

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10  
SEATTLE, WASHINGTON**

**RESPONSE TO COMMENTS  
FOR  
OUTER CONTINENTAL SHELF  
PREVENTION OF SIGNIFICANT DETERIORATION  
PERMIT NO. R10OCS/PSD-AK-2010-01**

**SHELL OFFSHORE INC.  
FRONTIER DISCOVERER DRILLSHIP  
BEAUFORT SEA EXPLORATION DRILLING PROGRAM**

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## Abbreviations and Acronyms

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
ANWR	Arctic National Wildlife Refuge
AS	Alaska Statute
BACT	Best Available Control Technology
BO	Biological Opinion
BP	British Petroleum
BPIPPRM	Building Profile Input Program for Prime
CAA	Clean Air Act
CBD	Center for Biological Diversity
CDPF	Catalytic Diesel Particulate Filter
C.F.R.	Code of Federal Regulations
CO	Carbon Monoxide
CO <sub>2</sub>	Carbon Dioxide
COA	Corresponding Onshore Area
CPAI	ConocoPhillips Alaska Inc.
Discoverer	Frontier Discoverer Drillship
EA	Environmental Assessment
EAB	Environmental Appeals Board
EIS	Environmental Impact Statement
EPA	United States Environmental Protection Agency
FEM	Federal Equivalent Method
FONSI	Finding of No Significant Impact
FRM	Federal Reference Monitor
FWS	U.S. Fish and Wildlife Services
GHG	Greenhouse Gases
HAP	Hazardous Air Pollutants
H <sub>2</sub> SO <sub>4</sub>	Sulfuric Acid Mist
IC	Internal Combustion
ICAS	Iñupiat Community of the Arctic Slope
km	Kilometers
kW-h	KiloWatts Hour
LOA	Letter of Authorization

µg/m <sup>3</sup> .....	Microgram per Cubic Meter
MMS .....	Minerals Management Service
NAAQS .....	National Ambient Air Quality Standards
NEPA .....	National Environmental Policy Act
NMFS.....	National Oceanic and Atmospheric Administration National Marine Fisheries Service
NOAA.....	National Oceanic and Atmospheric Administration
NO <sub>2</sub> .....	Nitrogen Dioxide
NO <sub>x</sub> .....	Oxides of Nitrogen
NPS .....	National Parks Service
NSB .....	North Slope Borough
NSPS .....	New Source Performance Standards
NSR .....	New Source Review
OCD.....	Offshore and Costal Dispersion
OCS.....	Outer Continental Shelf
OCSLA.....	Outer Continental Shelf Lands Act
PM .....	Particulate Matter
PM <sub>2.5</sub> .....	PM with an Aerodynamic Diameter less than 2.5 Microns
PM <sub>10</sub> .....	PM with an Aerodynamic Diameter less than 10 Microns
ppm.....	Parts Per Million
PQAO .....	Primary Quality Assurance Organization
PSD .....	Prevention of Significant Deterioration
QAPP .....	Quality Assurance Project Plans
REDOIL .....	Resisting Environmental Destruction on Indigenous Lands
SCR .....	Selective Catalytic Reduction
Shell.....	Shell Offshore Inc. and Shell Gulf of Mexico Inc.
SILS .....	Significant Impact Levels
SLAMS.....	State and Local Air Monitoring Sites
SMC.....	Significant Monitoring Concentration
SO <sub>2</sub> .....	Sulfur Dioxide
The Services.....	Collectively the National Oceanic and Atmospheric Administration Fisheries and/or the U.S. Fish and Wildlife Service
tpy.....	Tons per Year
ULSF.....	Ultra Low Sulfur Fuel
VOC.....	Volatile Organic Compound

## I. INTRODUCTION

Shell Offshore Inc. and Shell Gulf of Mexico (collectively referred to as “Shell”) Shell have applied for two CAA (“Clean Air Act”) Outer Continental Shelf/Prevention of Significant Deterioration (“OCS/PSD”) major source permits for air emissions related to operations using the Frontier Discoverer drillship (“Discoverer”) and a number of support vessels which are collectively referred to as the “Associated Fleet” for a multi-year exploratory oil and gas drilling program. One permit will cover all of Shell’s current lease holdings on the OCS of the Chukchi Sea, and a separate permit will cover all of Shell’s current lease holdings for the Beaufort Sea. Under Environmental Protection Agency (“EPA”) air quality regulations, 40 Code of Federal Regulations (“C.F.R.”) Part 55, an OCS source that is a major stationary source and which proposes to locate on the OCS is required to obtain a Prevention of Significant Deterioration (“PSD”) permit pursuant to the requirements of 40 C.F.R. § 52.21 before beginning construction.

In accordance with 40 C.F.R. Part 124, EPA published notice of a proposed OCS/PSD permit on February 17, 2010 with a public comment period running from February 17, 2010 through March 22, 2010. Informational meetings and public hearings were held in Barrow, Kaktovik and Nuiqsut, Alaska on March 16, 17 and 18, 2010 respectively.

EPA received written comments on the proposed permit from Shell (the applicant); the Alaska Eskimo Whaling Commission, the Inupiat Community of the Arctic Slope, and the North Slope Borough (“NSB”) in a combined comment letter (collectively, the “North Slope commenters”); the Ukpeagvik Inupiat Corporation; the Northwest Arctic Borough; Alaska Wilderness League, Audubon Alaska, Center for Biological Diversity, Earthjustice, Natural Resources Defense Council, Northern Alaska Environmental Center, Ocean Conservancy, Oceana, Sierra Club, Pacific Environment, Resisting Environmental Destruction on Indigenous Lands (“REDOIL”) and World Wildlife Fund in a combined comment letter (collectively, the “Conservation commenters”); the Center for Biological Diversity (“CBD”) in a separate comment letter; the Native Village of Point Hope; the City of Nuiqsut; the U.S. Minerals Management Service (“MMS”); Conoco-Phillips Alaska, Inc. (“CPAI”); the Alaska Department of Environmental Conservation (“ADEC”), Anadarko Petroleum Company; Statoil USA E & P Inc.; and some individual commenters.

