIN	11.0	15.2	18.6	29.9	40.0	48.4	52.9	50.9	42.9	30.7	18.3	13.8	31.1
Monthly Average Temperature													
2022	20.7	28.1	32.3	38.0	50.9	60.1	59.4	56.1	50.3	36.7	23.6	14.6	39.2
2021	22.3	14.3	19.2	34.8	48.0	56.5	59.1	57.3	47.4	37.9	15.8	17.0	35.8
2020	6.2	18.8	21.5	36.7	50.4	55.5	61.0	58.9	50.6	37.2	21.4	22.6	36.7
2019	20.3	20.8	35.7	40.1	50.2	60.5	65.3	62.6	52.7	41.7	35.7	24.6	42.5
2018	20.2	18.9	27.7	39.6	48.5	56.5	61.4	58.3	55.0	44.8	30.1	25.6	40.6
2017	13.6	18.7	19.2	40.3	47.9	55.3	60.2	57.5	51.6	39.1	20.9	26.5	37.6
2016	27.1	29.9	33.5	43.5	52.0	59.1	62.7	60.5	51.7	35.9	26.1	16.0	41.5
2015	20.4	25.0	29.7	40.7	50.2	59.5	62.1	58.9	46.4	40.4	23.8	21.5	39.9
2014	30.2	19.2	27.6	38.5	52.5	54.8	60.6	58.5	50.4	34.7	31.3	27.8	40.5
2013	22.4	24.6	24.5	29.6	45.0	58.8	61.5	58.4	49.2	43.9	23.0	15.9	38.1
2012	2.9	25.1	21.4	38.7	45.5	54.3	55.6	55.9	47.9	33.2	17.7	14.6	34.4

Table 9: Monthly Average Prevailing Wind Direction (closest 10°) Collected from 2012 through 2022 Compared to the Current Climate Normals (1991-2020)

Parameter	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Normal	360	360	360	170	170	170	170	170	170	360	360	360
Monthly Average Prevailing Wind												
2022	360	360	340	330	160	150	150	150	150	10	350	360
2021	360	360	360	150	150	150	150	170	150	360	360	360
2020	360	360	350	330	150	150	150	150	150	150	350	360
2019	10	360	150	150	150	150	300	170	150	360	360	10
2018	360	50	350	150	150	150	150	150	160	150	350	10
2017	360	350	350	150	150	150	150	150	150	150	350	330
2016	360	360	350	150	150	150	150	150	150	350	10	360
2015	360	10	350	150	160	150	150	160	150	360	350	360
2014	360	360	350	150	150	150	150	150	360	360	10	350
2013	360	350	350	350	170	150	300	150	10	140	360	360
2012	360	350	350	170	160	150	150	150	150	360	360	350

Table 10: Monthly Average Windspeed (mph) Collected from 2012 through 2022 Compared to the Current Climate Normals (1991-2020)

Parameter	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
MAX 2-minute	(-)	43	54	38	30	33	30	36	36	36	36	49	54
Normal	6.3	6.3	6.9	7.1	8.2	8.0	7.1	6.6	6.8	6.5	6.5	6.2	6.9
Monthly Average Windspeed													
2022	8.6	6.6	6.0	5.9	8.0	7.0	8.0	6.7	7.2	7.5	6.2	6.1	7.0
2021	5.6	5.8	5.4	7.6	8.1	7.9	6.6	6.3	6.2	5.9	5.5	5.9	6.4
2020	5.4	7.1	6.0	5.9	6.9	8.1	7.0	6.4	6.8	5.8	6.0	6.3	6.5
2019	5.1	4.4	6.3	6.9	7.7	6.5	5.7	6.1	6.0	7.8	7.2	6.7	6.4
2018	6.9	4.8	5.5	8.2	9.6	8.4	6.2	7.4	4.8	6.8	4.6	6.4	6.6
2017	5.4	4.8	8.2	5.5	8.5	7.7	6.4	6.6	6.8	7.0	6.5	5.8	6.6
2016	5.1	5.6	4.8	7.3	7.6	8.0	6.0	5.6	7.3	4.5	5.8	5.7	6.1
2015	4.5	6.1	5.7	7.2	6.1	7.7	6.0	6.3	5.5	4.4	5.9	5.4	5.9
2014	5.1	5.6	5.1	5.7	7.5	7.3	6.3	5.5	4.7	4.3	4.3	4.2	5.5
2013	6.4	5.3	6.3	6.3	5.8	6.5	5.6	6.1	5.8	7.7	6.3	4.7	6.1
2012	5.4	5.6	3.8	5.1	8.4	6.9	6.8	6.5	8.5	5.8	5.9	6.6	6.3

Figures/Drawings

Response to Request for Additional Information for the Application for Construction Permit AQ0069CPT02, Grayling Platform

