

2011 OCS Permits

Two seas, three drilling vessels, four air permits

August 3-4, 2011

Barrow, Alaska

Presentation Outline

- Present new air permitting projects
 - Permitting program background
 - Three projects
 - Analysis of projects
 - Air permits
- Describe next steps
 - Permit process/schedule
 - Opportunities to provide input*
 - Public comment periods
 - Public hearings

*this is why we are here

Background

- In 1990, Congress gave EPA the authority to regulate air pollution “sources” on the Outer Continental Shelf (OCS) similar to sources onshore – see Section 328 of the federal Clean Air Act
- 40 CFR 55 contains EPA’s implementing rules including the requirements for permitting exploration projects on the OCS
- The rules are slightly different between inner and outer OCS (25 miles from state seaward boundary 3 miles offshore)
- The inner program can be delegated to the state

Permit Programs

- Prevention of Significant Deterioration (PSD) permit
 - Preconstruction approval permit (federal only on OCS)
 - Applies to major sources (generally >250 tpy, except greenhouse gases and some source types)
 - Source must demonstrate compliance with National Ambient Air Quality Standards (NAAQS), increments and visibility requirements
 - Source must install Best Available Control Technology (BACT)

Permit Programs - continued

- Title V permit
 - Operating permit (federal and state on OCS)
 - Applies to major Title V sources (generally >100 tpy, except greenhouse gases and hazardous air pollutants)
 - Source must demonstrate compliance with NAAQS)
 - Permit compiles all applicable requirements
- ADEC minor source permit
 - Preconstruction approval permit (state only on OCS)
 - Applies to minor sources
 - Sources must demonstrate compliance with NAAQS

Important Note

- EPA's air permits do not provide authorization to drill; EPA's permits ensure compliance with air quality regulations only if and when drilling occurs
- The Bureau of Ocean Energy Management Regulation and Enforcement (BOEMRE) is the federal agency that provides authorization to drill
- Find out more about BOEMRE in Alaska at: <http://alaska.boemre.gov/>

Three Exploration Projects

Shell Discoverer	ConocoPhillips	Shell Kulluk
<ul style="list-style-type: none"> ● Drill ship & associated fleet ● Beaufort and Chukchi Seas ● 2 PSD permits ● 2012 Drilling season 	<ul style="list-style-type: none"> ● Jackup drill rig & associated fleet ● Chukchi Sea ● 1 Title V permit ● 2013 Drilling season 	<ul style="list-style-type: none"> ● Drill vessel & associated fleet ● Beaufort Sea ● 1 Title V permit (with mNSR) ● 2012 Drilling Season

Discoverer Drill Ship



Kulluk Drill Vessel



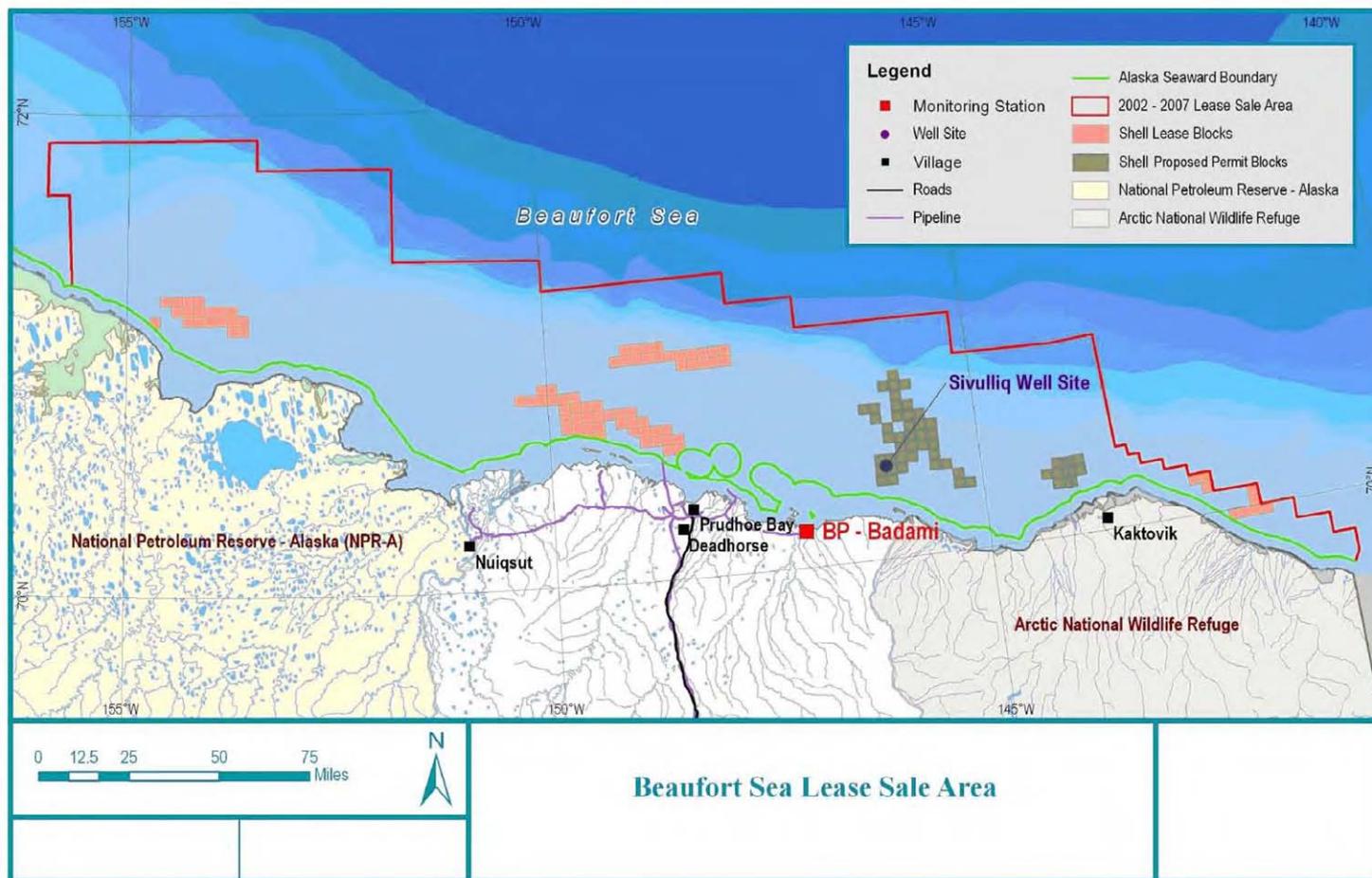
Associated Fleets

Shell Discoverer	ConocoPhillips	Shell Kulluk
<ul style="list-style-type: none"> ● Icebreakers ● Supply ships* ● Oil spill response fleet* ● Barge & tug* <p>* Varies depending on sea</p>	<ul style="list-style-type: none"> ● Icebreakers ● Supply vessels ● Oil spill response vessels ● Marine research vessel 	<ul style="list-style-type: none"> ● Icebreakers ● Resupply vessels ● Oil spill response vessels

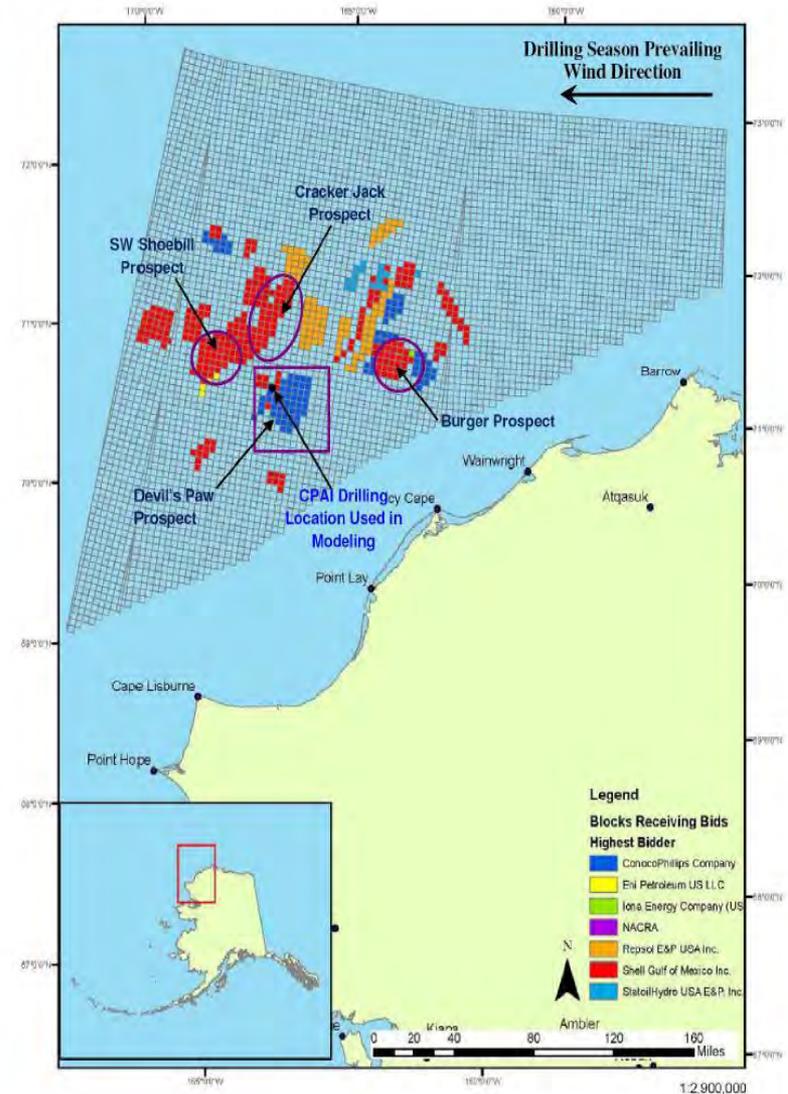
Typical Emission Units

- Diesel engines for:
 - Propulsion
 - Thrusters
 - Electricity generation
 - Compressors
 - Hydraulic power units
 - Cranes
 - Cementing units
 - Logging Winches
- Heaters & boilers
- Incinerators
- Fuel tanks
- Drilling mud systems & storage
- Gas diverter systems