In addition to receiving written comments, EPA received numerous comments on this proposed permit decision as oral testimony during the public hearings held in Kaktovik, Nuiqsut and Barrow, Alaska on March 16, 17 and 18, 2010 respectively. This testimony was transcribed and has been included in the permit record.<sup>1</sup>

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<sup>1</sup> The transcripts from public hearings, written comments submitted on the proposed permit, and selected other documents in the permit record can be found online at: <http://yosemite.epa.gov/R10/airpage.nsf/Permits/chukchiap>

This Response to Comments document summarizes the written and oral comments received by the EPA regarding this proposed permit decision. After EPA's careful review and consideration, responses to these comments are presented herein.

EPA recently finalized the permit for operations in the Chukchi Sea Permit, No. R10OCS/PSD-AK-09-01. Many of the commenters submitted comments on the proposed Beaufort permit that repeated the comments they previously made on the proposed Chukchi permit. In some cases the commenters specifically incorporated their prior comments on the Chukchi permit. Therefore, for consistency purposes and to reduce repetition and duplication, the Chukchi Response to Comments is incorporated by reference into this response to comments document. Generally if the same comment was made for both permits, the comment and response to it is not repeated in this document. Therefore, to the extent similar comments were also submitted on the proposed Chukchi permit the commenter should also refer to the Chukchi permit Response to Comments for the agency response to the comments and where the Chukchi Response references the Chukchi Statement of Basis the comparable section in the Beaufort Statement of Basis may be referred to.

## **II. RESPONSE TO COMMENTS**

### **A. CATEGORY – COMMENTS OF GENERAL SUPPORT**

**Comment:** EPA received a number of comments in general support of this permit. The comments were similar to the comments of general support received on the Chukchi permit. The Ukpeagvik Native Corporation commented that the greatest opportunity to keep Alaska's economy strong, providing employment to the residents of Barrow, rural villages, Alaska, as well as other citizens across the United States, lies in the culturally sensitive and environmentally responsible exploration and development of Alaska's federal OCS oil and gas leases.

**Response:** EPA is proceeding with issuance of the final permit. See the Chukchi Response to Comments Category A (Comments of General Support) for the agency response to this category of comments.

### **B. CATEGORY – COMMENTS OF GENERAL OPPOSITION**

**Comment** Similar to the comments received on the proposed Chukchi permit, a number of commenters were generally opposed to the issuance of the Beaufort permit. Additionally, numerous people at the public hearings commented that they were opposed to offshore drilling. A commenter stated that the proposal to conduct oil and gas exploration in the Beaufort and Chukchi Seas and the increasing industrialization of the Arctic threatens the Inupiat health and culture. Commenters also state that consideration of exploration drilling in the Arctic Ocean at this time is inappropriate because so little is known about the regional environment and climate change is affecting the Arctic so rapidly. Such uncertainty demands further research before the federal government makes decisions that could irreversibly push the Arctic down the road of environmental degradation. The commenters indicated that EPA should cooperate with other agencies to produce a comprehensive, multi-agency environmental impact statement ("EIS") that analyzes the potentially significant effects of Shell's proposed operations in the Beaufort and Chukchi seas before permitting the activity. If implemented, Shell's drilling program would constitute a massive industrial undertaking. It would involve drilling operations not only in the Beaufort Sea, but also in the Chukchi Sea. It would involve a 514-foot long drillship and armada of icebreakers and other support ships and aircraft traveling to and through the Arctic Ocean and Bering Sea, generating industrial noise in the water, running the risk of a large oil spill, and emitting tons of pollutants into the air and thousands of barrels of waste into the water.

**Response:** After full consideration of the concerns expressed and the requests to deny the permit, EPA is proceeding with issuance of the permit allowing Shell

to conduct exploratory drilling in the specified lease blocks in the Beaufort Sea because the permit complies with all applicable laws and regulations.

See also Chukchi Response to Comments Category B. In response to comments regarding coordination with other agencies see Category KK below and the Chukchi Response to Comments KK (NEPA) for a more detailed response.

**Comment:** A commenter states that the permit must be limited to the lease Blocks which Shell will seek authorization to operate under Outer Continental Shelf Lands Act (“OCSLA”). Shell’s permit applications and the draft OCS permits issued by EPA are not subject to any specific well sites or time restraints. Commenter points out that the Beaufort permit covers 53 lease blocks in lease sales 195 and 202. In the Beaufort, “Shell proposes to drill two exploration wells on these leases during the July-October 2010 open-water drilling season, one on each of two distinct oil and gas prospects. The total number of wells that would be drilled in 2010 would depend on ice and weather conditions.”

The commenter states that not including more specific terms in the draft Permits is unlawful. The language in CAA Section 328 specifically limits the definition of “OCS sources” to pollutant-emitting equipment in the OCS that is “authorized” under OCSLA. OCSLA in turn requires lessees to identify the particular well sites in which it is seeking authorization to operate. Therefore, Shell’s OCS PSD permits must be limited to the specific well sites that Shell delineates in its exploration plans. Commenter asserts that the CAA does not provide the authority to issue a permit for exploration activities beyond those that Shell is seeking authorization for under OCSLA. We request that EPA require OCS PSD permit applicants to submit the specific well blocks for which they will seek authorization to operate under OCSLA in their applications to EPA.

The commenter contends that complying with this limitation in the CAA is essential in light of the regulation of carbon dioxide (“CO<sub>2</sub>”), new nitrogen dioxide (“NO<sub>2</sub>”) national ambient air quality standards (“NAAQS”), and new particulate matter with an aerodynamic diameter less than 2.5 microns (“PM<sub>2.5</sub>”) increments that are discussed above. Emissions of all of these pollutants are about to be subject to very different controls all during the course of Shell’s proposed operations this summer. For example, if Shell’s OCS PSD permits are issued before the greenhouse gas (“GHG”) emission rule is finalized, Shell may escape carbon regulation indefinitely as it pursues its off-shore drilling plans in the Arctic under its current leases. In light of EPA's recent endangerment finding and the acute effects of climate change in the Arctic, EPA should recognize that Shell is intending to conduct a multi-year exploration plan that will include operations well after EPA has promulgated GHG

emissions limitations throughout the country. As a result, it is critical that EPA ensure that any future operations in which Shell wishes to engage will be subject to current CAA requirements instead of those in place for this permit.