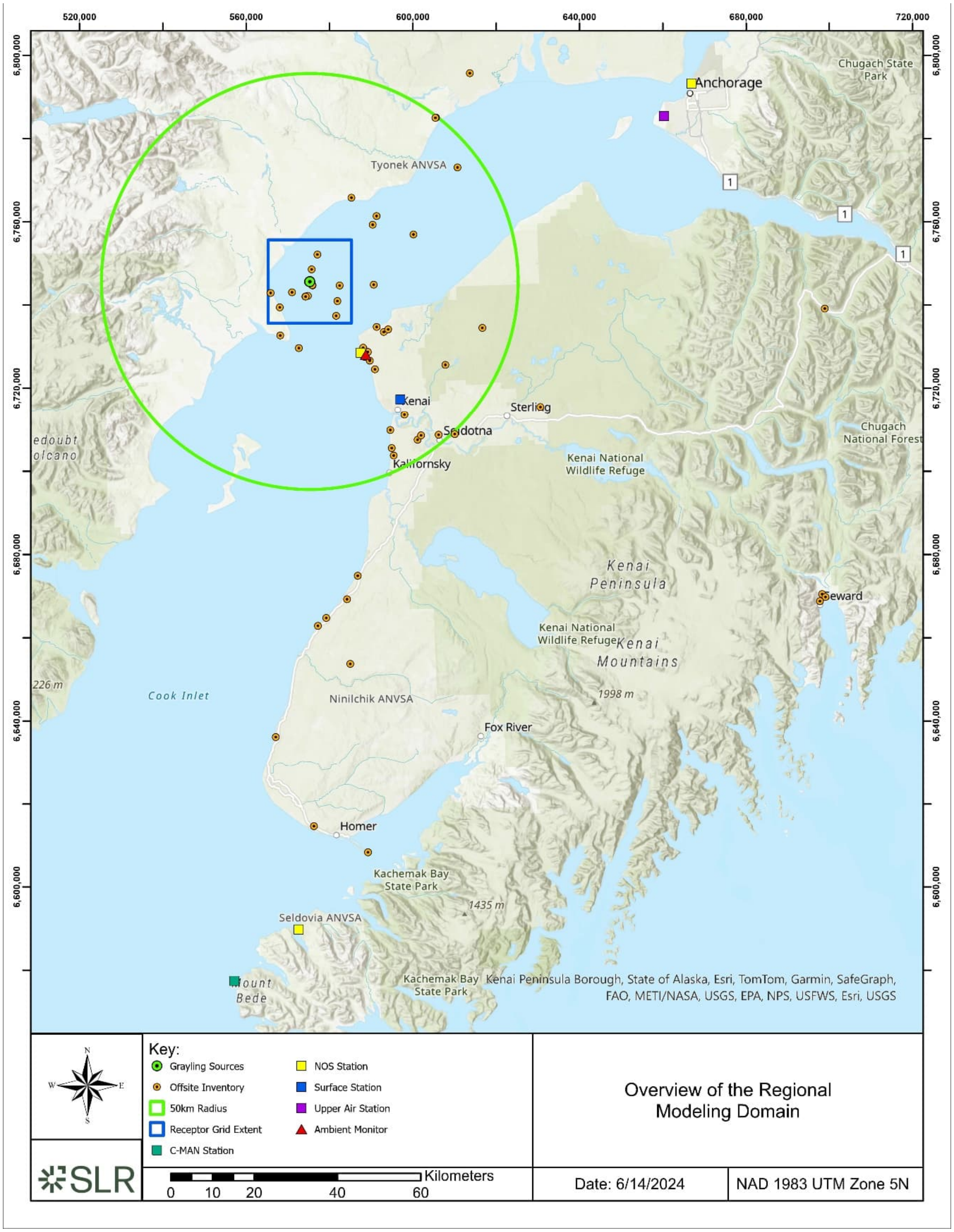

Figure 1: **Overview of the Regional Modeling Domain including Modeled Offsite Source Locations**