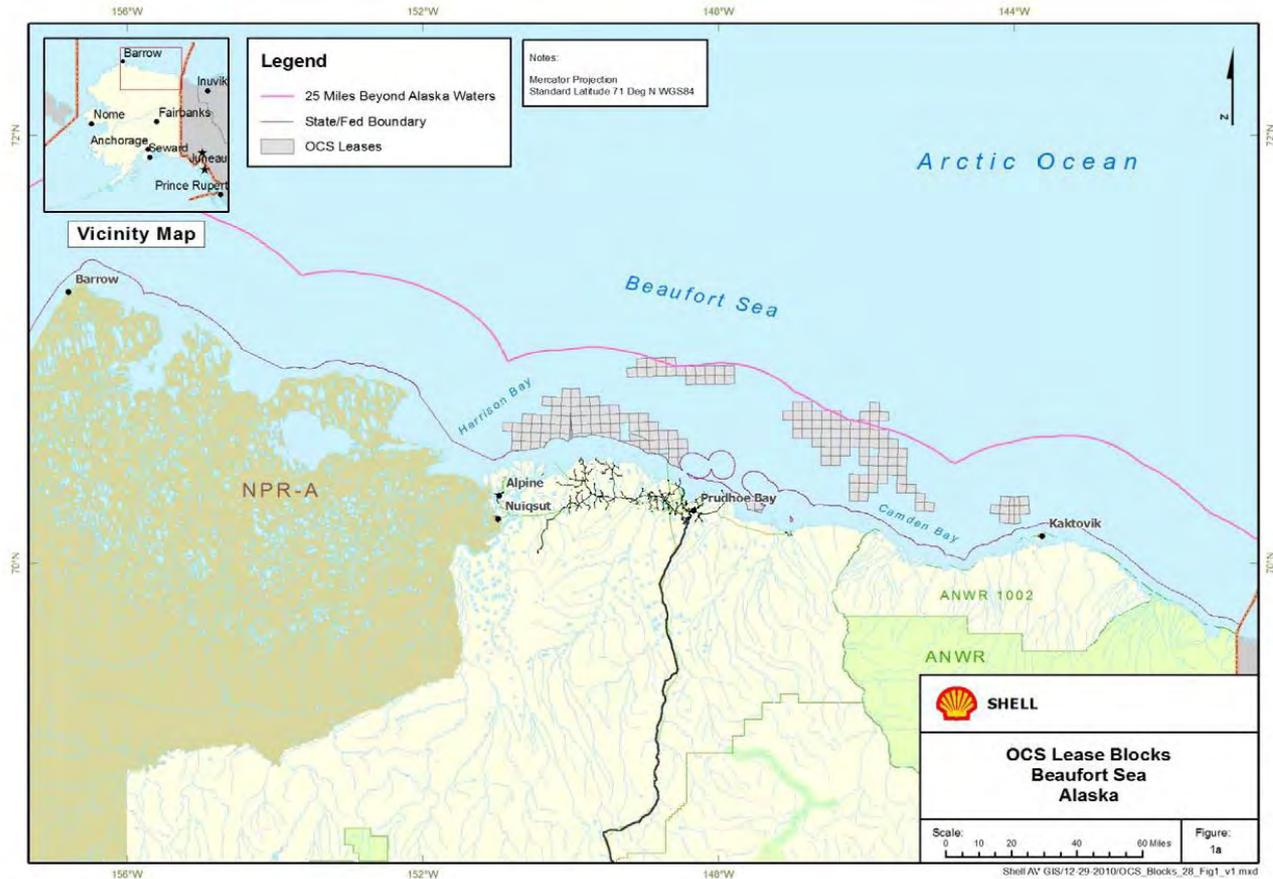
Map for Discoverer Leases



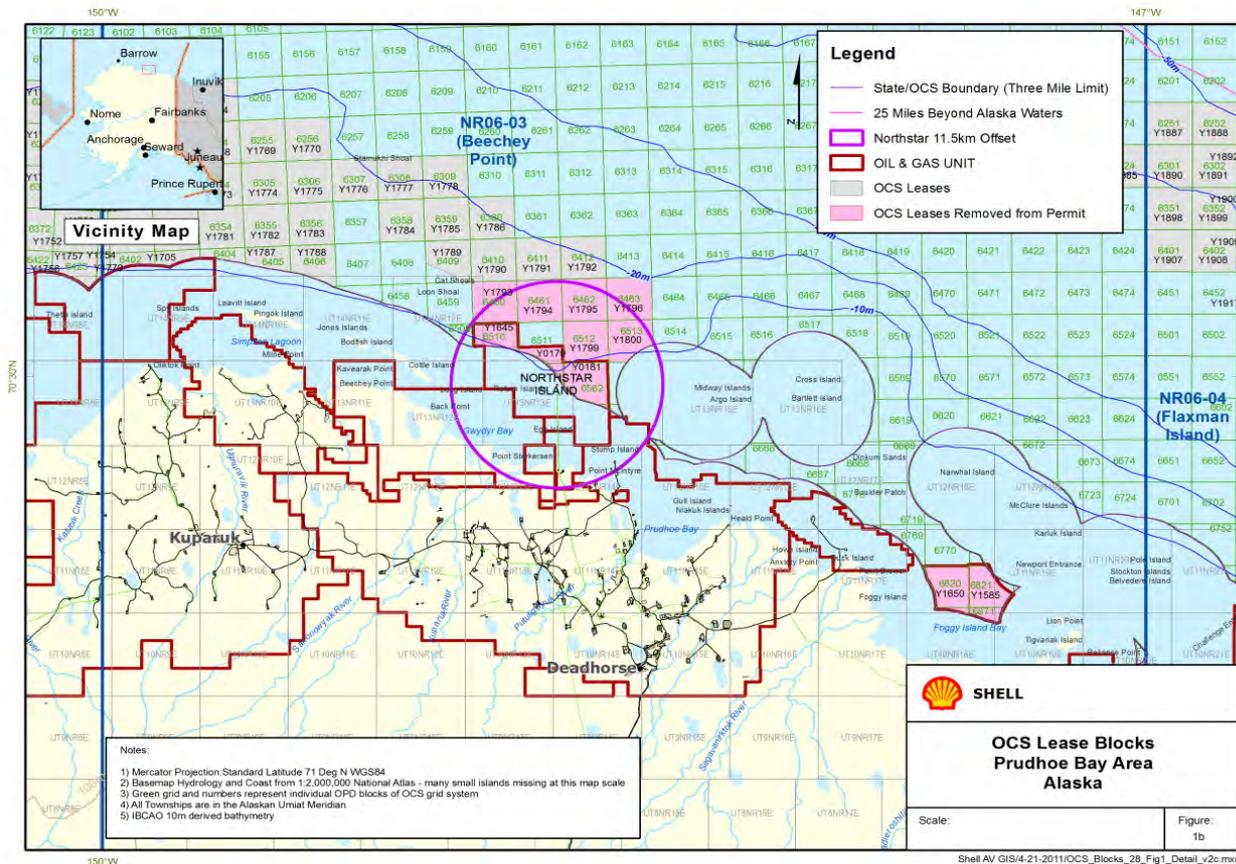
Map for ConocoPhillips Leases



Map for Kulluk Leases



Exceptions to Kulluk Leases



Project History - Discoverer

- Shell “Disco” drill ship
- 2 PSD permits
 - Chukchi Sea issued 3/31/10
 - Beaufort Sea issued 4/9/10
- Challenged; remanded to EPA Dec 30, 2010
- Remand clarification on 2/10/11 and 3/14/11
- Note: Frontier Discoverer » Noble Discoverer

Disco Remand

- Did not remand EPA's decisions that:
 - BACT does not apply to vessels in associated fleet
 - The “anchor handler” is not attached to and thus part of the Disco
 - PM and PM₁₀ can be addressed as PM_{2.5} in BACT
 - Emissions from spill response, propulsion engines and vessels >25 miles from the Disco do not have to be included in the ambient impact analysis
- Remanded for all other issues raised
- New petitions are limited to remand issues or issues that could not have been raised previously

Disco Remand - Specific Issues

- EPA decision regarding when the Disco becomes an “OCS source” was not supported by the record and inappropriately delegated the decision to Shell
- EPA’s environmental justice analysis should have addressed the new 1-hour NO₂ NAAQS
- EPA’s decision to not require secondary PM_{2.5} modeling was not supported by the record
- EPA should consider all new standards in re-issuing the permits, but can use discretion
- The sufficiency of preconstruction monitoring is within the scope of the general remand

Project History – The Other Two

- ConocoPhillips jackup rig
 - Applied Feb 2010 for Title V permit
 - Application complete April 2010
 - Additional information submitted
- Shell Kulluk drill vessel
 - Previous application withdrawn in 2009
 - Applied Feb 2011 for Title V and minor state permit
 - Application incomplete March 2011
 - Additional information submitted
 - Application complete July 2011

Project Analyses

- Application completeness – all the boxes checked and enough information to get started; request additional as needed
- Applicability – which permit/other programs apply
- Emissions – supports applicability and later analyses
- Applicable requirements (Title V)
- BACT (PSD)
- Ambient impacts
 - NAAQS
 - Increment & visibility (PSD)

Project Analyses - continued

- Setting limits and monitoring, recordkeeping and reporting requirements that assure compliance
- Environmental Justice
- Endangered Species Act
- Essential Fish Habitat of Magnuson-Stevens Act
- National Historical Preservation Act
- Coastal Zone Management
- Tribal Consultation
- National Environmental Policy Act

Permit Program Applicability

- Subject to PSD (major) if:
 - PTE>250 tpy for any PSD pollutant, or
 - PTE>100,000 tpy CO₂e, but
 - Can take “synthetic minor” limits to avoid PSD
- Subject to minor NSR (minor) if:
 - Not (PSD) major and other criteria
- Subject to Title V (major) if:
 - PTE>100 tpy
 - PTE>100,000 tpy CO₂e

PSD Major Sources

- If source is major for one pollutant, then subject to PSD for all pollutants > significant emission rate (SER)
- Disco example:
 - Major (>250 tpy) for CO and NO_x
 - Also subject to PSD (> SER) for PM, PM₁₀, PM_{2.5}, VOC
 - Created Synthetic minor limits for SO₂, H₂SO₄ and CO_{2e} (greenhouse gases)
 - Count emission from drill ship and all vessels within 25 miles of ship while ship is an “OCS source”

Ambient Impact Analyses

- Modeling Air Quality
- Emissions
- Modeling Approaches
 - Shell Discoverer
 - Shell Kulluk
 - ConocoPhillips
- Modeling Results
- Cumulative Analysis
- Summary

Modeling for Air Quality

- Attempt to characterize air pollution impacts
- NAAQS – National Ambient Air Quality Standards
 - Health based
- Modeling results compared with the NAAQS
- Modeled results less than the NAAQS are considered acceptable and protective of health
- EPA has guidelines for modeling
 - Appendix W
 - Applicants are required to follow modeling guidelines

NAAQS – National Ambient Air Quality Standards – Modeled Pollutants

Air Pollutant	Averaging Period	NAAQS ($\mu\text{g}/\text{m}^3$)
NO ₂	1-hour	188
	Annual	100
PM _{2.5}	24-hour	35
	Annual	15
PM ₁₀	24-hour	150
SO ₂	1-hour	196
	3-hour	1,300
	24-hour	365
	Annual	80
CO	1-hour	40,000
	8-hour	10,000