**Response:** The comment requesting that Shell submit the specific lease blocks for which they seek authorization to drill is misplaced. As the comment itself points out Shell is seeking authorization for 53 specific lease blocks. Drilling is authorized under this permit only in those identified lease blocks. The comment argues that because Section 328 of the CAA limits the definition of “OCS Sources” to pollutant emitting equipment in the OSC that is “authorized” under OSCLA that the permit must be limited to the specific sites delineated in its exploration plan.

The commenter overlooks the fact that the proposed OCS/PSD permit does not relieve Shell of the responsibility to comply fully with all other requirements of federal law as provided in 40 C.F.R. §§ 55.6(a)(4)(iii) and 52.21(r)(3). See Permit Condition A.3. This would include the requirement to obtain approval of an exploration plan and other necessary approvals authorizing Shell to conduct exploratory operations for each year beyond 2010. Thus even though this permit authorizes drilling in 53 specific lease block, drilling may still not occur unless and until Shell receives approval to drill in specific lease blocks from MMS.

See the Chukchi Response to Comments Category P (Permit Duration) for a more detailed response.

Regarding contention that limiting the permit to currently approved drilling sites is critical in light of new CO<sub>2</sub> regulation, the new NO<sub>2</sub> NAAQS and PM<sub>2.5</sub> increment it is important to note that the permit meets all applicable requirements in effect at the time the permit is issued. New regulatory requirements are not imposed on a source with an existing construction permit, such as a PSD permit, except in connection with a modification to the source or a reopening for cause. Thus contrary to the comment, there is no requirement that a PSD permit ensure compliance with requirements that come into effect after the permit is issued. To the extent that the exploratory operations are subject to a requirement, there are other mechanisms, such as the Title V operations permit, that will ensure compliance with those applicable requirements. See response to comments below in Category HHHH (Global Warming Greenhouse Gases) and Category II (New NAAQS for Nitrogen Dioxide). For more information relating to GHG and the new NO<sub>2</sub> NAAQS see the related Chukchi Response to Comments for the same categories.

## **C. CATEGORY – GENERAL COMMENTS OF QUALIFIED SUPPORT**

**Comment:** Three commenters support the expeditious issuance of this permit but believe that believe that the proposed permit still contravenes the CAA in several respects and requests that EPA correct these flaws. The comments include their concern that the errors will hinder the permitting not only of exploration in the Beaufort Sea but also production activities throughout the Alaska OCS. The commenter asks that EPA apply the relevant rules properly and equitable to all leaseholders to ensure none are prevented by this permit from exercising their lease rights.

**Response:** As discussed in the response to comments in Category B (Comments of General Opposition) above, EPA believes that the permit is consistent with CAA requirements and is proceeding with issuance of the final permit. See the Chukchi Response to Comments Category C (General Comments of Qualified Support) for a more detailed response. Additionally see Category PP (Impact on Local Communities Subsistence Activities, and Traditional Use) below for response to concerns regarding impact on subsistence.

## **D. CATEGORY – PERMIT APPLICATION**

We did not receive comments specific to the Beaufort permit application.

## **E. CATEGORY – EMISSION INVENTORY**

**Comment:** Commenter contends that EPA exceeded its authority by including non-road engines emissions in the potential to emit of the proposed project. The commenter references Section 328 of the CAA which provides that the permitting requirements for OCS sources located within 25 miles of the seaward boundary of a state “shall be the same as would be applicable if the source were located in the corresponding onshore area . . .” The commenter notes that one of the rules that EPA incorporated in to 40 C.F.R § 55.14 is 18 Alaska Administrative Code (“AAC”) 50.100 which provides:

“The actual and potential emissions of non-road engines are not included when determining the classification of a stationary source or modification under Alaska Statute (“AS”) 46.14.130. Nothing in this section exempts non-road engines from compliance with other applicable air pollution control requirements.”

Commenter further states that EPA did not apply 18 AAC 50.100 in processing Shell’s permit application. Instead EPA included non-road engine emissions in the potential to emit if the OCS source. In the commenters view the corresponding onshore area (“COA”) requirements

are the applicable requirements for OCS permitting and if EPA had applied 18 AAC 50.100 the commenter questions whether Shell's exploration project would even require a PSD permit and contends that EPA must recalculate the potential to emit of the proposed OCS source excluding non-road engine emissions.

**Response:** EPA disagrees with this comment as the commenter fails to recognize both the statutory and regulatory definitions of "OCS source" as well as the provisions of Section 328 of the CAA that state that regulations established under Section 328 have the effect of standards under Section 111 of the Act (New Source Performance Standards ("NSPS") for stationary sources). Since the statutory definition of "nonroad engine" in Section 216(10) of the Act specifically states that any engine subject to Section 111 is not considered to be a nonroad engine, engines on OCS sources are not considered to be nonroad engines for purposes of both applicability of permitting programs or for regulation under standards established pursuant to Section 328. See the Chukchi Response to Comments Category F (Definition of OCS Source).

## **F. CATEGORY – DEFINITION OF OCS SOURCE**

**Comment:** EPA received a number of comments relating to the definition of OCS source, including numerous comments on its two proposed alternatives for determining when the Discoverer becomes an "OCS source" within the meaning of 40 C.F.R. § 55.2. The comments were not unique to the Beaufort permit.

**Response:** After careful consider of the definition of OCS source in 40 C.F.R. § 55.2, EPA concludes that the Discoverer will be an "OCS source" from the time the Discoverer is sufficiently secure and stable to commence exploratory activity at the drill site. See the Chukchi Response to Comments Category F (Definition of OCS Source) for a more detailed summary of the comments on this issue and the full response. See also Category F below and the related sections in the Chukchi Response to Comments.

