

**ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION  
AIR PERMITS PROGRAM**

**TECHNICAL ANALYSIS REPORT**  
For Air Quality Control Minor Permit No. AQ0696MSS03

Pacific Energy Resources, Ltd (Pacific Energy)  
Osprey Platform

**REVISE FUEL GAS HYDROGEN SULFIDE LIMIT**

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Preparer: Patrick Dunn  
Supervisor: Sally A. Ryan, P.E.  
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## Abbreviations/Acronyms:

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
AS	Alaska Statutes
ASTM	American Society of Testing and Materials
CEMS	Continuous Emission Monitoring System
C.F.R.	Code of Federal Regulations
COMS	Continuous Opacity Monitoring System
EPA	Environmental Protection Agency
NA	Not Applicable
NAICS	North American Industry Classification System
NESHAPS	National Emission Standards for Hazardous Air Pollutants
NSPS	New Source Performance Standards
PSD	Prevention of Significant Deterioration
PTE	Potential to Emit
RM	Reference Method
SIC	Standard Industrial Classification
SN	Serial Number
TAR	Technical Analysis Report
TBD	To Be Determined

## Units and Measures:

bhp	brake horsepower or boiler horsepower
gr./dscf	grains per dry standard cubic feet (1 pound = 7,000 grains)
dscf	dry standard cubic foot
gph	gallons per hour
kW	kiloWatts
kW-e	kilowatts electric <sup>1</sup>
lbs	pounds
mmBtu	million British Thermal Units
ppm	parts per million
ppmv	parts per million by volume
tph	tons per hour
tpy	tons per year
wt%	weight percent

## Pollutants:

CO	Carbon Monoxide
HAPS	Hazardous Air Pollutants
H <sub>2</sub> S	Hydrogen Sulfide
NO <sub>x</sub>	Oxides of Nitrogen
NO <sub>2</sub>	Nitrogen Dioxide
NO	Nitric Oxide
PM-10	Particulate Matter with an aerodynamic diameter less than 10 microns
S	Sulfur
SO <sub>2</sub>	Sulfur Dioxide
VOC	Volatile Organic Compound

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<sup>1</sup> kW-e refers to rated generator electrical output rather than engine output

## **1.0 Introduction:**

This Technical Analysis Report (TAR) provides the Alaska Department of Environmental Conservation's (Department's) basis for issuing Air Quality Control Minor Permit AQ0696MSS03 to Pacific Energy for the Osprey Platform. This minor permit revises the fuel gas Hydrogen Sulfide (H<sub>2</sub>S) limit at the Osprey Platform in Minor Permit AQ0696MSS02, Revision 1.

### **1.1 Stationary Source Description:**

The Osprey Platform is an offshore oil and gas production platform located in Cook Inlet, Alaska. The Osprey Platform was previously determined by the Department to be aggregated with the Kustatan Production Site. In May 2009, the Department determined the Osprey Platform to be disaggregated from the Kustatan Production site.

### **1.2 Permit History:**

Prior to issuance of AQ0696MSS03, Pacific Energy operated the Osprey Platform under the following active permits, in order of issue date:

**Operating/Construction Permit No. 696TVP01, issued July 7, 2004 (Title V) and revised January 11, 2008 (Revision 1) and January 16, 2008 (administrative revision, Revision 2).**

The initial permit is an operating/construction permit that has now expired. This permit did not include any Title I provisions of pre-1997 Title I permits. Therefore, there is no need for the Department to re-establish pre-1997 Title I permit conditions in Minor Permit AQ0696MSS03. Operating Permit AQ0696TVP01, Revision 2 incorporated revisions in Minor Permit AQ0696MSS02. Operating Permit AQ0696TVP01, Revision 2 expired on July 6, 2009.

**Minor Permit No. AQ0696MSS02, issued October 23, 2007 (Title I) and revised through March 20, 2008 (administrative revision, Revision 1).** The Department is revising the fuel gas H<sub>2</sub>S limit in this permit upon issuance of AQ0696MSS03. The Department rescinded AQ0696MSS01 upon issuance of AQ0696MSS02.