- Other NAAQS:
 - Ozone
 - 75 ppb (3yr 4th high 8-hour average)
 - NOx and VOC precursor pollutants
 - Lead
 - 0.15 $\mu\text{g}/\text{m}^3$ (3 month rolling average)
 - 1.5 $\mu\text{g}/\text{m}^3$ (Quarterly average)
 - ConocoPhillips modeled lead (0.031 $\mu\text{g}/\text{m}^3$)
 - Shell permits – emissions below significance so not modeled

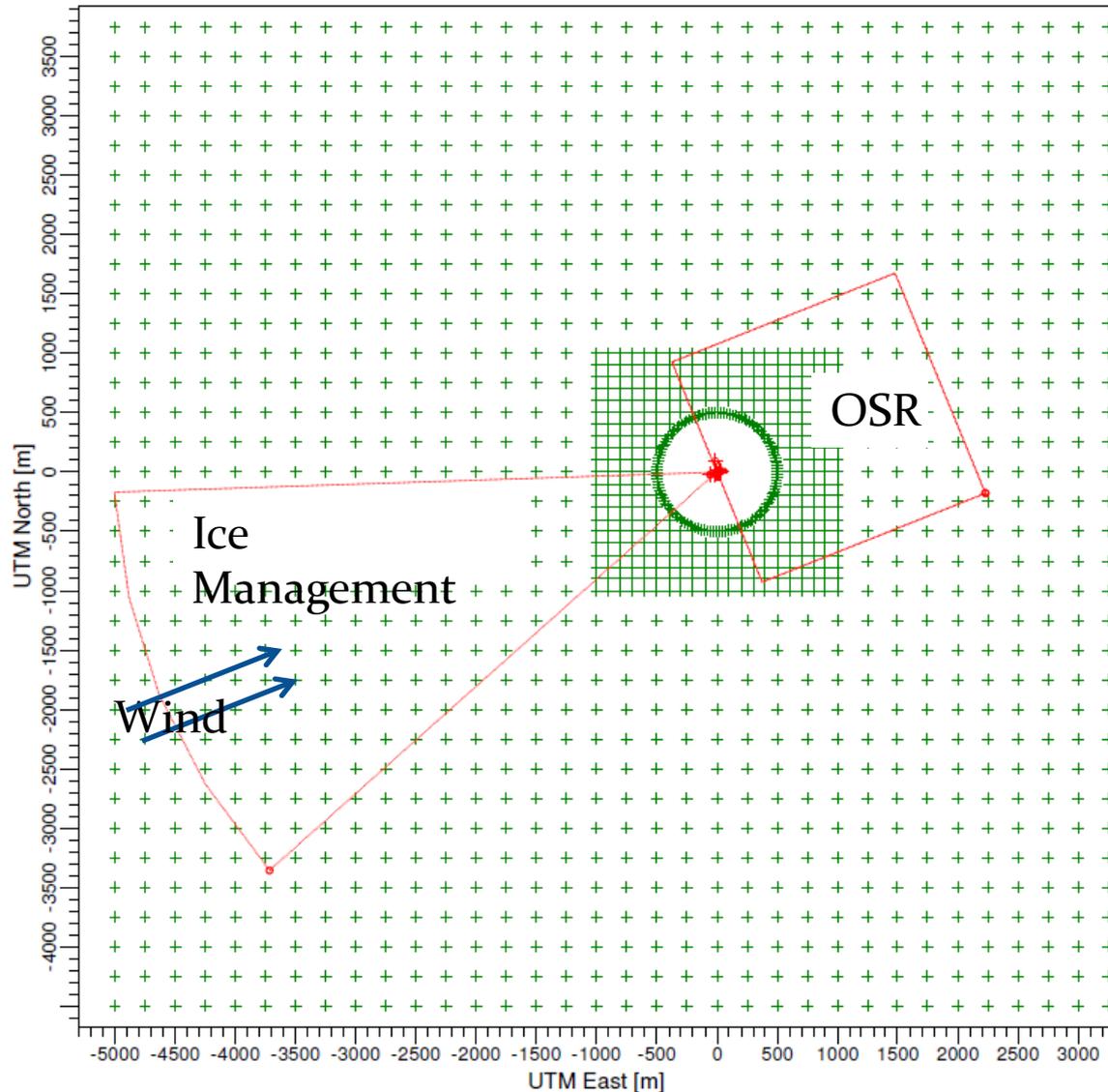
Emissions

- Discoverer – Beaufort and Chukchi Seas
 - Uses emissions sequencing (engines turn on and off)
 - 4 wells, 120 days as OCS source, 2 – 120 day periods modeled
- Kulluk – Beaufort Sea only
 - Uses emissions sequencing (engines turn on and off)
 - 4 wells, 120 days as OCS source, 2 – 120 day periods modeled
- ConocoPhillips – Chukchi Sea only
 - Uses worst case emissions for entire drilling period
 - Assumes entire drilling season as an OCS source (July 1 – Nov 30)
- Note emissions occurring while drilling vessel is not an OCS source are not permitted or modeled

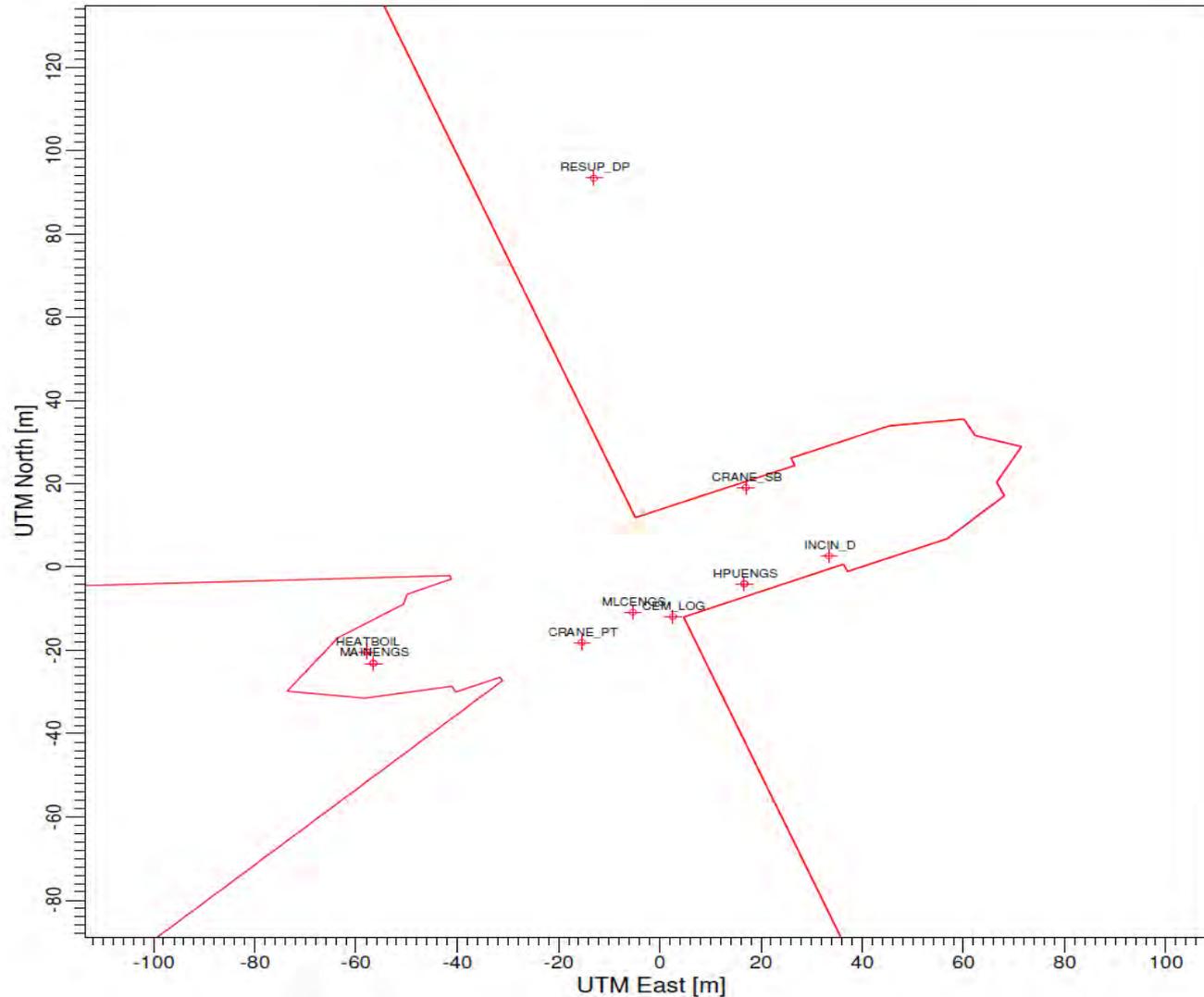
Shell Disco Modeling Approach

- Turret moored ship that turns into the wind
- Used AERMOD (with COARE during open H₂O)
 - COARE is a new approach
- Used a realistic sequencing of emission scenarios
- Used one well location for the entire drilling season
- Modeled using permitted emission rates
- Modeling includes support vessels (Ice Management, Oil Spill Response, Resupply)