### **F.1 SUBCATEGORY –REGULATION OF OTHERWISE "NON-ROAD ENGINES" AS PART OF THE OCS SOURCE**

**Comment:** EPA has erroneously required Shell to impose stationary source control strategies (PSD and best available control technology ("BACT")) on marine vessels and non-road engines that are not stationary sources, such as deck cranes, cementing units, logging winch engines and hydraulic power unit engines. These are all non-road engines that are not regulated by Section 165 of the CAA. CAA Section 328, which defines emissions from certain engines as "potential emissions" from the OCS source for the purposes of calculating the source's "potential to emit," does not override

the principle that non-road engines are not subject to regulation as stationary sources.

Commenter states that EPA's application of BACT to support and supply vessels (such as Icebreakers #1 and #2, Cuttings/Mud Disposal Barge, Supply Ship/Barge and Tug) even when they are not attached to the OCS source is contrary to EPA's regulations, which they say only requires the BACT analysis for vessels when they are attached to the OCS Source. The comment claims that if the BACT analysis is done properly here, the emissions contribution of these vessels would be so small that no additional controls would be justified on a dollar per ton basis.

**Response:** Similar comments were received on the proposed Chukchi permit. As explained in the Beaufort Statement of Basis and Chukchi Response to Comments, the exclusion of nonroad engines from the general definition of "stationary source" in Section 302(z) of the CAA is overridden by the more specific definition of "OCS source" in Section 328 of the CAA. Therefore, emissions from these otherwise nonroad engines on drill ships and support vessels are considered as "potential emissions" from the OCS source and nonroad engines that are part of the OCS Source are subject to regulation as stationary sources. Beaufort Statement of Basis, pp. 25-26, citing CAA Section 328(a)(4)(C); see also 40 C.F.R. § 55.2.

The commenter errs in the allegation that EPA has applied BACT to support vessels when they are not attached to the OCS source. The permit does not include any BACT emission limitations for support vessels that apply when those vessels are not attached to the Discoverer. The only vessel that attaches to the Discoverer and which has "stationary source-related" emissions is the supply ship and, with the exception of the use of ultra-low sulfur diesel fuel, BACT was determined to be no additional controls. Note that the permit does include ambient air quality based emission limits for most of the support fleet when within 25 miles of the OCS source but these limits are not BACT emission limits.

See response to comment E above and Chukchi Response to Comments Category F (Definition of OCS Source) Comment F.4 above for why otherwise nonroad engines are subject to regulation as stationary engines under Section 328 of the Act.

## **G. CATEGORY – REGULATION OF ASSOCIATED FLEET AS PART OF OCS SOURCE**

### **G.1 SUBCATEGORY - ASSOCIATED FLEET AND BACT**

**Comment:** Commenter asserts that EPA is incorrect to limit its application of BACT only to the drillship and vessels attached to the drillship and that EPA has

not even fully explained its application of its own flawed approach. EPA has interpreted when a vessel is attached so as to constitute part of the OCS source by analogy to the rule governing when a vessel is part of a marine terminal stationary source. 57 Fed. Reg. 40,792, 40,793 (1992). A vessel at a marine terminal is part of the stationary source when it is attached dockside and performing activities that directly serve the terminal. 45 Fed. Reg. 52,676, 52,696 (1980). Two vessels not regulated with BACT restrictions appear to meet this definition. Shell will use a vessel, likely the Nanuq, to refuel the Discoverer. Statement of Basis at 118-19. That ship will be attached to the drillship and may be part of the OCS source during refueling, and even under EPA's approach, should be subject to BACT. See *id.* at 118-19. Also, “[w]hen the ice breaker fleet needs supplies, personnel, or assistance from the Discoverer, either the primary ice breaker or the anchor handler will approach the Discoverer, dock briefly, and then return to the normal ice management location.” *Id.* at 117 (emphasis added). Thus, it appears that the Nanuq and the icebreakers may at times be part of the OCS source because they will be performing activities that serve the Discoverer directly and, if they do attach to the Discoverer, will be in positions analogous to a vessel dockside at a marine terminal. See *id.* at 118-19.]

**Response:** See generally Chukchi Response to Comments Category G (Regulation of Associated Fleet as Part of OCS Source) which discusses regulation of the associated fleet as part of the OCS source. As explained in that document, under the regulatory definition of “OCS source,” only vessels that are “attached to the seabed and erected thereon and used for the purpose of exploring, developing, or producing resources therefrom...” or that are attached to an OCS facility are considered an OCS source and subject to regulation as stationary sources under the PSD program.

Icebreaker #1 and #2 are both prohibited from attaching to the Discoverer See Permit Condition O.8 and P.9. Similarly, Permit Condition R.6 provides that: At no time shall the Arctic Endeavor Barge, Point Barrow Tug, Nanuq, Rozema Skimmer, or any Kvichak work boats be attached to the Discoverer. Thus commenter's concern is without merit.

While the Nanuq may be used to transfer fuel to the Discoverer via a fuel line, which is not connected to the Discoverer. The Nanuq's propulsion engines will be used to maintain its position and while doing so is operating as a marine vessel. As explained in the Chukchi response to comments, Section G1.a., the OCS regulations make clear that, although the emissions from a vessel servicing an OCS source and within 25 miles of the OCS source are not regulated as part of the OCS source, emissions from such vessels are considered to be emissions from the OCS source and thus are considered in the ambient air quality impact analysis and offset calculations. 57 Fed. Reg. at 40794. Although this permit does not

impose BACT on emission units that comprise the Associated Fleet (except for the supply vessels when attached to the Discoverer when the Discoverer is an OCS source), the permit does limit emissions from the Associated Fleet to ensure that the potential emissions of the OCS source do not cause or contribute to a violation of the NAAQS or violate increment.

**Comment:** Another commenter asserts that EPA improperly applied BACT to the Associated Fleet even when they are not attached to the OCS source and that this runs afoul of EPA's regulations, which only requires the BACT analysis for vessels when they are attached to the OCS Source. The commenter further contends that if the BACT analysis is done properly here, the emissions contribution of these vessels would be so small that no additional controls would be justified on a dollar per ton basis.

**Response:** Contrary to the comment, except for the supply vessel and the cuttings/mud barge, the vessels in the Associated Fleet will not be physically attached to the Discoverer, and therefore will not be part of the OCS source and are not subject to the BACT requirement. BACT is not applied to the Associated Fleet. See Beaufort Statement of Basis p. 93. EPA agrees that the emissions from the supply vessel when tied to the Discoverer are very small and that, with the exception of utilizing ultra-low sulfur fuel ("ULSF") the installation of any additional control technology on the supply vessels would not be cost effective. Id.