### **1.3 Application Description:**

Pacific Energy requested that the Department remove the fuel gas H<sub>2</sub>S limit of 100 parts per million volumes (ppmv) at the Osprey Platform to protect ambient air quality standards and increments in Minor Permit AQ0696MSS02, Revision 1. Pacific Energy made this request based on source testing of the fuel gas H<sub>2</sub>S concentration at the Osprey Platform showing that the fuel gas H<sub>2</sub>S concentrations are well below 100 ppmv. Pacific Energy submitted the initial minor permit application on August 4, 2008. The Department determined the application was incomplete because it did not contain an ambient analysis. Pacific Energy subsequently submitted the ambient analysis on December 17, 2008 and the application was determined to be complete. Pacific Energy submitted a revised ambient analysis on July 23, 2009 demonstrating that the fuel gas H<sub>2</sub>S limit could be increased to 993 ppmv while still protecting the ambient air quality standards and increments.

#### 1.4 Emissions Summary and Permit Applicability:

Table 1 shows the proposed Potential to Emit (PTE) in tons per year (tpy) of the Osprey Platform with the fuel gas H<sub>2</sub>S limit increased from 100 ppmv to 993 ppmv. There are six existing emission units at the Osprey Platform which burn fuel gas. Emission Units 1, 2, 2a, 3 and 4 listed in Table 1 of Minor Permit AQ0696MSS02, Revision 1 are dual fired boilers whose PTE does not increase with the increased fuel gas H<sub>2</sub>S limit because their PTE is based on burning liquid fuel with sulfur content of 0.25 percent by weight. Emission Unit 16 listed in Table 1 of Minor Permit AQ0696MSS02, Revision 1 is the well test flare, and this is the only emission unit whose PTE increases with the increased H<sub>2</sub>S fuel gas limit.

Pacific Energy’s PTE calculations for the well test flare in the application included the following assumptions.

1. Existing annual operational limit of 20 million standard cubic feet per year (20 MMscf/yr).
2. Fuel gas H<sub>2</sub>S concentration of 993 ppmv

As shown in Table 1 this project is not classified under 18 AAC 50.502(c) (3).

Table 2 shows the stationary source’s assessable emissions due to the fuel gas H<sub>2</sub>S increase.

**Table 1 – Osprey Platform Minor Permit Applicability, tpy:**

Pollutant	NO <sub>x</sub>	CO	PM-10	VOC	SO <sub>2</sub>
PTE for Osprey Platform <sup>[a]</sup>	163.8	67.7	15.2	7.2	36.8
PTE Change with fuel gas H <sub>2</sub> S increase	0	0	0	0	1.5
Minor Permit Threshold	10	N/A	10	N/A	N/A <sup>[b]</sup>
Minor Permit?	No	N/A	No	N/A	N/A

Table Notes:

<sup>[a]</sup> – From Table 2.1 of Minor Permit AQ0696MSS01 TAR

<sup>[b]</sup> – Minor Permit threshold not applicable because existing SO<sub>2</sub> PTE below 40 tpy.

**Table 2– Osprey Platform Stationary Source Assessable Emissions Summary, tpy:**

Pollutant	NO <sub>x</sub>	CO	PM-10	SO <sub>2</sub>	VOC	Total Assessable
PTE for Osprey Platform including fuel gas H <sub>2</sub> S increase	163.8	67.7	15.2	38.3	0 <sup>[a]</sup>	285

Table Notes:

<sup>[a]</sup> – VOC PTE not included in assessable emissions because it is under 10 tpy.

## **1.5 Department Findings:**

The Department made the following findings regarding Pacific Energy's application:

1. Revising the existing Title I permit conditions described in the application requires a minor permit under 18 AAC 50.508(6).
2. As shown in Table 1 this project is not classified under 18 AAC 50.502(c) (3).
3. The revision to the fuel gas H<sub>2</sub>S limit described in the application will cause an increase in stationary source-wide SO<sub>2</sub> PTE. The Department will revise the stationary source wide assessable PTE listed in Condition 1 of Operating/Construction Permit No. AQ0696TVP01, Revision 1.
4. The Department must administratively amend the operating permit to include the revised fuel gas H<sub>2</sub>S limit before Pacific Energy can operate under the terms of Minor Permit AQ0696MSS03.
5. Pacific Energy supplied an ambient analysis as part of their application, as required under 18 AAC 50.540(k) (3), which demonstrates compliance with the ambient air quality standards and increments.
6. The Department will revise the fuel gas H<sub>2</sub>S limit to the value used in the ambient analysis (993 ppmv) rather than remove the limit as requested by Pacific Energy. Although Pacific Energy submitted documentation that the fuel gas H<sub>2</sub>S concentrations are well below 100 ppmv, the Department is concerned about future increases due to fuel gas souring.
7. The Osprey Platform is located in the Kenai Peninsula Borough coastal district. The project is consistent with the Alaska Coastal Management Program (ACMP) through AS 46.40.040(b) (1). This application is a minor permit under 18 AAC 50.508(6). This classification is not in the ACMP C list, therefore the ACMP project modification and Department single agency review procedures do not apply.