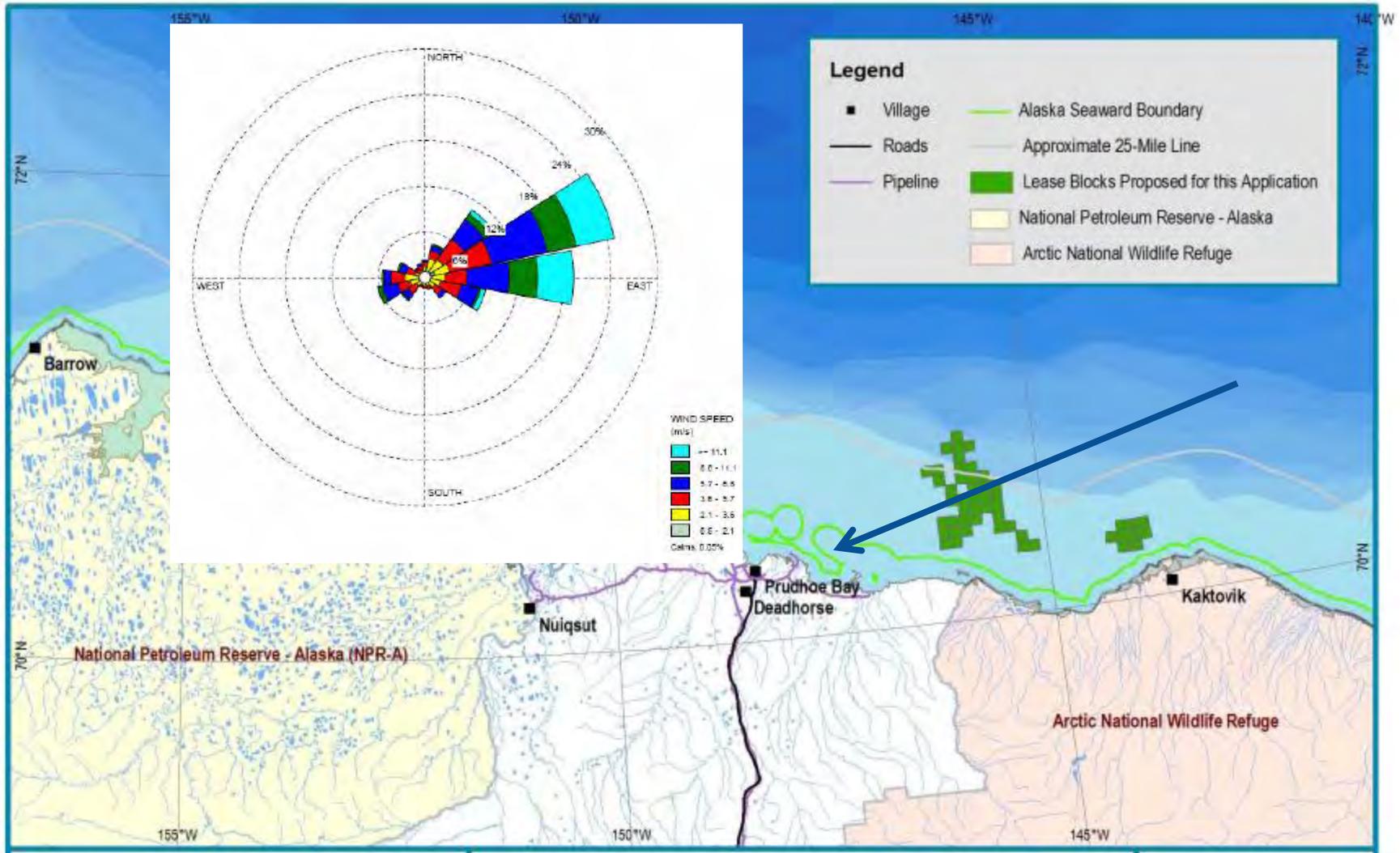
Modeling Setup - Disco

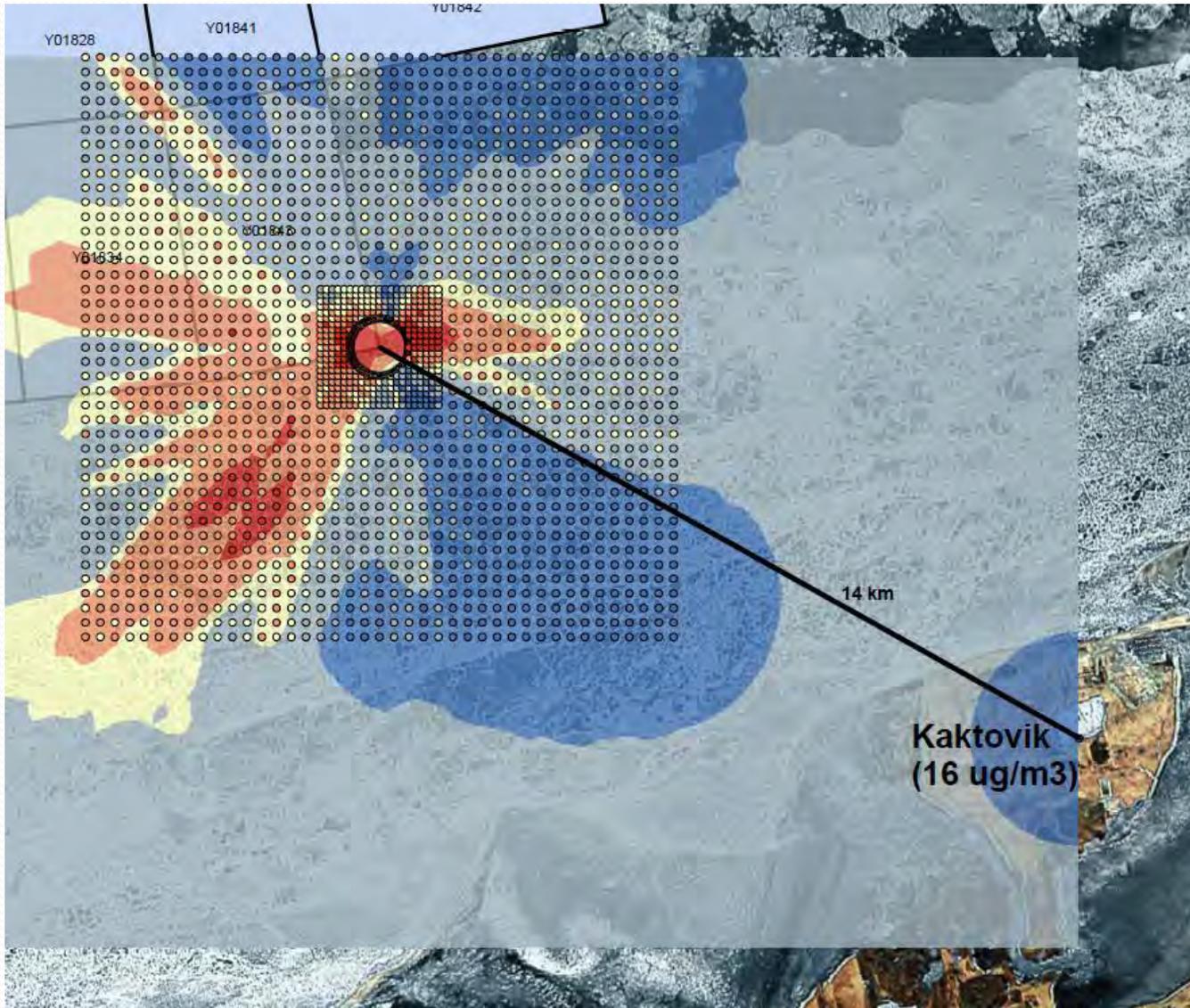


Shell Disco Emission Points



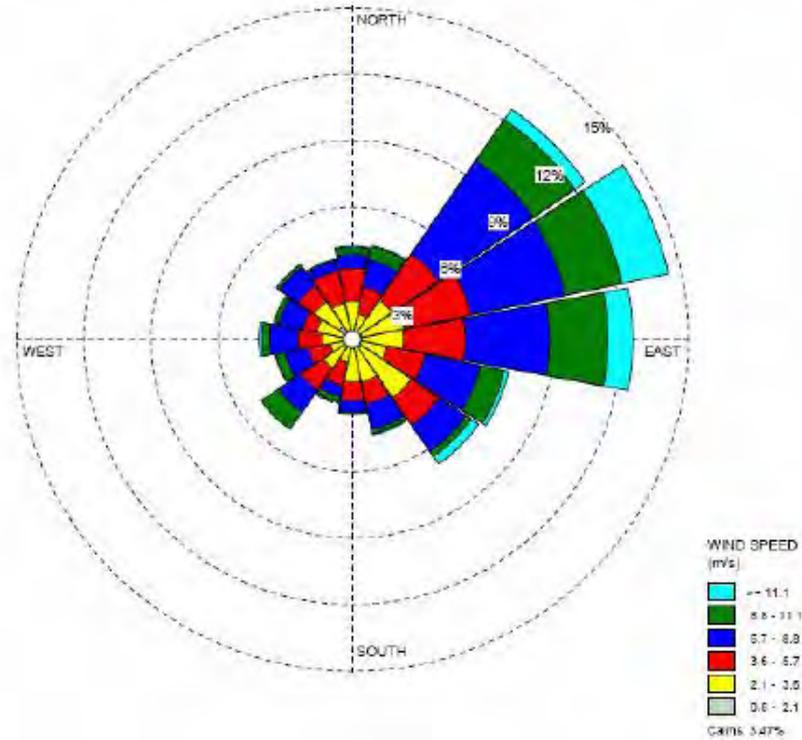
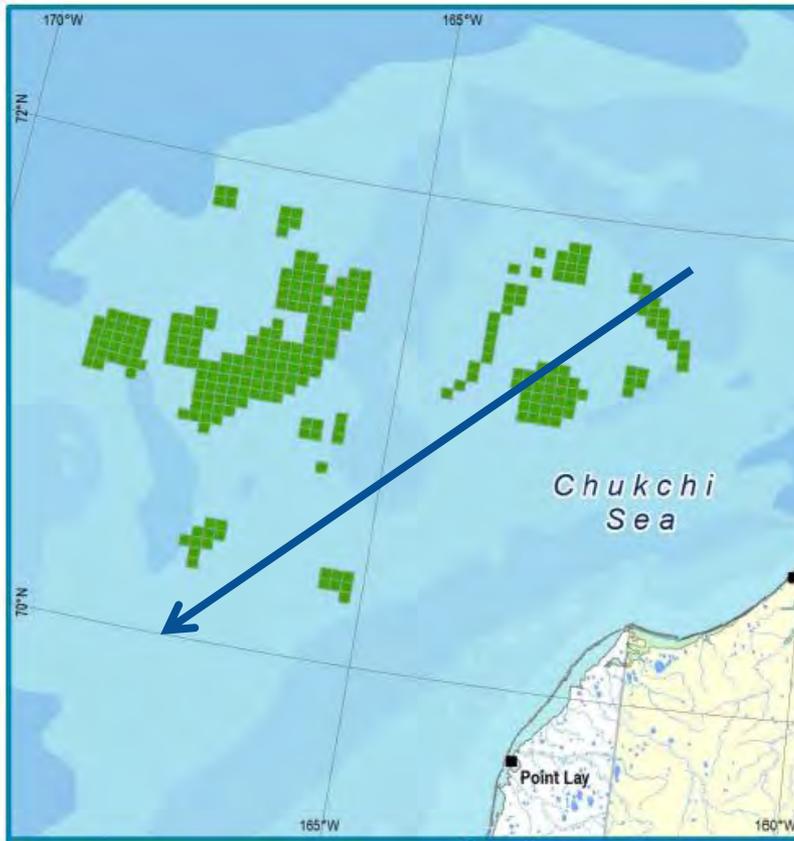
Beaufort Disco Drilling Locations and Meteorology