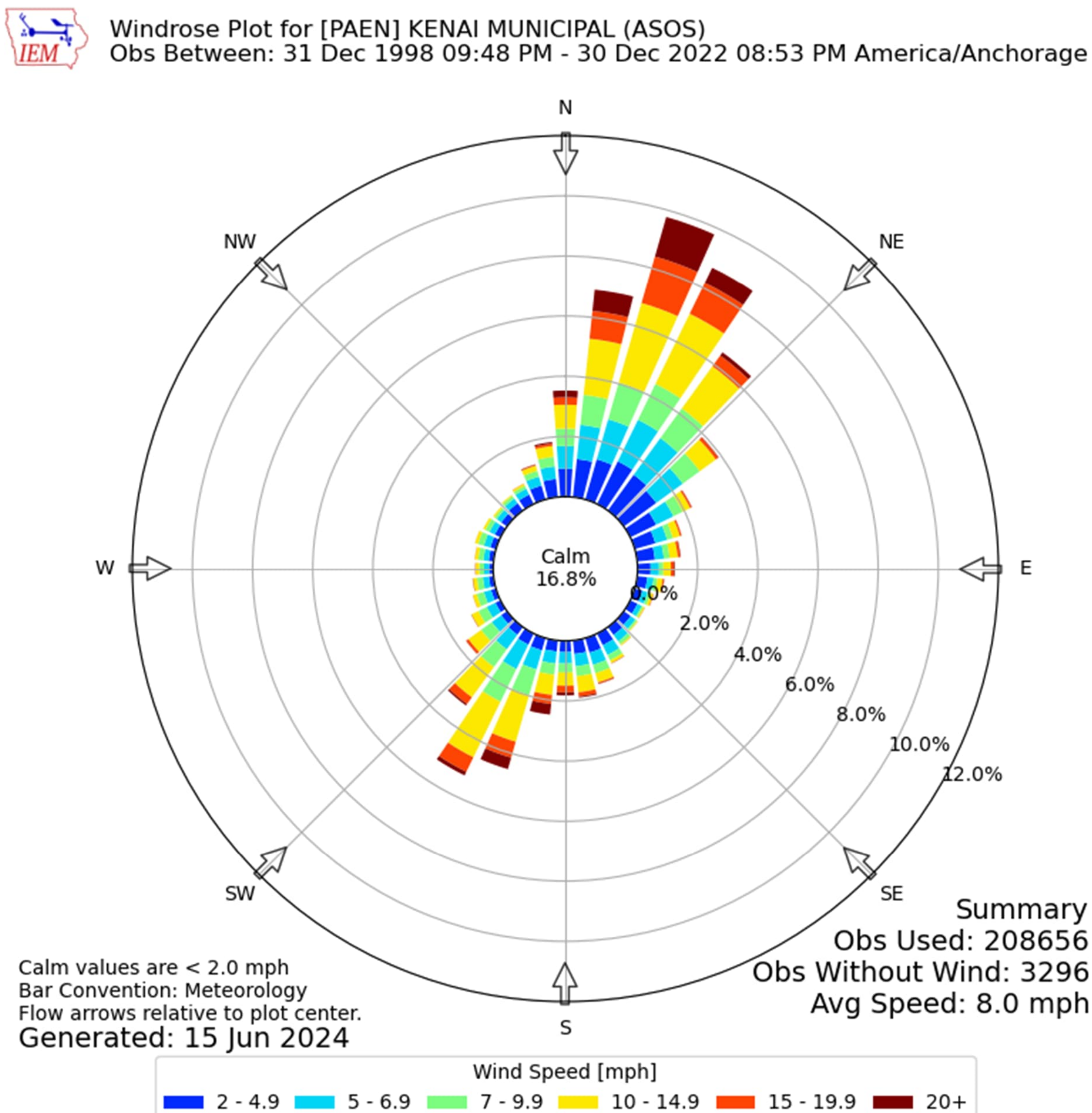

Figure 2: 30-Year Wind Rose from the Kenai Municipal Airport ASOS Station (PAEN)