## **2.0 Permit Conditions:**

### **2.1 Requirements for all Minor Permits:**

As described in 18 AAC 50.544(a), each minor permit issued under 18 AAC 50.542 must identify the stationary source, the project, the Permittee, and contact information, and the requirement to pay fees.

The permit cover page identifies the stationary source, the project, the Permittee, and contact information as required in 18 AAC 50.544(a) (1). The permit contains a requirement to pay fees as required in 18 AAC 50.543(a) (2). The Department will update the operating permit assessable emissions through this minor permit. The assessable emissions for the Osprey Platform are 285 tpy, as shown in Table 2.

### **2.2 Requirements for a Minor Permit that Revises or Rescinds a Previous Title I Permit:**

As described in 18 AAC 50.544(i) a minor permit classified under 18 AAC 50.508(6) must contain terms and conditions as necessary to ensure that the permittee will construct and operate the stationary source in accordance with 18 AAC 50.

### **2.2.1 Ambient Air Quality Requirements:**

Pacific Energy submitted an ambient air quality modeling assessment to demonstrate that they can comply with the Alaska Ambient Air Quality Standards (AAAQS) listed in 18 AAC 50.010 and the maximum allowable increases (increments) listed in 18 AAC 50.020 while operating under the revised fuel gas H<sub>2</sub>S limit. The Department reviewed the modeling assessment and concurs that the revisions authorized by Minor Permit No. AQ0696MSS03 will comply with the AAAQS and the increments. The Department's review of the assessment is included in Appendix A of this TAR.

### **2.3 Terms to make Permit Enforceable:**

The minor permit contains additional requirements as necessary to ensure that the Permittee will construct and operate the stationary source or modification in accordance with 18 AAC 50, as described in 18 AAC 50.544(i).

### **3.0 Permit Administration:**

The provisions of Minor Permit AQ0696MSS03 relax the existing fuel gas H<sub>2</sub>S limit contained in Operating Permit AQ0696TVP01, Revision 2. Therefore, Pacific Energy must still operate under the existing fuel gas H<sub>2</sub>S limit until the Operating Permit can be administratively amended.

**Modeling Review Memorandum dated 7/26/09**

**(Inserted as a word document, formatting and page numbers may be different  
from original)**

# MEMORANDUM

**State of Alaska**  
**Department of Environmental Conservation**  
**Division of Air Quality**

TO: File

DATE: July 26, 2009

FILE NO.: AQ0696MSS03

PHONE: 269-7577

FAX: 269-7508

FROM: Patrick Dunn.  
Environmental Engineer Associate  
Air Permits Program

SUBJECT: Review of Pacific Energy's  
Osprey Platform Ambient  
Assessment

This memorandum summarizes the Department's findings regarding the fuel gas hydrogen sulfide (H<sub>2</sub>S) limit revision on Pacific Energy Resources', Ltd. (Pacific Energy's) Osprey Platform. Pacific Energy submitted the analysis in support of their August 4, 2008 application for Air Quality Control Minor Permit No. AQ0696MSS03. As described in this memorandum, Pacific Energy's assessment adequately shows that operating their emission units within the requested constraints will not cause or contribute to a violation of the Alaska Ambient Air Quality Standards (AAAQS) provided in 18 AAC 50.010 or the maximum allowable increases (increments) listed in 18 AAC 50.020.