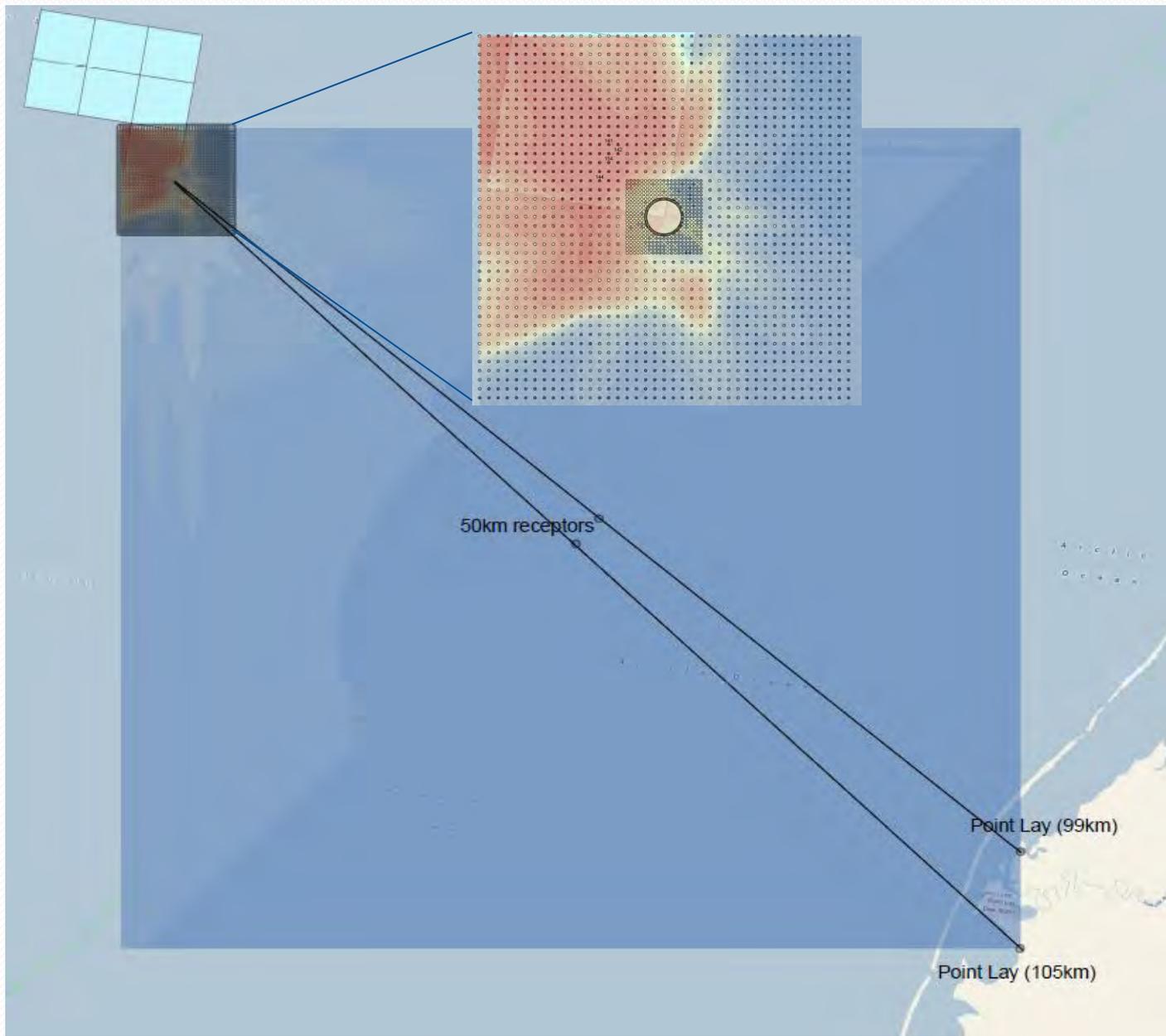




- Beaufort 1-hour NO₂ example modeling results
- Red indicates higher modeled concentrations
- NO₂ NAAQS is 188 ug/m³

Chukchi Disco Drilling Locations and Meteorology



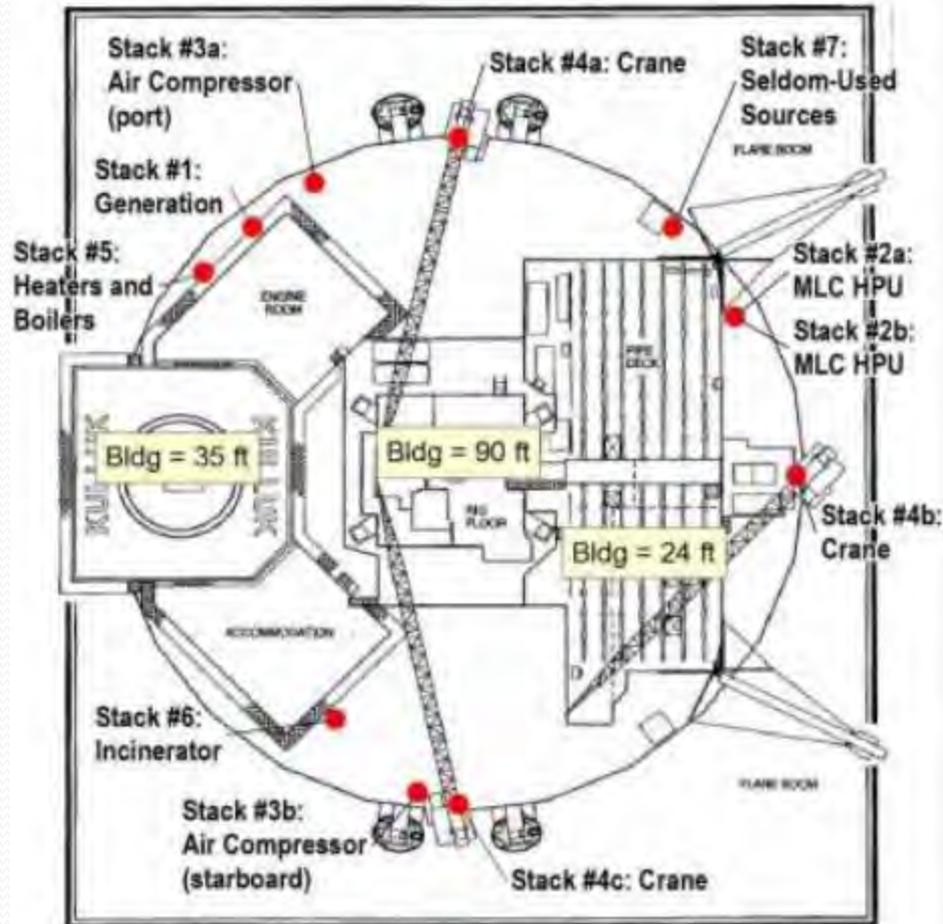


- Chukchi 1-hour NO₂ example modeling results
- Red indicates higher modeling concentrations (for the drilling season)

Shell Kulluk Modeling Approach

- Kulluk modeling approach is very similar to the Disco modeling approach
- Differences
 - Lease block locations
 - Background ambient monitors
 - Not a turret moored ship (no ship rotation into the wind)
 - Additional use of Ice management vessels expected in open water conditions

Shell Kulluk Emission Points



Conoco Phillips Modeling Approach

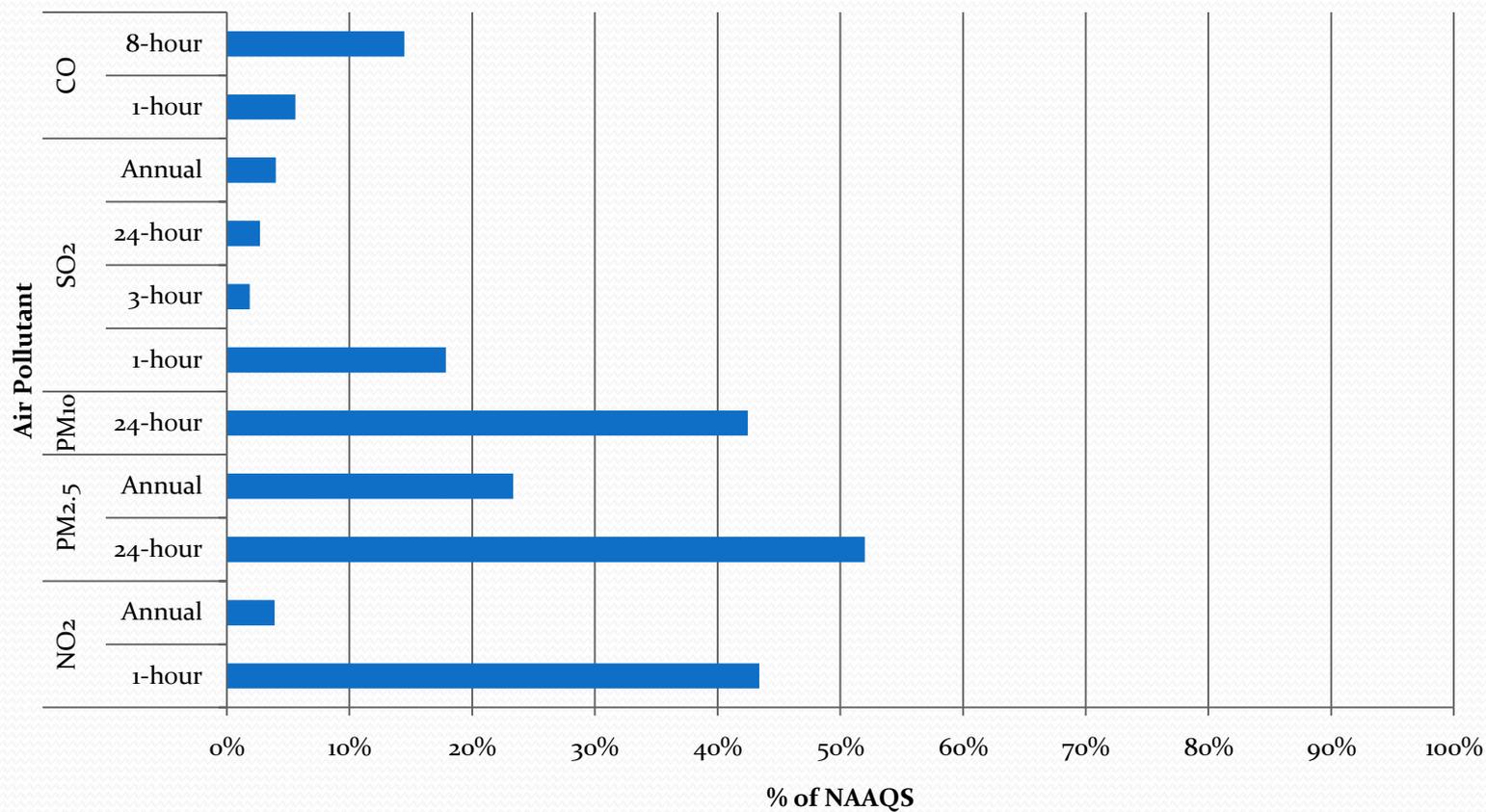
- Many differences from the Shell Disco and Kulluk modeling
 - Jackup drilling platform (rig)
 - Actual platform and support vessels yet to be identified
 - Used OCD vs. AERMOD for modeling
 - Different meteorology
 - Used worst case emissions scenarios
 - Different lease blocks but nearby other lease holders
 - Cumulative impact of additional nearby drilling may need further analysis
 - Modeling assumes drill season as an OCS source vs. 120 days in Shell modeling