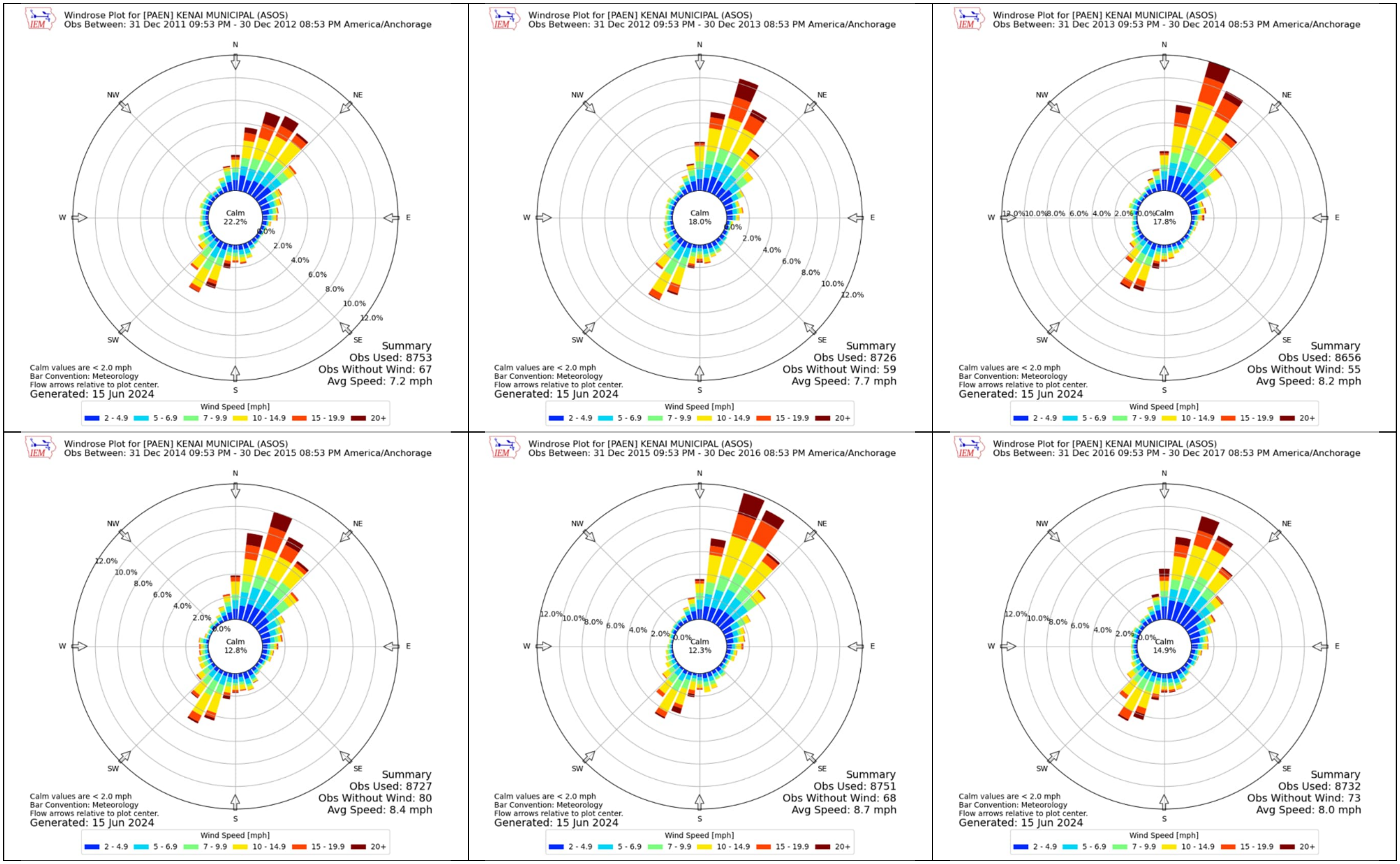

Figure 3: Wind Roses from the Kenai Municipal Airport ASOS Station (PAEN) 2012 through 2017