## **BACKGROUND**

Pacific Energy is seeking to increase the allowable fuel gas H<sub>2</sub>S concentration at the Osprey Platform from 100 parts per million volumes (ppmv) to 993 ppmv. The 100 ppmv H<sub>2</sub>S limit was established in Minor Permit AQ0696MSS01 to protect the sulfur dioxide (SO<sub>2</sub>) AAAQS and increment and carried forward in Minor Permit AQ0696MSS02. Pacific Energy's application triggers minor permit review under 18 AAC 50.508(6). Per 18 AAC 50.540(k) (3), applicants subject to 18 AAC 50.508(6) must include in their application the effects of revising permit terms and conditions.

The Osprey Platform is an existing stationary source permitted under Operating Permit No. AQ0696TVP01, Revision 2 and Minor Permit No. AQ0696MSS02, Revision 1.

Pacific Energy submitted the ambient analysis on December 17, 2008 in support of their application for Minor Permit AQ0696MSS03. The Department determined the initial application

incomplete because it did not contain an ambient analysis. The Department found the initial ambient analysis contained the use of flagpole receptors.

(See Platform and Receptor Elevations below). Pacific Energy submitted a revised ambient analysis on May 15, 2009. Pacific Energy corrected the use of flagpole receptors and revised the stack height of the modeled flare and building height used in the ambient analysis.

Pacific Energy stated, these values had been corrected to reflect the true platform dimensions. The Department requested that Pacific Energy submit verification of these revised values and Pacific Energy submitted verification of these values on July 22, 2009. Pacific Energy submitted a final analysis on July 23, 2009 to incorporate the use of effective stack height and stack diameter for the flare.

The Department has previously reviewed Osprey ambient assessments. The most recent ambient assessments were submitted in support of Minor Permits AQ0696MSS01 and AQ0741MSS01 described in the May 25, 2007 memorandum, "Review of Kustatan SO<sub>2</sub> Ambient Assessment – REVISED." The Osprey Platform and the Kustatan site were considered aggregated at the time of the May 25, 2007 memorandum. The Department considers them disaggregated as of May 2009. Today's memorandum only describes aspects, which have changed subsequent to the previous assessment or that otherwise warrant discussion.

## **APPROACH**

Pacific Energy used computer analysis (modeling) to predict the ambient SO<sub>2</sub> impact. Hoefler Consulting Group conducted the analysis on behalf of Pacific Energy.

### **Model Selection**

There are a number of air dispersion models available to applicants and regulators. U.S. Environmental Protection Agency's (EPA) lists these models in their *Guidelines on Air Quality Models* (Guideline). Pacific Energy used the EPA's *Off-Shore Coastal Dispersion* (OCD) model (version 5) for the ambient analysis since the turbines are offshore sources. OCD is an appropriate model for this analysis.

### **Meteorological Data**

OCD requires hourly meteorological data to estimate plume dispersion. Pacific Energy used one year of surface offshore meteorological data from the ConocoPhillips Alaska, Incorporated Tyonek platform collected from August 1, 1993 through July 31, 1994. This data set was collected as part of a PSD monitoring program that followed the Department and EPA quality assurance guidelines. Pacific Energy also used one year of on-shore meteorological data and one year of upper air data from the Beluga on-shore station collected from August 1, 1993 through July 31, 1994 as part of the same PSD monitoring program.

### **Emission Unit Inventory**

Pacific Energy modeled the existing Well Test Flare emission unit listed in Attachment B of the minor permit application. The flare has a maximum capacity of 15 million standard cubic feet per day (MMscf/day).

The other existing emission units at the Osprey Platform, which burn fuel gas, are three rig boilers and two camp boilers. These boilers operate on either fuel gas or liquid fuel. These boilers were not included in the modeling analysis because their potential to emit (PTE) in

previous ambient assessments is based on liquid fuel with a fuel sulfur content of 0.25 percent by weight sulfur (wt%S). Increasing the H<sub>2</sub>S fuel gas concentration has no effect on the PTE of these boilers.

### **Emission Rates and Stack Parameters**

The assumed emission rates and stack parameters have significant roles in an ambient demonstration. Therefore, the Department checks these parameters very carefully.

The modeled emission rates and stack parameters are reasonable. However, the following parameters or assumptions warrant special comment.

#### Annual Operation

Pacific Energy's approach assumed maximum operation (i.e., 15 million standard cubic feet per day (MMscf/day)) for the flare to show compliance with the short-term and annual AAAQS and increment. The Osprey Platform has an annual operational limit on the flare of 20 MMScf/year; therefore, Pacific Energy's approach is extremely conservative for the annual impact.