Modeling Results – All 4 permits

- Maximum impacts nearby the drilling vessel/rig
- Onshore impacts from the drilling vessel/rig much lower than maximum impacts
- Results include background monitoring values
 - Background monitoring values can be a large portion of the overall maximum impact

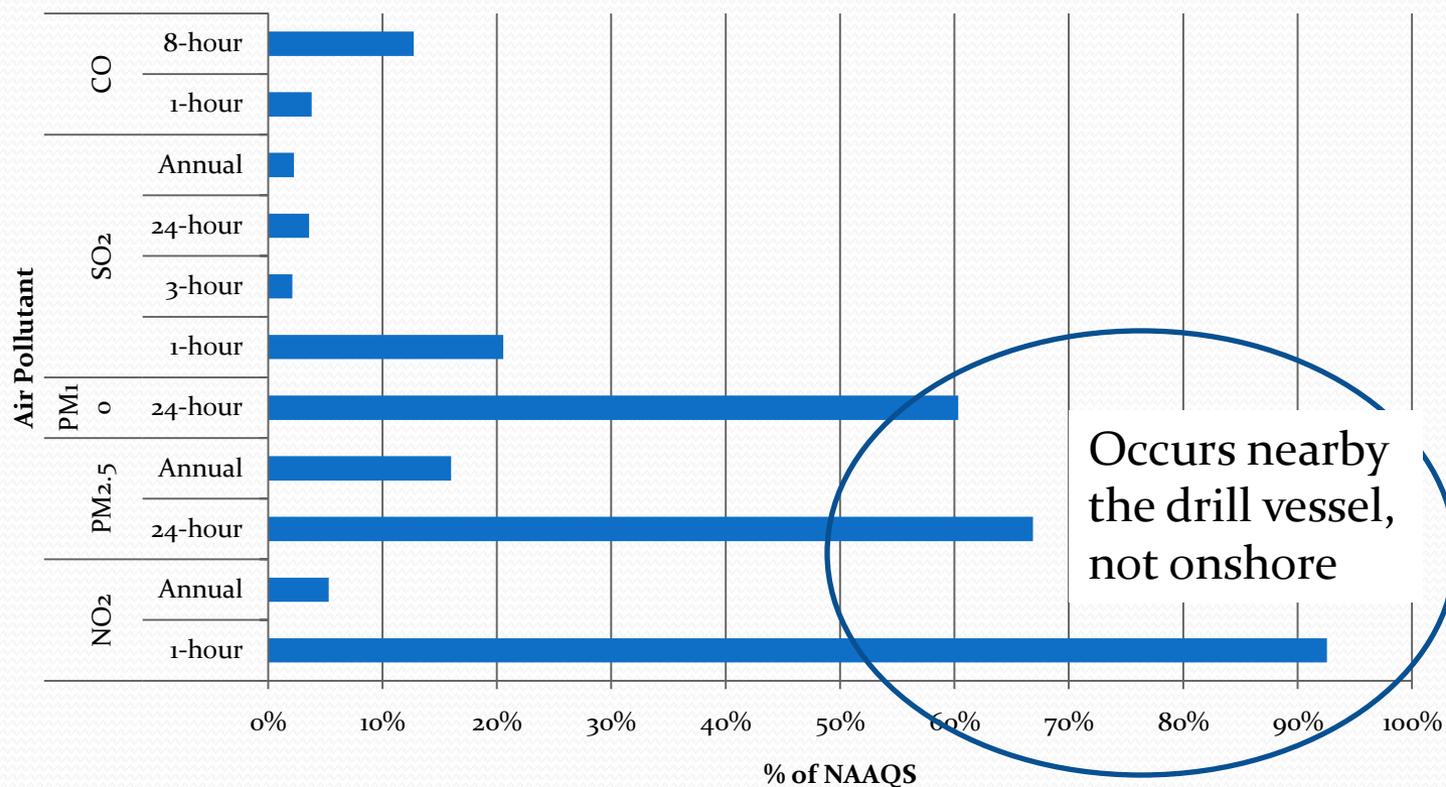
Modeled Impacts - Disco

Beaufort Sea - Shell Discoverer



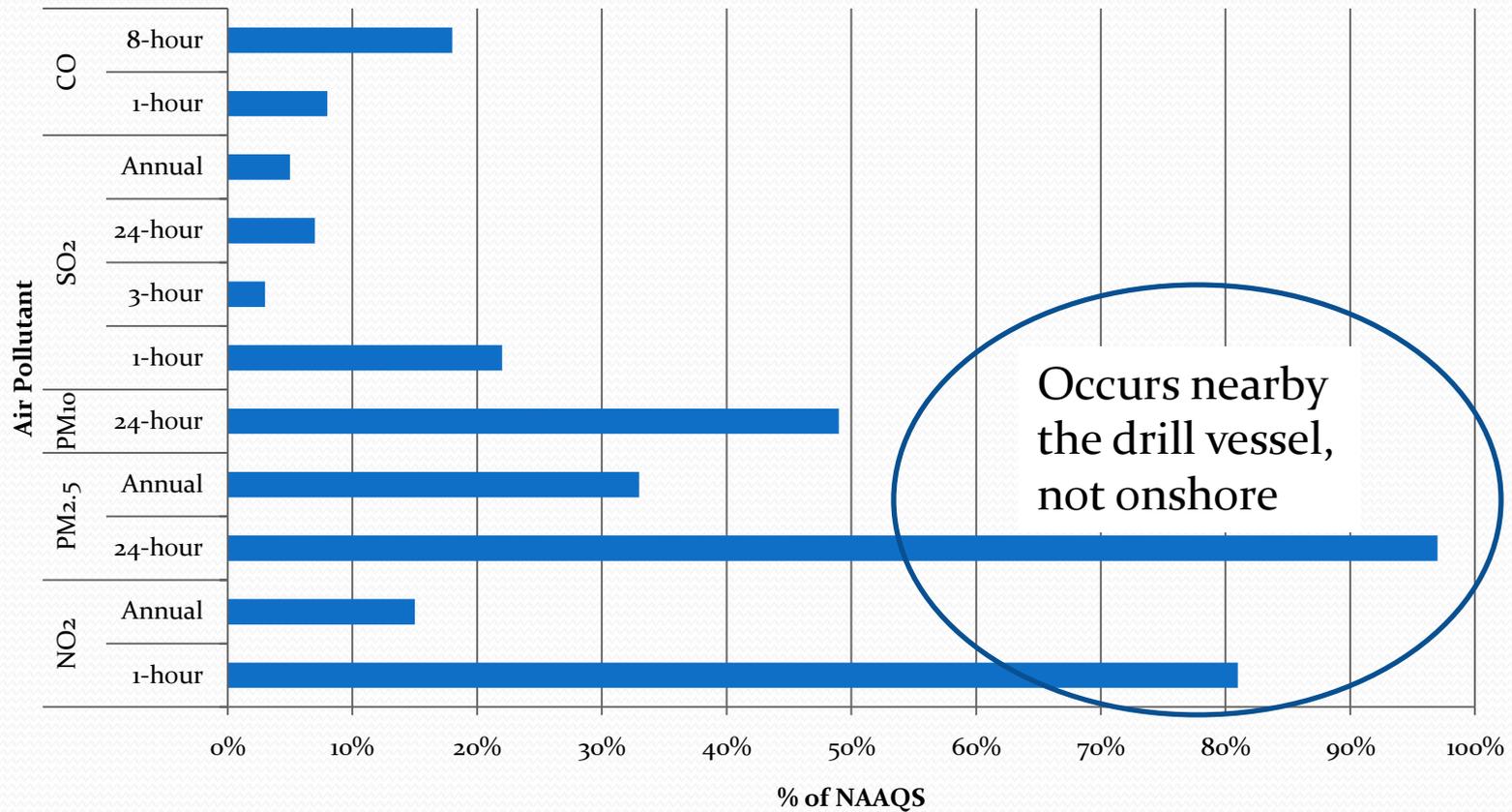
Modeled Impacts - Disco

Chukchi Sea – Shell Discoverer



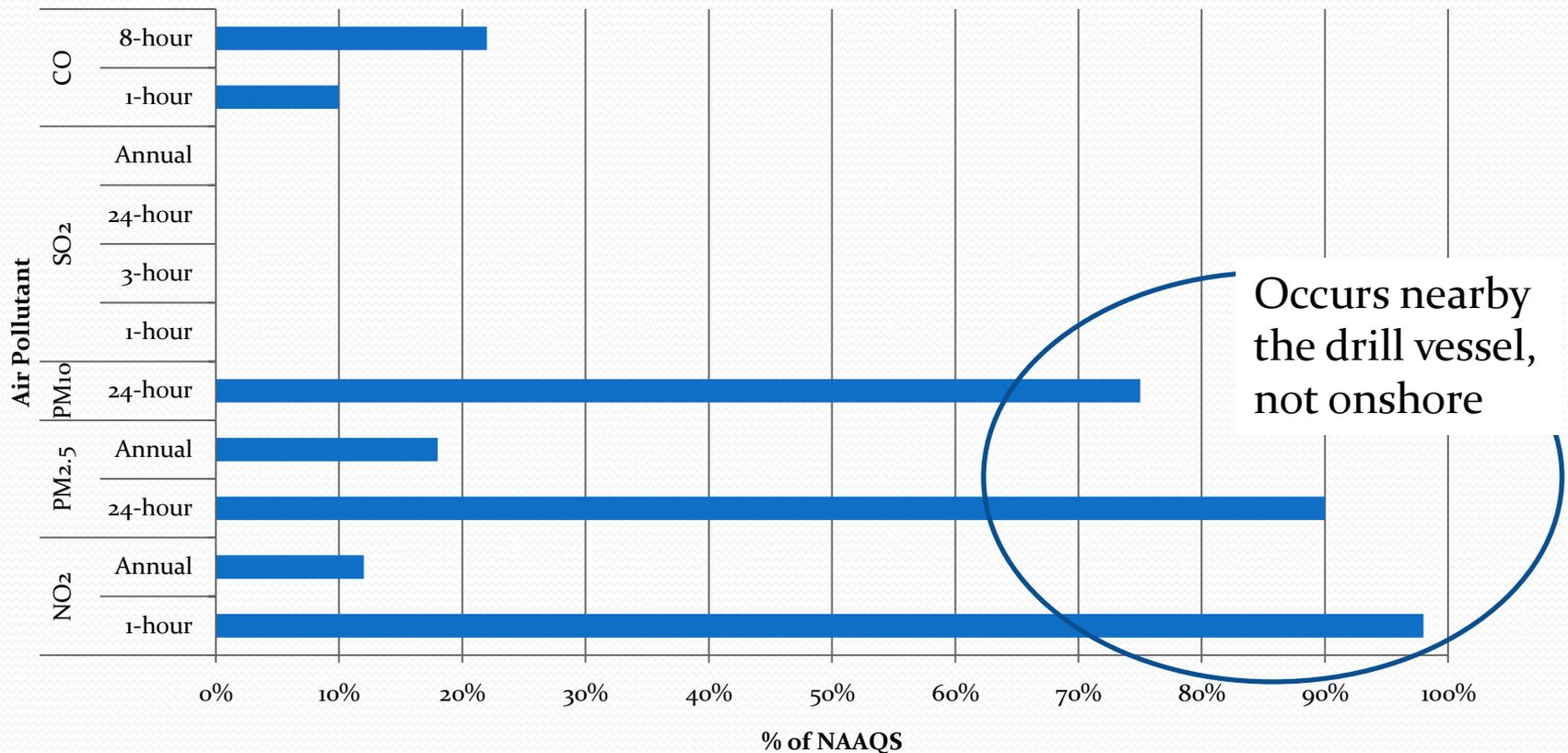
Modeled Impacts - Kulluk

Beaufort Sea - Shell Kulluk



Modeling Impacts - ConocoPhillips

Chukchi Sea - ConocoPhillips

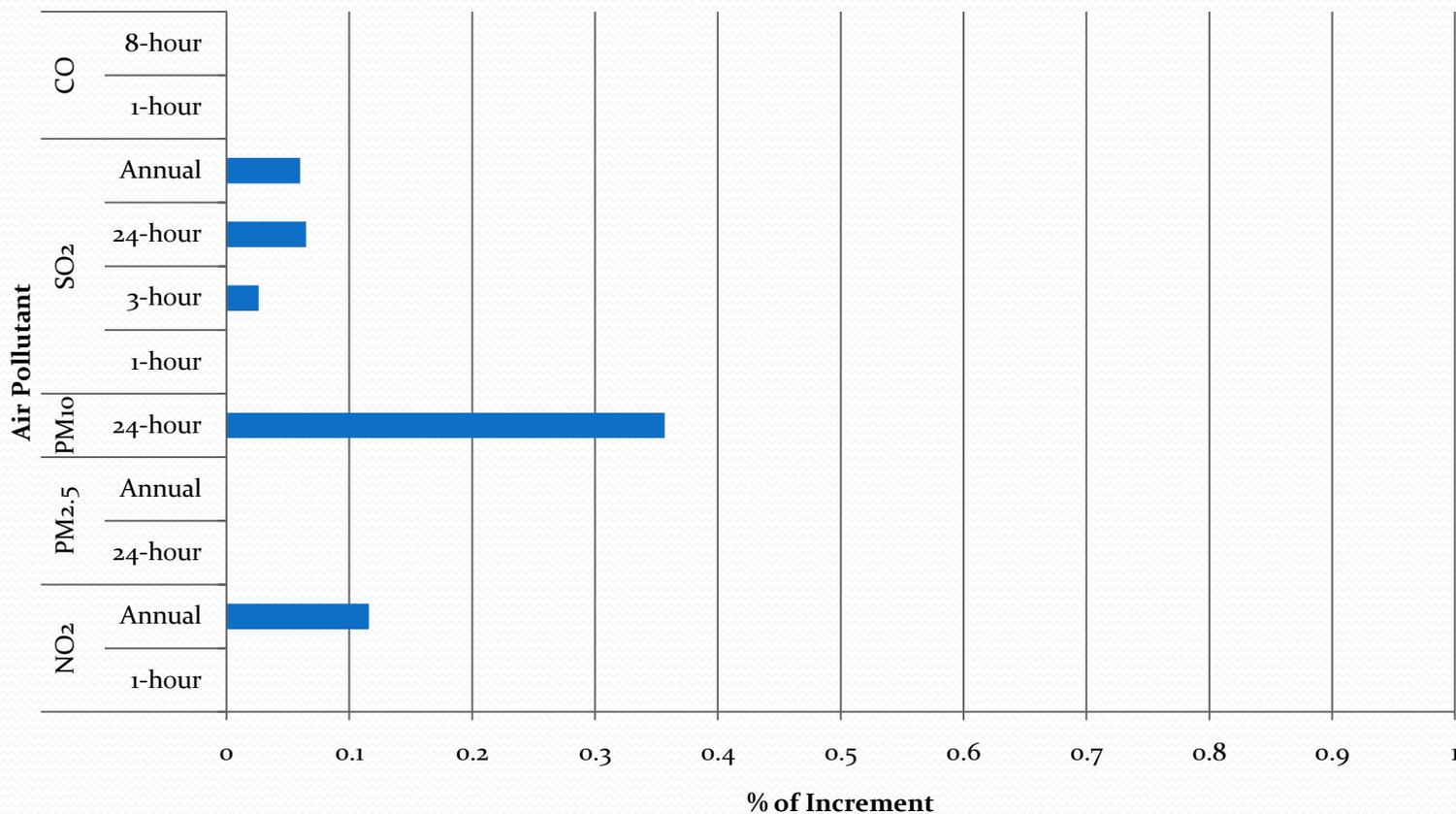


Occurs nearby the drill vessel, not onshore

SO₂ – results not included because < significant impact level

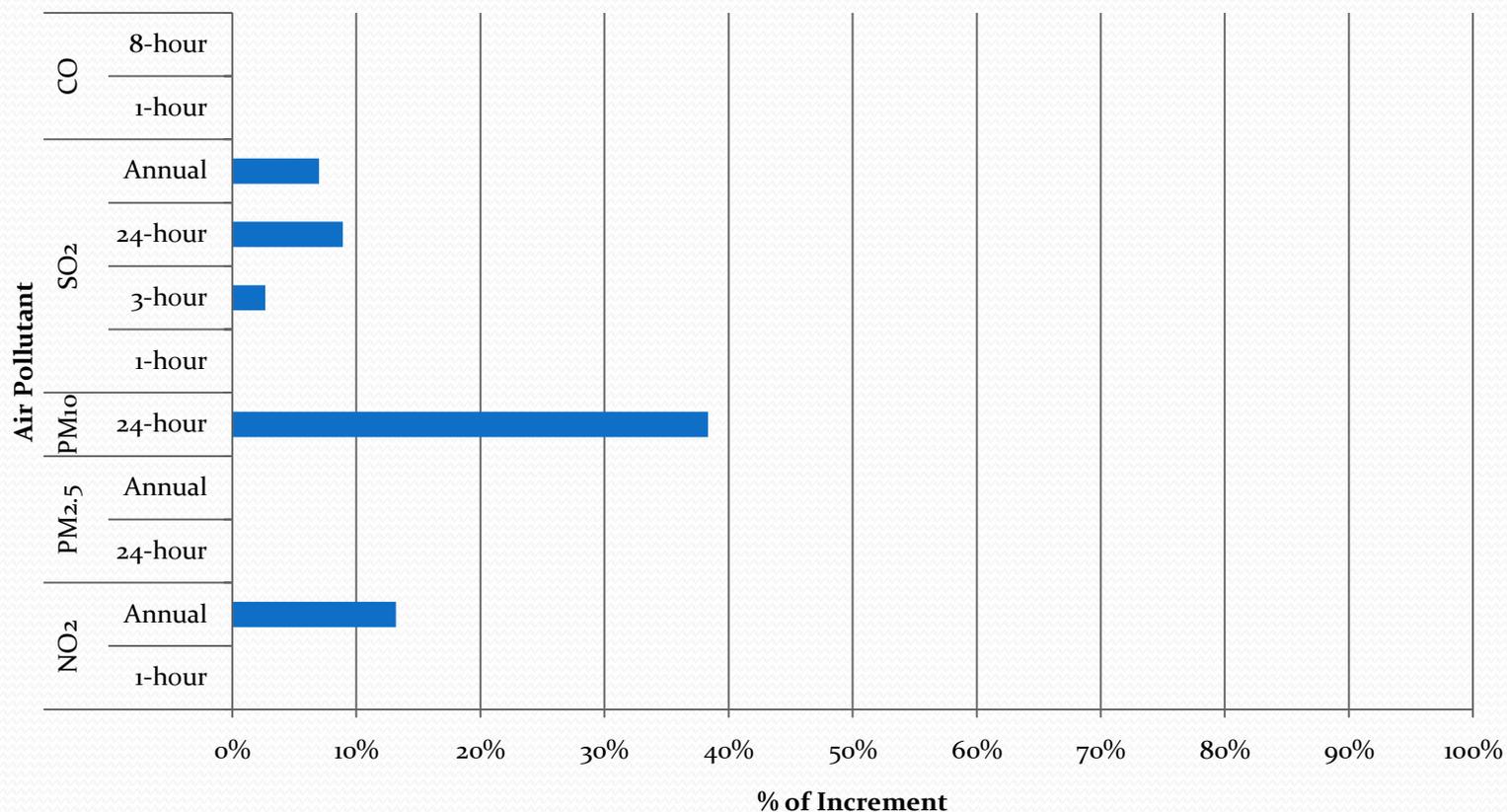
Modeled Impacts - Disco

Beaufort Sea - Shell Discoverer

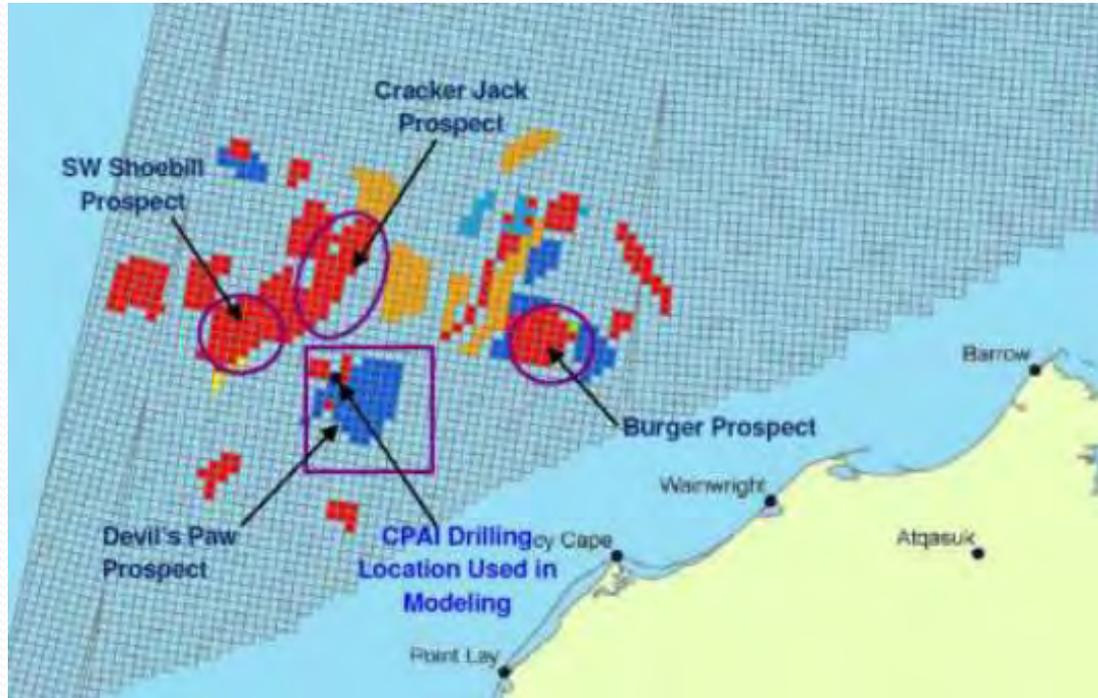


Modeled Impacts - Disco

Chukchi Sea - Shell Discoverer



Cumulative Ambient Analysis



- 7 different companies have lease blocks in Chukchi Sea
- Cumulative analysis will be required if drilling in same proximity occurs concurrently

Modeling Summary

- All 4 permit applications demonstrate compliance with the NAAQS
 - Shell permit applications – Use AERMOD-COARE
 - Conoco-Phillips - OCD
- Impacts greatest near the drilling vessel
- Minimal impacts onshore due to large distance between operations and villages

Permit Contents of Interest

- Disco Revisions:
 - Addressed remand issues
 - Added new limits and restrictions that resulted
 - Made other unrelated revisions
- ConocoPhillips & Kulluk:
 - Synthetic minor limits to avoid PSD
 - NAAQS-based emission and operational restrictions
 - Other federal applicable requirements
 - Corresponding onshore area requirements (Kulluk)
 - New permit layout

Disco Remand Responses

- A new OCS source definition was set: one anchor down
- A detailed supplemental EJ analysis focused on NAAQS; Shell modeled to show compliance with 1-hour NO₂ using a new modeling approach
- Shell also demonstrated compliance with PM₁₀ and PM_{2.5} considering secondary aerosols
- EPA is addressing all new standards since the remand: 1-hour NO₂ and SO₂ NAAQS and greenhouse gas permitting in re-issuing the permits
- EPA reviewed and considered ambient monitoring data that now available

Key Disco Permit Revisions

- New permit restrictions:
 - NO₂, PM₁₀, PM_{2.5} and GHG emission limits
 - Operational limits (duration, hours)
 - Additional control equipment required
 - A required Coast Guard-approved safety zone
- Some emission increases for some emission units
- Increased emissions from supply ship in “DP” mode
- Larger emergency generator with tighter restrictions
- Added seldom used sources with limits
- Some vessel position restrictions removed/replaced

Disco Revisions Reminder

- Any appeals of the Disco permits are limited to issues addressed by EPA in the 2011 revised permits and issues otherwise raised in the 2010 petitions but not addressed by EPA
- No new issues may be raised that could have been raised but were not raised in appeals of the 2010 permits
- Only the conditions of the 2011 Disco permits that are proposed for revision are open for public comment now

Framework for Permit Conditions

- All requirements need to be enforceable
- Generally applicable requirements show up in all permits and are normally enforceable on their own