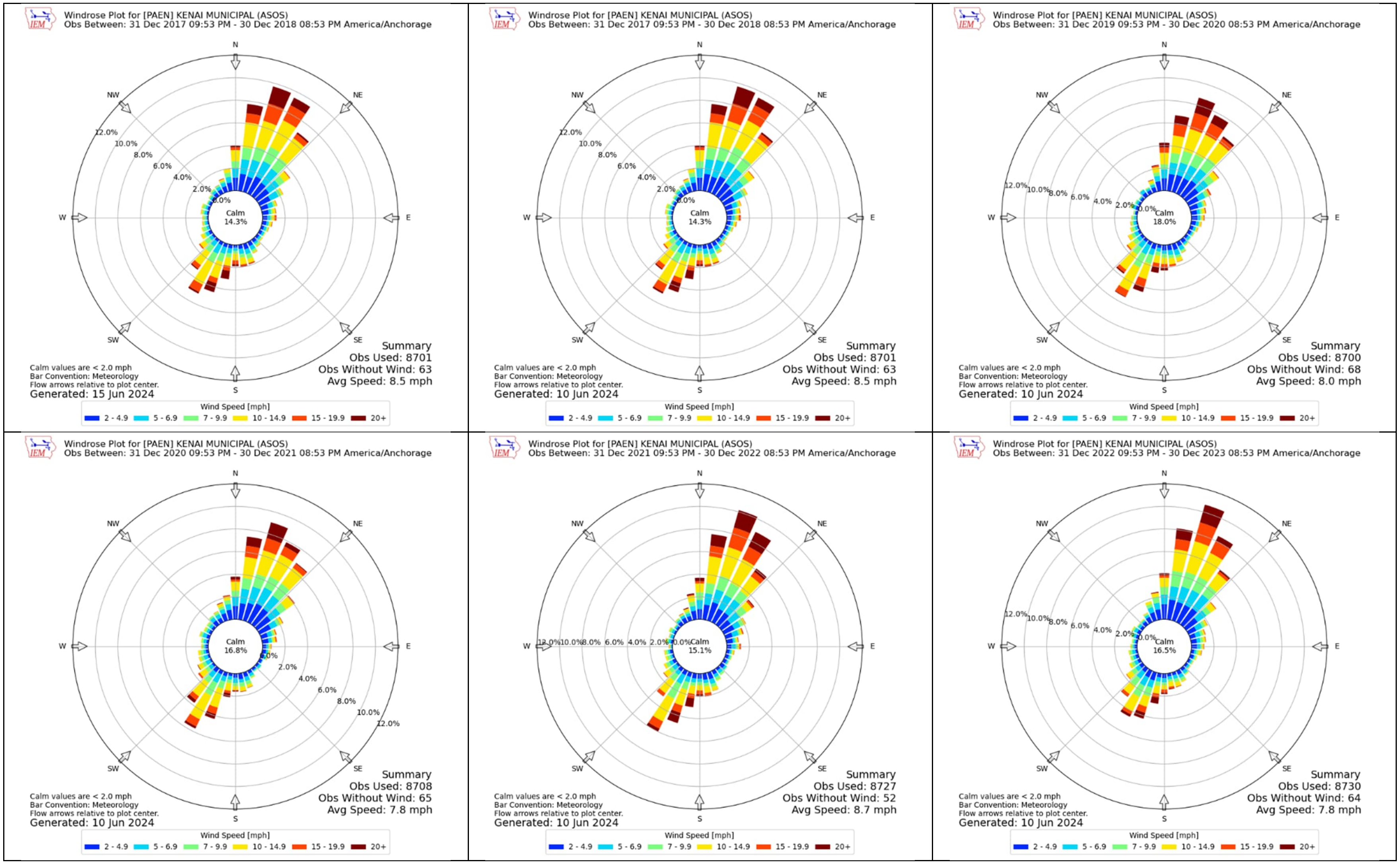

Figure 4: Wind Roses from the Kenai Municipal Airport ASOS Station (PAEN) 2018 through 2023