#### Effective Stack Parameters for Flare

The effective stack height and stack diameter can be a critical component of an ambient demonstration when modeling a flare. Pacific Energy used the methodology specified by the EPA in their final submittal.

### **Ambient Air Boundary**

For purposes of air quality modeling, "ambient air" means outside air to which the public has access. Ambient air typically excludes that portion of the atmosphere within a stationary source's boundary. The use of a marine safety zone is warranted for platforms located in Cook Inlet due to strong tidal currents. Pacific Energy used a 100-meter radius from the Osprey Platform outer edge as the ambient air boundary for this application. This approach is acceptable for Cook Inlet platforms.

### **Receptor Grid**

Pacific Energy constructed the receptor grid by placing receptors approximately 20 meters apart along the ambient air boundary. Two additional receptor grids were used to model locations beyond the ambient air boundary. A polar receptor grid was used to model a circular area extending 500 meters from the center of the platform. The receptors in this polar grid begin 150 meters from the center of the platform and are spaced 50 meters apart with grid radials separated by 10 degrees. The other grid is a Cartesian grid with receptors placed 500 meters apart outside of the ambient air boundary extending five kilometers in all directions from the center of the platform. This grid is adequate for modeling the maximum impacts from the flare.

### **Platform and Receptor Elevations**

Pacific Energy used flagpole receptors to represent receptor elevations at mean sea level (MSL) in the initial submittal. Pacific Energy was attempting to correct for the platform elevation being measured from mean lower low water (MLLW) level. The correct approach in correcting for the difference between MSL and MLLW level in Cook Inlet is to reduce the platform elevation by 3.4 meters and not use flagpole receptors. A sensitivity analysis the Department conducted showed that representing MSL with flagpole receptors underestimates the impacts. Pacific Energy used the correct approach in the final submittal.

**Downwash**

Downwash refers to conditions where the plume pattern is influenced by nearby structures. An oil or gas platform presents an obstacle to airflow over the water that can lead to downwash.

The OCD model incorporates algorithms to account for downwash based on the dimensions of platform structures and stack heights.

Pacific Energy set the building width to the width of the platform and the building height was set to the approximate height of the solid structures on the platform. Pacific Energy’s approach is appropriate.

**Ambient SO<sub>2</sub> Modeling**

Pacific Energy used an H<sub>2</sub>S fuel gas concentration of 993 ppmv to calculate the SO<sub>2</sub> emission rate of the flare.

**RESULTS AND DISCUSSION**

The maximum SO<sub>2</sub> impacts are shown in Table 1. The maximum impact is less than the SIL, which is also shown in Table 1. Therefore, Pacific Energy has demonstrated that the project will not cause or contribute to a violation of the SO<sub>2</sub> AAAQS or increment.

**Table 1: Maximum Project Impacts**

Air Pollutant	Avg. Period	Maximum Modeled Conc (µg/m <sup>3</sup> )	SIL (µg/m <sup>3</sup> )
SO <sub>2</sub>	Annual	0.15	1.0
	24 hour	3.97	5.0
	3 hour	24.91	25.0

It is important to note that since ambient concentrations vary with distance from each emission unit, the maximum value represents the highest value that may occur within the area. The concentrations at other locations within the area should be less than the value reported above.

**CONCLUSION**

The Department reviewed Pacific Energy’s modeling analysis for the fuel gas H<sub>2</sub>S limit revision project at the Osprey Platform and concluded the following:

1. The SO<sub>2</sub> emissions associated with operating the emission units at the Osprey Platform under the revised H<sub>2</sub>S limit will not cause or contribute to a violation of the SO<sub>2</sub> AAAQS listed in 18 AAC 50.010 or the SO<sub>2</sub> increment listed in 18 AAC 50.020.
2. Pacific Energy’s modeling analysis fully complies with the requirements of 18 AAC 50.540(k) (3).
3. Pacific Energy conducted their modeling analysis in a manner consistent with EPA’s *Guideline on Air Quality Models*.

The Department has revised the fuel gas H<sub>2</sub>S limit in the air quality control minor permit. This condition is summarized below:

1. Limit the fuel gas H<sub>2</sub>S concentration combusted in emission units at the Osprey Platform to 993 ppmv.