- Requirements like emission limits often don't come with testing, monitoring, recordkeeping and reporting (or some combination), so "MRR" must be added to ensure the limit is enforceable
- Some emission limits, like NSPS or NESHAP, have MRR built in
- For others those requirements are created in the permit (gap-filling)

Layout of the C & K Permits

- Layout of ConocoPhillips and Kulluk permits:
 - Approval conditions
 - Generally applicable requirements
 - COA source-wide requirements (Kulluk)
 - Source-wide notifications
 - Source-wide emission limits & operational restrictions
 - Source-wide testing
 - Source-wide monitoring and recordkeeping
 - NESHAP & NSPS

Navigating the C & K Permits

- The layout of ConocoPhillips and Kulluk permits is more organized than the Disco
 - Limits
 - Testing
 - Monitoring and recordkeeping
- Exceptions are the “self-contained” requirements: COA requirements and NSPS & NESHAP
- This layout highlights our use of credible evidence
 - Any monitoring or records that reveal compliance issues can be relied upon

Navigating: Limits and Restrictions

- Layout of ConocoPhillips and Kulluk permits:
 - Approval conditions
 - Generally applicable requirements
 - COA source-wide requirements (Kulluk)
 - Source-wide notifications
 - Source-wide emission limits & operational restrictions
 - Source-wide testing
 - Source-wide monitoring and recordkeeping
 - NESHAP & NSPS

Navigating: Testing, Monitoring & Recordkeeping

- Layout of ConocoPhillips and Kulluk permits:
 - Approval conditions
 - Generally applicable requirements
 - COA source-wide requirements (Kulluk)
 - Source-wide notifications
 - Source-wide emission limits & operational restrictions
 - Source-wide testing
 - Source-wide monitoring and recordkeeping
 - NESHAP & NSPS

Navigating: Reporting

- Layout of ConocoPhillips and Kulluk permits:
 - Approval conditions
 - Generally applicable requirements
 - COA source-wide requirements (Kulluk)
 - Source-wide notifications
 - Source-wide emission limits & operational restrictions
 - Source-wide testing
 - Source-wide monitoring and recordkeeping
 - NESHAP & NSPS

Navigating: Self-Contained

- Layout of ConocoPhillips and Kulluk permits:
 - Approval conditions
 - Generally applicable requirements
 - COA source-wide requirements (Kulluk)
 - Source-wide notifications
 - Source-wide emission limits & operational restrictions
 - Source-wide testing
 - Source-wide monitoring and recordkeeping
 - NESHAP & NSPS

Approval Conditions

- Define OCS source & associated fleet
 - Floating drill vessels: one anchor down
 - Jackup rig: zero air gap
- In Kulluk, identified lease blocks on inner & outer OCS
 - Outer are subject to federal requirements and use Title V to create synthetic minor limits
 - Inner are subject to federal and COA requirements and use minor source permit to create “owner requested” limits (synthetic minor limits)

Generally Applicable Requirements

- Requirements that apply to all Title V sources
- A.5 Notifications to owners, operators, contractors
- A.8 Credible evidence and A.9 Inspection and entry
- A.6 Permit renewal
- A.10 Recordkeeping (5 years)
- A.11 Agency notifications and document certifications
- A.17 & A.18 Deviation & excess emission reporting
- A.19 Annual reporting
- Fees
- A.26 General test requirements – always apply

COA Source-Wide Requirements

- State requirements that apply to Kulluk leases on inner OCS and to specific types of emission units:
 - Fuel burning equipment
 - Diesel engines
 - Boilers and heaters
 - Liquid fuel-fired sources
 - Incinerators