## **H. CATEGORY – BACT ANALYSIS IN GENERAL**

**Comment:** A commenter questions EPA's acceptance of Shell's voluntary use of ULSF as BACT for sulfur dioxide ("SO<sub>2</sub>") for Diesel Internal Combustion ("IC") Engines, Boilers and Incinerators and states that EPA failed to do a complete BACT analysis, because the Agency never gets to the economic analysis part of the process in Step 4 of the Top Down method. Commenter contends this is an erroneous determination and characterization and comments that while ULSF may be BACT for Shell in this permit, it is not precedent setting for subsequent permittees because only BACT that has undergone complete BACT analysis, including the dollar per ton cost analysis, can be determined to be BACT for all subsequent permittees. EPA compounds its error when it applies this same incorrect reasoning to bootstrap its conclusion regarding BACT for particulate matter ("PM") in Generator Diesel IC Engines and PM for Smaller Diesel IC Engines.

**Response:** The use of ULSF in the diesel engines and other combustion sources on the Discoverer was derived from the BACT process not from a voluntary action by Shell. In the permit application dated January 18, 2010, Shell went through the five step BACT process for SO<sub>2</sub> (pp. 59-60). Shell

identified ULSF as the most effective technically feasible control technology and proposed use of ULSF as BACT. Since Shell proposed the most effective control technology as BACT and EPA agreed with this proposal, an economic analysis was not required.

Shell did volunteer to also use ULSF in the Associated Fleet engines in order to minimize air quality impacts of SO<sub>2</sub> emissions. However, the Associated Fleet is not subject to the BACT requirement except for the supply vessel while it is attached to the drillship and the drillship is an OCS source.

**Comment:** Commenter claims that EPA errs when it declares that BACT for PM in Diesel Fired Boiler and BACT for CO and volatile organic compounds (“VOC”) for Diesel Fired Boiler and the Incinerator is “good combustion practices” and then proceeds to specify the practices and set an emission limit, and an opacity limit, without having conducted the required economic analysis on this compounded BACT.<sup>2</sup> This commenter asserts that EPA can only set an emission limit, which they claim the source is free to meet in any manner it wishes and that EPA cannot require a particular technology such as “good combustion practices”, and then in addition set an emission limit. Commenter also asserts that if EPA believes that a surrogate (such as visual opacity monitoring) is as effective as other approaches to monitoring compliance, EPA should only require the surrogate rather than as here require the surrogate in addition to other approaches to monitoring compliance such as an emissions limit, weekly inspections or a full time maintenance specialist onboard at all times.

**Response:** The conclusion that good combustion practices represent BACT for PM, CO and VOC from the boilers was the result of the five step BACT process as described on pages 88 – 89 of the Shell permit application dated January 18, 2010. Since good combustion practices were the only technically feasible control technology, an economic analysis was not required. EPA enumerated specific work practices to define what good combustion practices are for these emission units. The emission limits for the boiler and incinerator were also included in the permit since they were used to calculate the emission rates used in the air quality modeling portion of the PSD analysis and thus are necessary to insure that air quality is preserved. EPA expects that the use of the good combustion practices will result in emission rates lower than the specified emission limits, but can not predict with certainty what they will be. The emission rates from the boilers and incinerator can not exceed the emission limits specified since they were used as the basis for the modeling analysis to demonstrate compliance with the NAAQS and PSD increments. Furthermore specific work practices are in part necessary for monitoring

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<sup>2</sup> See Statement of Basis, page 83 of 141, Section 4.4.4 and page 93 of 141, Section 4.5

and compliance assurance. In addition, contrary to the commenter's assertions, both EPA Administrators and the Environmental Appeals Board ("EAB") have confirmed that "[a]lthough BACT is defined as an 'emission limitation,' it is also, as its name implies, keyed to a specific control technology." *In re Hibbing Taconite Co.*, 2 E.A.D. 838, 844 (Adm'r 1989); *In re Newmont Nevada Energy Inv., L.L.C.* 12 E.A.D. 429, 469 (EAB 2005) and cases cited therein. Furthermore, the opacity limit is not a surrogate, but rather is a BACT emission limit as specifically authorized by the definition of BACT in 40 C.F.R. § 52.21(b)(10).

**I. CATEGORY – BACT FOR MAIN GENERATOR DIESEL IC ENGINES (FD-1 THROUGH FD-6)**

**Comment:** A commenter supports EPA's determination of BACT as the use of selective catalytic reduction ("SCR") to reduce oxides of nitrogen ("NO<sub>x</sub>") emissions from the six generator engines on board the Discoverer but questions if the associated permitted emission rate of 0.5 g/kW-hr (Permit Condition C.3.1) is the appropriate corresponding emission limit for the proposed system. Referring to p. 68 in the Beaufort Statement of Basis, commenter points to statements from the vendor, D.E.C. Marine, to indicate that the SCR system can achieve an emission rate as low as 0.1 g/kW-hr under ideal steady state conditions. This represents a limit that is 80% lower than what is proposed as the permit limit for these units. It is quite possible that the units will, in reality, operate at a level lower than the guaranteed 0.5 g/kW-hr emission rate. The comment expresses support for EPA's requirement to test these engines (Condition C.6) to verify emission limits can be achieved; however, these data are needed prior to issuing a permit in order to set an appropriate BACT limit. In the event that the test data for these units demonstrate the ability to meet a lower NO<sub>x</sub> limit than the proposed 0.5 g/kW-hr, EPA must revise the BACT limit accordingly.

Additionally, it seems possible that exhaust gases from other emission units could be routed to and treated by the SCR systems for the generator engines. Since it was deemed infeasible to install SCR for the smaller compression ignition internal combustion engines on board the Discoverer primarily due to space considerations, please provide justification for why these engines can't use the same SCR system employed for the generator engines.