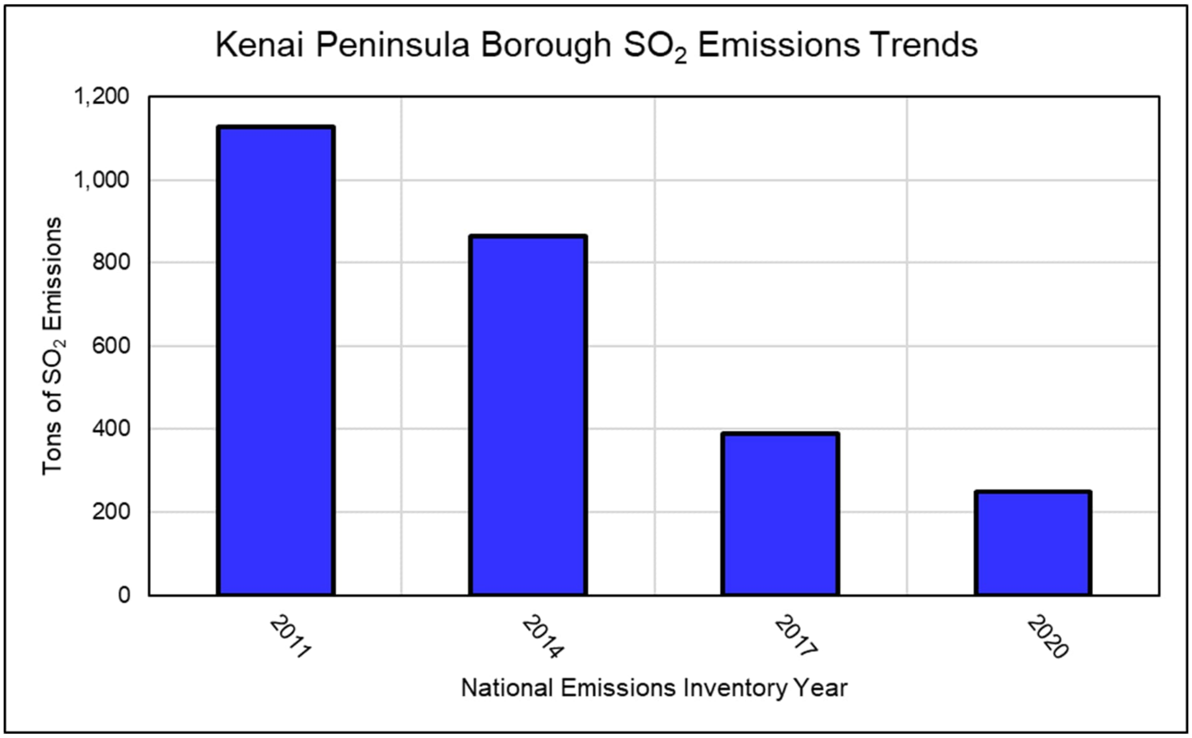

Figure 5: Kenai Peninsula Borough – Trends in SO_2 Emissions Trends Since 2011

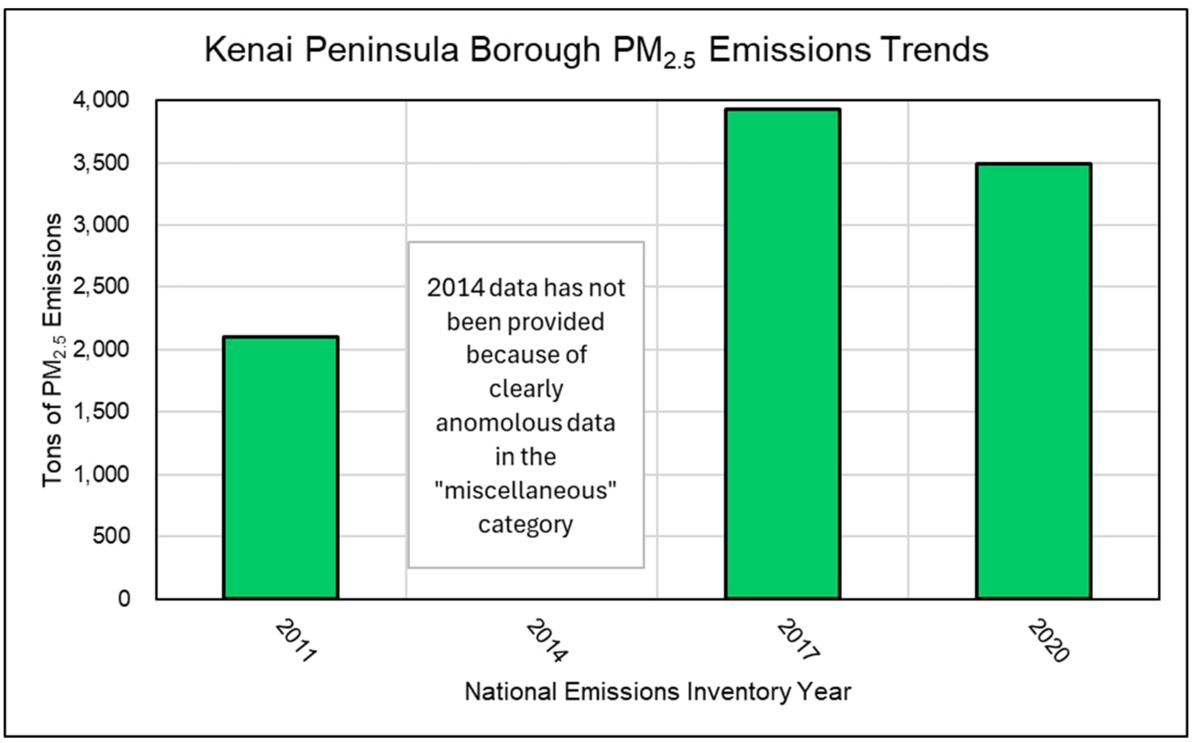

Figure 6: Kenai Peninsula Borough – Trends in $PM_{2.5}$ Emissions Trends Since 2011