- Visible emission limits
- Particulate matter limits
- Fuel sulfur and SO₂ limits

Source-Wide Notifications

- Drill site notification – where will they be
- Drilling season notification – when will they be there
- Seasonal notifications – which vessels and equipment
- NAAQS demonstration – to assure compliance with NAAQS if vessels, equipment or plans change somewhat
- Note that there is a lot of flexibility built into these permits

Source-Wide Emission Limits...

- A key section for assuring compliance with NAAQS & PSD:
 - Synthetic minor limits/restrictions
 - NAAQS-based limits/restrictions
 - Other operational restrictions:
duration/prohibitions/design/safety zone
 - Control equipment requirements
- We set limits etc and clarify how to determine compliance in this section; the testing, monitoring and recordkeeping that assure compliance is in other sections

Take the Kulluk Syn Minor Limits

- D.4 has the synthetic minor emission limits (tpy) that are calculation-based limits that rely on emission factors (initial & from tests), recorded operational data and calculations
- D.2 lists the initial emission factors to use while E.1-3 requires emission factor verification
- F.2 requires monitoring and recording of fuel use or hours of operation
- D.1 sets the frequency for actual calculations
- D.7-11 restrict emissions and require controls and “good” operation
- F.3-4 ensure the control devices are operating correctly

Take the Kulluk NAAQS Limits

- D.5-6 have the NAAQS-based emission limits and operational restrictions that rely on emission factors (initial & from tests), testing, recorded operational data and calculations
- D.2 lists the initial emission factors to use while E.1-3 requires emission factor verification
- D.3 limit operations (and emissions)
- F.1-2 require monitoring and recording of fuel use or hours of operation
- D.1 sets the frequency for actual calculations
- D.7-11 restrict emissions and require controls and “good” operation
- F.3-4 ensure the control devices are operating correctly

Source-Wide Monitoring...

- GPS is used to track of vessel locations because support vessel emissions are tracked when within 25 miles of the drill vessel and some vessels have location/time restrictions
- Tracking fuel usage, fuel sulfur content, hours of operation and incinerator operations are tracked to ensure compliance with several permit limits
- Control equipment monitoring is required to ensure good operation and actual emission reductions

NESHAP & NSPS

- Federal requirements that apply to engines (G.1-3) and boilers/heaters (G.4) of specific ages and sizes
- Self-contained requirements
- Where there is overlap or inconsistency with state or permit-created conditions, the most stringent requirement applies

Next Steps & Schedule

Task	Disco	Kulluk/ConocoPhillips
Start Public Comment	7/6	7/22
Pubic Info Meeting	8/3	8/3, 23, 24
ICAS G2G Meeting	8/4	8/4
Public Hearing	8/4	8/23, 24, 26
End Public Comment	8/5	9/6
Issue Permit	9/6	10/15
Appeal Deadline	10/6	11/15

Opportunities to Provide Input

- Public Comment Periods (mail, email, recordings):
 - Disco: 7/6 to 8/5
 - ConocoPhillips & Kulluk: 7/22 to 9/6
- Public Hearings (oral testimony):
 - Disco: 8/4 in Barrow & via call centers
 - Kulluk: 8/23 in Barrow & via call centers
 - ConocoPhillips: 8/24 in Barrow & via call centers
 - ConocoPhillips and Kulluk: 8/26 in Anchorage
- Public Meetings
 - All three projects: 8/3 and 8/4 in Barrow
 - ConocoPhillips and Kulluk: 8/23 & 8/24 in Barrow

Questions?