**Response:** Similar comments were addressed in the response to comments for the Shell Chukchi permit. The comment regarding why the NO<sub>x</sub> emission limit for the generator engines was 0.5 g/kW-hr instead of a lower value was addressed in the Chukchi Response to Comments Category I (BACT for Main Generator Diesel IC Engines) Response I.1. The comment

regarding emission testing prior to issuing the permit was addressed in the Chukchi Response to Comments Category K (BACT for Smaller Compression Ignition Internal Combustion Engines) Response K.4. The comment regarding routing exhaust gases from other emission units to the generator SCR system was addressed in the Chukchi Response to Comments Categories J (BACT for Mud Line Cellar Compressor Engines) Comment J.2 and Category M (BACT for Boilers) Comment M.3.

**J. CATEGORY – BACT FOR THE MUD LINE CELLAR (MLC) COMPRESSOR ENGINES (FD 9 THROUGH FD 11)**

See the Chukchi Response to Comments for responses related to this category of comments.

**K. CATEGORY – BACT FOR SMALLER COMPRESSION IGNITION INTERNAL COMBUSTION ENGINES (FD 12 THROUGH FD 20)**

See the Chukchi Response to Comments for responses related to this category of comments.

**L. CATEGORY – BACT FOR THE INCINERATOR (FD-23)**

See the Chukchi Response to Comments for responses related to this category of comments.

**M. CATEGORY – BACT FOR BOILERS (FD-21 AND FD-22)**

See the Chukchi Response to Comments for responses related to this category of comments.

**N. CATEGORY – BACT FOR VENTED SOURCES**

See the Chukchi Response to Comments for responses related to this category of comments.

**O. CATEGORY – BACT ON ASSOCIATED FLEET**

**Comment:** EPA properly sets BACT for the Supply Vessel as “no additional add-on controls” and then acknowledges that Shell has agreed to use ULSF. We contend that this is the correct approach to acknowledge that the permittee has elected to employ “controls” that are more stringent than BACT.

**Response:** At the outset, use of ULSF for the supply vessel is not BACT in this permit, but rather it is an owner requested limit in order to limit the potential to emit sulfuric acid mist (“H<sub>2</sub>SO<sub>4</sub>”) of the project. However, we note that ULSF could have been determined to be BACT for the non-

propulsion engines on the supply vessel when it is attached to the Discoverer and thus part of the OCS source subject to PSD.

**P. CATEGORY – PERMIT DURATION**

See the Chukchi Response to Comments for responses related to this category of comments.

**Q. CATEGORY – PERMIT TERMS AND CONDITIONS**

**Q.1 SUBCATEGORY – GENERAL**

See the Chukchi Response to Comments for responses related to this category of comments.

**Q.2 SUBCATEGORY - STACK TESTING REQUIREMENTS**

**Comment:** Commenter expressed concern regarding EPA’s requirement for stack testing to the exclusion of other well-tested approaches (such as fuel use limits and operational limits) to determine compliance with emission limitations and mentioned that because there is no industry-standardized equipment for stack testing, currently each operator has to develop their own. Commenter further stated there are also concerns regarding the operation and calibration of the equipment (which go to the reliability of the data), not to mention the format that the data is generated in, and the difficulty in translating that data into a useable format for reporting and that by contrast, well accepted practices such as fuel consumption monitoring and placing limits on the number of hours of operation will produce data that is of equal quality to stack testing without all of the issues associated with stack testing. This commenter states that therefore, EPA should allow the operator to select the monitoring approach that it prefers (e.g. stack testing, fuel use or operational limits) and not mandate stack testing to determine compliance with emission limits.

**Response:** The primary purpose of the stack testing is to assure compliance with the mission limits established in the permit. EPA set the emission limits based on the best information available to EPA at the time of permit issuance. EPA believes that the stack testing required by the permit, in conjunction with the other required monitoring, is sufficient to confirm the accuracy of the emission factors and provide a reasonable assurance of compliance with the emission limits. The emission factors can then be used in conjunction with fuel use and operational limits to determine compliance.

See the Chukchi Response to Comments Category Q (Permit Terms and Conditions) Subcategory Q.2 for a more detailed response.

**Q.3 SUBCATEGORY – MONITORING**

See the Chukchi Response to Comments for responses related to this category of comments.

**Q.4 SUBCATEGORY - CONDITION B.2: RELIEF WELLS**

See the Chukchi Response to Comments for responses related to this category of comments.

**Q.5 SUBCATEGORY - CONDITIONS B.4 AND B.5: SULFUR CONTENT OF DIESEL FUEL**

See the Chukchi Response to Comments for responses related to this category of comments.

**Q.6 SUBCATEGORY - CONDITION B.21: PROHIBITED ACTIVITIES**

See the Chukchi Response to Comments for responses related to this category of comments.

**Q.7 SUBCATEGORY - CONDITION C: MAIN GENERATOR ENGINES**

See the Chukchi Response to Comments for responses related to this category of comments.

**Q.8 SUBCATEGORY - CONDITION D.1: PROPULSION ENGINE**

See the Chukchi Response to Comments for responses related to this category of comments.

**Q.9 SUBCATEGORY - CONDITIONS L AND Q: SUPPLY SHIP**

**Comment:** Shell made a similar comment on the proposed Chukchi permit regarding the supply ship operation limits. In their comments on the Beaufort permit they also included a request that Condition L clarify that all of its requirements apply only when the supply ship is attached to the Discoverer. Specifically they explain that Proposed Condition L imposes operational limits when the supply ship is attached to the Discoverer. The condition – in its entirety – should therefore explicitly apply only when the supply ship is attached to the Discoverer. As drafted, however, only Condition L.1 specifically states that it applies only when the supply ship is attached to the Discoverer. The other requirements in Condition L, particularly L.2 and L.3, must also clearly apply only when the supply ship is attached to the Discoverer. Shell asks EPA to revise Condition L to make each requirement apply only when the supply ship is attached to the Discoverer.

**Response:** EPA agrees and has changed the permit accordingly. See the Chukchi Response to Comments Category Q (Permit Terms and Conditions) Subcategory Q.9 for a more detailed response.

**Q.10 SUBCATEGORY - PERMIT CONDITIONS O, P, AND R:  
ICEBREAKERS AND OIL SPILL RESPONSE FLEET**

See the Chukchi Response to Comments for responses related to this category of comments.