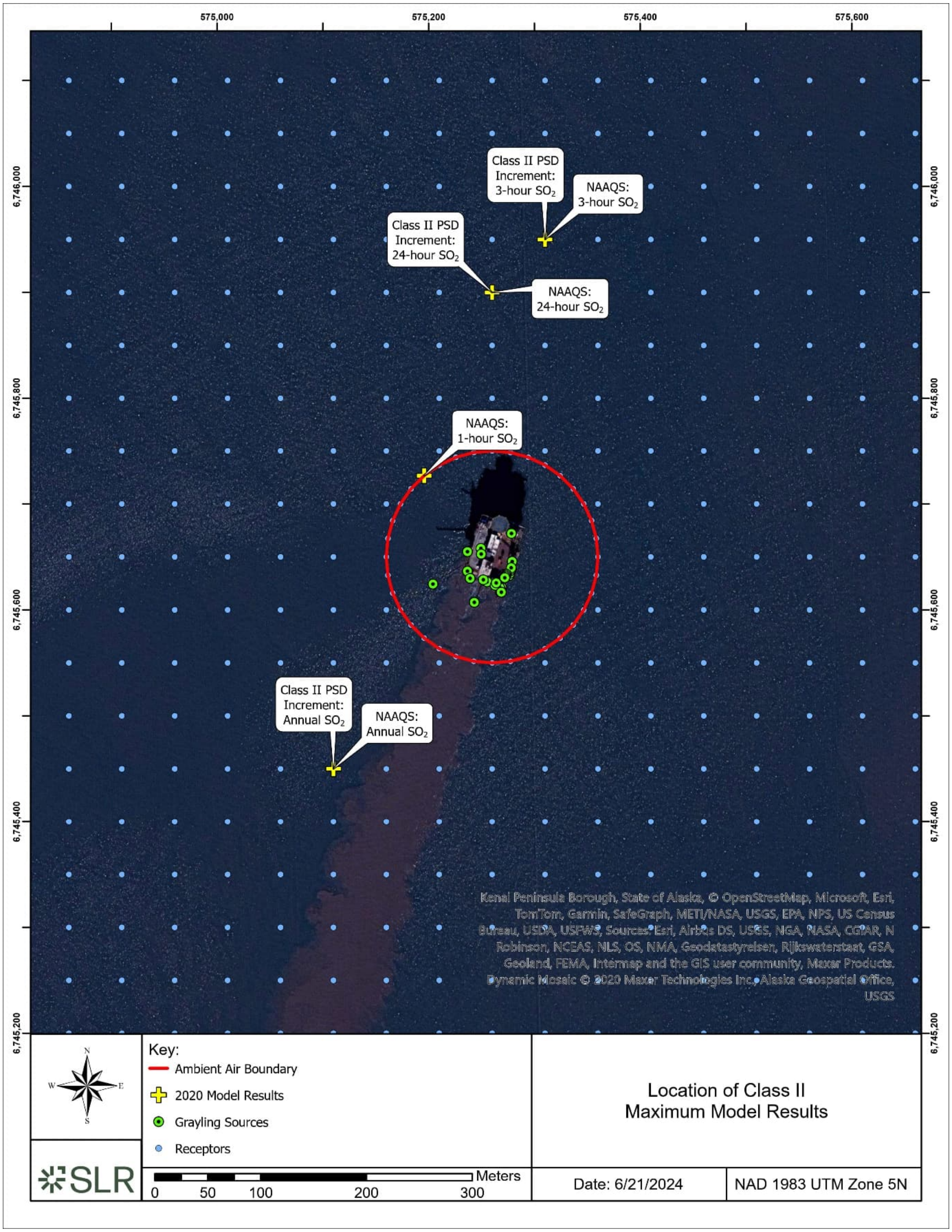

Figure 7: Location of Maximum SO_2 Design Values in support of the Class II Impacts Analysis