**Q.11 SUBCATEGORY - CONDITION S: POST-CONSTRUCTION AMBIENT  
MONITORING**

See the Chukchi Response to Comments for responses related to this category of comments.

**Q.12 SUBCATEGORY- BOW WASHING-ANCHOR SETTING &  
RETRIEVING**

**Comment:** EPA's proposed permit includes requirements for bow washing for Icebreaker #2 in Permit Condition P.9. Specifically, the permit requires Shell to record the date, hour and minute that Icebreaker #2 begins and ends its bow washing operations. The permit should limit the bow washing operations to an hour since this was the basis for the modeling analysis and EPA makes it clear in the Statement of Basis that this is a maximum timeframe needed for bow washing activities. Similarly, EPA must also include a permit requirement limiting the total travel and idle time during Icebreaker #1 resupply to two hours and during anchor handler (Icebreaker #2) resupply to one hour.

During anchor setting and retrieval, EPA states that "[d]rilling is not expected to occur during this process, so several of the Discoverer's emission sources are not modeled, and the anchor handler's main engines are assumed to be at 20% load." If EPA is basing its modeling demonstration on certain Discoverer emission sources not operating during anchor handling and retrieval and is assuming the icebreaker #2's main engines are operating at 20% load then EPA must include enforceable permit conditions prohibiting operation of those sources and limiting operating loads to ensure that what was modeled represents actual operations.

**Response:** EPA disagrees that permit limits are needed on Discoverer emission sources or on the Icebreaker #2 engines during the anchor setting and retrieval processes. Emissions before or after the Discoverer is an OCS source are not subject to regulation under Section 328 of the Act or 40 C.F.R. Part 55. Based on EPA's decision regarding when the Discoverer

is an OCS source (see Response in Category F (definition of OCS Source above)), these emissions will not occur while the Discoverer is an OCS source.

### **Q.13 SUBCATEGORY TANKER REQUIREMENTS**

**Comment:** EPA’s proposed permit does not include any specific requirements for the tanker that will accompany the drilling fleet. According to the Statement of Basis, “[a] tanker is expected to accompany the drilling fleet at the distance of at least 25 miles from the Discoverer. It will not approach the Discoverer. The tanker will be either the Affinity or a similar vessel. The 228-meter Affinity uses Distillate Marine C oil, similar to No. 4 oil. EPA completed a modeling analysis of the tanker’s impacts based on the above assumptions for the vessel. EPA must include a provision in the permit prohibiting the tanker from operating within 25 miles of the Discoverer and must also specify the Affinity or a vessel that would have a similar impact to the Affinity and fuel requirements for the vessel that would ensure compliance with all NAAQS and increment standards.

**Response:** EPA disagrees that it needs to include additional conditions for the tanker. The permit currently includes conditions precluding the tanker from operating within 25 miles of the Discoverer when it is an OCS source (Permit Condition 21.5). Therefore, the tanker is never considered to be part of the Associated Fleet whose emissions are considered to be direct emissions of the OCS source.

### **R. CATEGORY – TITLE V APPLICABILITY**

See the Chukchi Response to Comments for responses related to this category of comments.

### **S. CATEGORY – COMPLIANCE MONITORING AND ENFORCEMENT**

**Comment:** EPA received a number of comments related to the compliance monitoring and enforcement of the permit. In addition to the comments similar to the Chukchi permit, the comments included:

There is no monitoring of the permit separate from industry. The industry has very little incentive to be reporting themselves if they get away with it. The monitoring should be done onsite by a totally independent observer.

This is a self-regulated process by the people that are doing the emissions that are affecting us and we have suspicions related to this. There is a lack of personnel in Alaska to monitor the process and even look at what is already in existence.

The monitoring should start before July 1 as the ships are coming around the point and other places. The numerous ships that are running on diesel should be tested before they get to the Beaufort Sea to make sure they are running clean.

**Response:** Regarding the comment that monitoring should start before July 1, see the Permit Conditions requiring that stack testing be conducted before the first drilling season. For the agency responses to the general compliance monitoring and enforcement comments, see Chukchi Response to Comments Category S (Compliance Monitoring and Enforcement).

**T. CATEGORY – APPLICABILITY OF INCREMENT AND BASELINE ON THE OCS**

**Comment:** A commenter states that with respect to increment modeling, the applicable increment depends on a designated area's classification as a Class I or Class II area. See 42 U.S.C. § 7473. Both modeling demonstrations require EPA to have formally designated the applicable air quality control region, which EPA has not done. These commenters contend that to designate air quality control regions, EPA must consult with the state. In addition, after promulgating a NAAQS, EPA must designate the areas "in the State" as either "attainment" or "nonattainment" or "unclassifiable" with respect to each NAAQS. See *id.* § 7407(d). EPA has not undertaken either task with respect to the OCS. EPA has apparently attempted to establish a baseline area for the purposes of PSD permitting of OCS sources through its Region 10 internal memorandum dated 07/02/09, but this memorandum does not comply with EPA's statutory requirement as described above. In addition, as set forth in detail in the comments filed by CPAI on OCS PSD Permit Number: R10OCS/PSD-AK-09-0 at 3-7 and incorporated by reference in the comments submitted on the proposed Beaufort permit, even if EPA were to properly classify such areas in the OCS, the legislative history of Section 328 and the CAA implementing regulations dictate that NAAQS modeling should analyze onshore air impacts.

**Response:** EPA disagrees that a formal designation of an Air Quality Control Region is necessary to implement the PSD baseline area provisions, either onshore or on the OCS. The definition of "baseline area" is not dependent upon formally designated Air Quality Control Regions under Section 107(b) and (c) of the Act. Second, Section 328 of the Act directs EPA to promulgate regulations to protect the NAAQS and comply with the provisions of Part C of Title I on the OCS, beyond the jurisdiction of States. It is EPA's position that it need not consult with States or follow the provisions of Section 107 that apply to States when promulgating regulations to comply with Section 328 on the OCS. Rather, it is EPA's position that Congress expressly granted EPA the authority to promulgate

regulations to comply with the provisions of Part C of Title I without the need to follow the onshore (State) procedures for establishing baseline areas, since, as the commenter points out, the provisions of Section 107 are clearly applicable only within the boundaries of States.