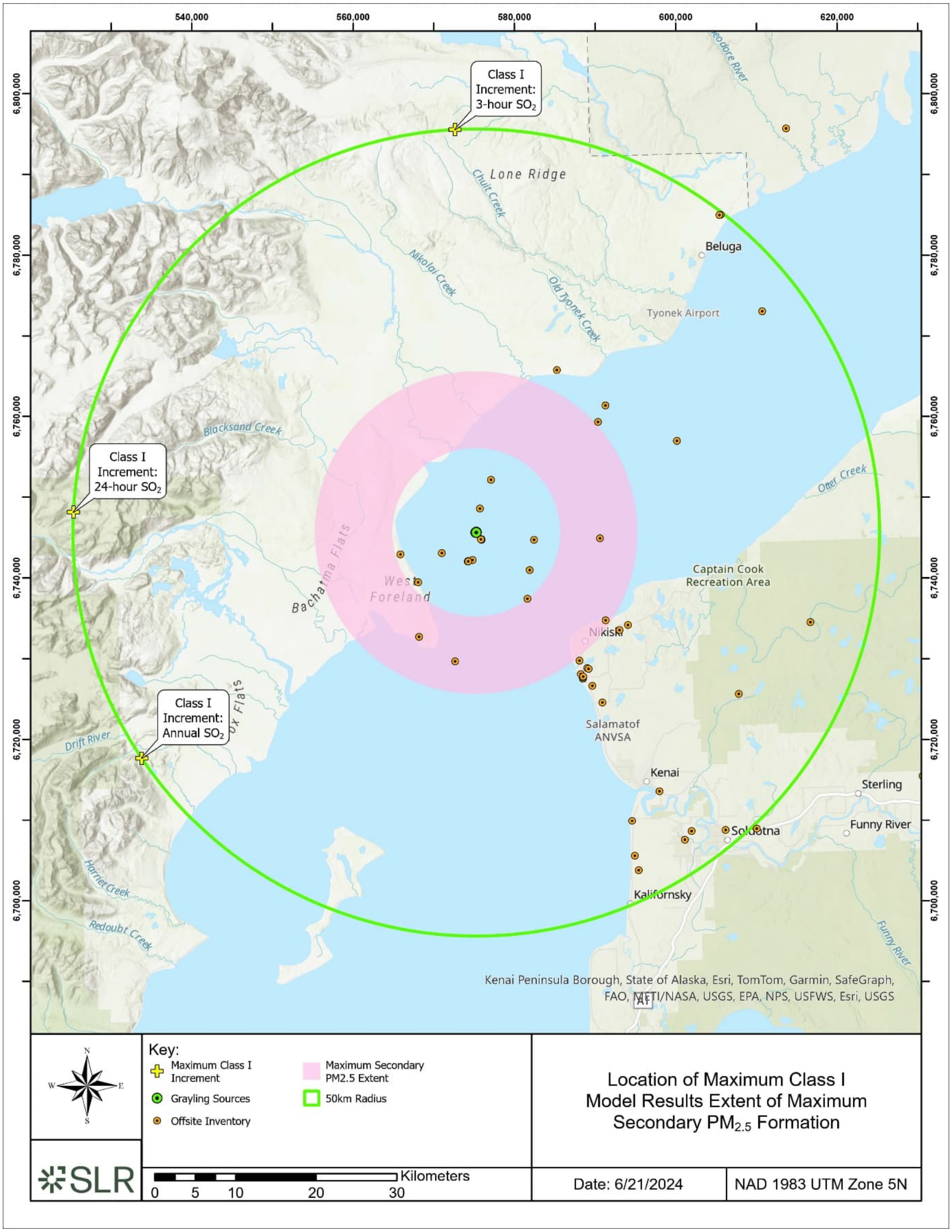

Figure 8: Location of SO_2 and Secondary $PM_{2.5}$ Formation Impact Maxima Predicted in the Far-Field

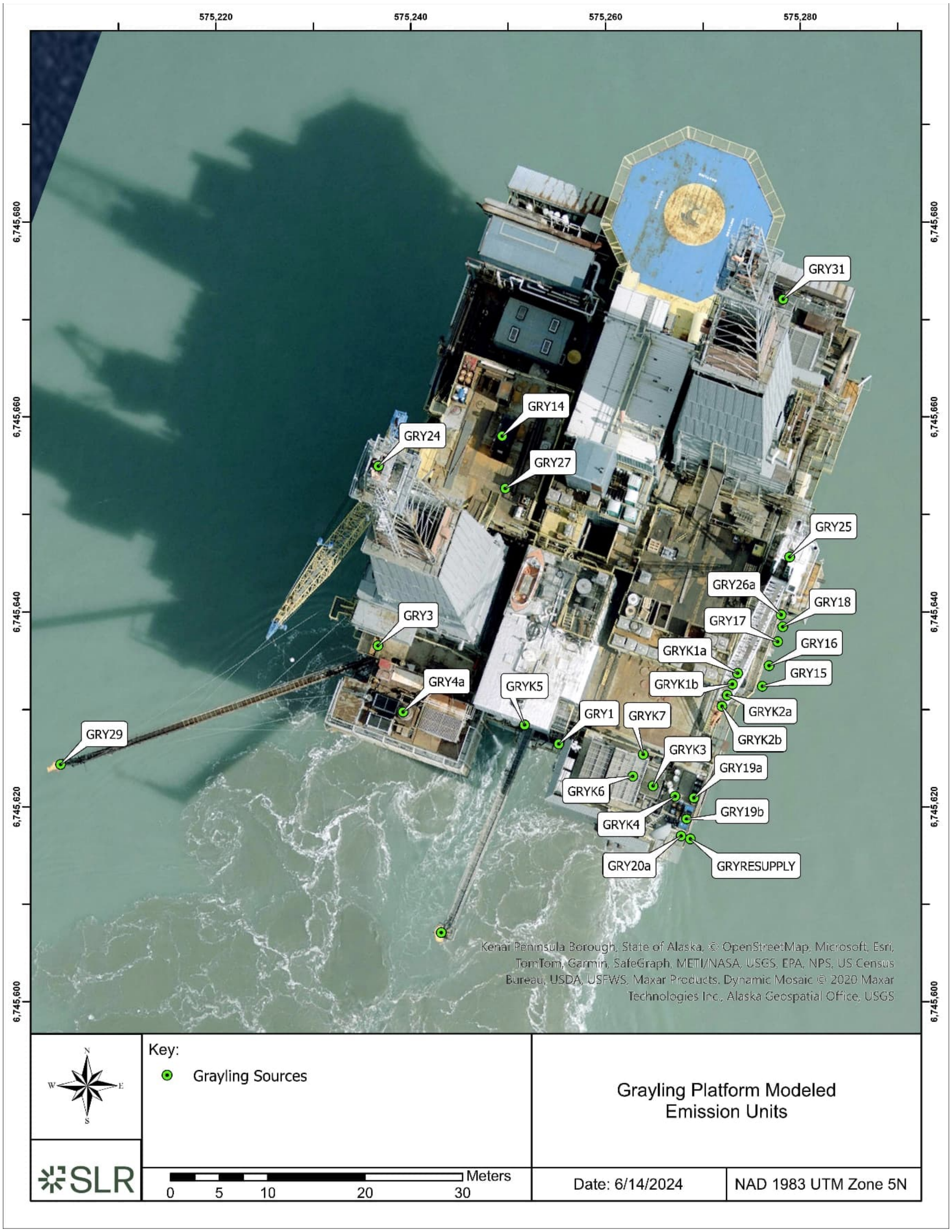

Figure 9: Grayling Platform Modeled Emissions Unit Layout