EPA also disagrees that the legislative history of Section 328 indicates that regulations promulgated under this section are intended to be limited to protecting air quality onshore. See the Chukchi Response to Comments Category T (Applicability of Increment and Baseline on the OCS) for comments related to this category of comments.

**Comment:** To the extent that EPA contends that it has established an OCS Air Quality Region or baseline area through its Region 10 internal memo dated 07/02/09 and has sought to apply this standard to Shell through this permit, it has done so without proper notice in the federal register.

**Response:** As explained in above, the EPA has not established an Air Quality Control Region on the OCS, nor is there any need to do so. EPA has issued guidance on how to implement the regulatory definition of “baseline area,” which was incorporated into the 40 C.F.R. Part 55 regulations through appropriate notice and comment rulemaking, on both the inner and outer OCS. See the Chukchi Response to Comments Category T (Applicability of Increment and Baseline on the OCS) for a more detailed response.

## **U. AMBIENT AIR BOUNDARY**

**Comment:** Some commenters contend that requiring Shell to demonstrate compliance with NAAQS and PSD increments at the rail of the Discoverer instead of at the nearest shoreline point along the coast of Alaska is an incorrect interpretation and application of the CAA. A commenter stated that the EPA’s own rulemaking statements as well as the CAA legislative history make it explicit that the OCS program was intended to protect onshore air quality. Commenters claim that because EPA has not followed the procedures set forth in 42 U.S.C. § 7407 to properly designate any portion of the OCS as an air quality control region or to classify the level of attainment for each NAAQS on the OCS, Shell is only required to show compliance at the nearest onshore point along the coast of Alaska. With respect to NAAQS modeling, the CAA explicitly requires the demonstration of NAAQS compliance “in any air quality control region.” 42 U.S.C. § 7475(a)(3)

The commenter further states that requiring the air modeling demonstration compliance with NAAQS and PSD increments at the rail of the Discoverer will lead to an overstatement of the impacts to ambient air quality by Shell and will severely and unnecessarily limit oil and gas

exploration and production in offshore Alaska. (Anadarko p. 1) Furthermore, in the commenter's opinion, citing 40 C.F.R. Part 55, this approach lacks legal and policy justification and would impermissibly discourage OCS exploration contrary to the regulatory requirement that the OCS rule is not used for the purpose of preventing exploration and development of the OCS.

**Response:** EPA does not agree with the commenter's statement that requiring compliance with the NAAQS at the rail of the Discover will overstate the air quality impacts and will limit oil and gas exploration activities in offshore Alaska is unsubstantiated and without merit. As explained in the Chukchi Response to Comments Category U (Ambient Air Boundary), the ambient air is defined at 40 C.F.R. § 50.1(e) as the air external to building to which the public has access and Shell acknowledges that in this instance the permit is based on an ambient air boundary that begins at the edge of the Discoverer. See also Beaufort Statement of Basis p. 103 and Shell January 10, 2010 Application. EPA recognizes that oil and gas exploration operations will be required to employ the appropriate air pollution control technologies and may be subject to operational restrictions as necessary to protect air quality and the public health and welfare, but believes that additional oil and gas exploration activities may still be permitted.

And, as stated in the Chukchi Response to Comments Category T (Applicability of Increment and Baseline on the OCS) Comment T.3, EPA disagrees that Section 328 only requires demonstration of compliance with NAAQS and increments onshore. While the legislative history evinces Congress' concern that EPA's regulations ensure air quality protection onshore, nothing in the enacted statute limits EPA's regulations to onshore protection. EPA's promulgated rules at 40 C.F.R. Part 55 require compliance with 40 C.F.R. § 52.21 or the COA permitting rules which are adopted by reference. All of the adopted rules require compliance with NAAQS and increments at all locations in ambient air irrespective of established Air Quality Control Regions (see 40 C.F.R. § 52.21(k) and 18 AAC 50.306(b)). Furthermore, as stated in the Chukchi Response to Comments Category T (Comment T.4), Congress was presumably aware that the provisions of Part C of Title I and Section 107 were specifically limited to States and authorized EPA to promulgate regulations outside of States on the OCS to implement the provisions of Part C of Title I that did not rely the State language in these statutory provisions.

**V. CATEGORY – GENERAL COMMENTS ON AMBIENT AIR QUALITY ANALYSIS AND SUPPORTING DATA**

See the Chukchi Response to Comments for responses related to this category of comments.

**W. CATEGORY – IMPACT ON FUTURE OIL AND GAS EXPLORATION IN THE BEAUFORT SEA**

See response in Category U and the Chukchi Response to Comments for responses related to this category of comments.

**X. CATEGORY – CONSIDERATION OF OTHER SOURCES OF EMISSIONS IN AIR QUALITY ANALYSIS**

**X.1 SUBCATEGORY OTHER SOURCES OF SHORT-TERM EMISSIONS**

**Comment:** Commenters assert that EPA should require Shell to perform a full short-term emissions analysis. Shell has only performed a limited short-term emissions analysis that included emissions from the British Petroleum (“BP”) Endicott and BP Northstar facilities, but did not include emissions data from most regional onshore sources. Beaufort Statement of Basis at 107-10. The sources Shell ignores are massive sources of pollution. For instance, BP’s Central Compression Plant has facility wide emissions of 14,238 tons per year (“tpy”) of NO<sub>x</sub>, 147 tpy of sulfur dioxide (SO<sub>2</sub>), and 347 tpy of PM with an aerodynamic diameter less than 10 microns PM<sub>10</sub>. *Id.* at 108. EPA’s explanation for Shell not accounting for these other sources is the unavailability of short-term emissions data. *Id.* at 110. Commenter claims that Shell can calculate these short-term emissions based off of the facilities’ annual emissions and states that EPA agrees that “a full analysis including short-term emissions from all sources would have been preferable . . . .” *Id.* at 110. Shell’s analysis may underestimate cumulative impacts beyond 50 km severely, and a full short-term analysis is necessary to accurately assess maximum impacts.

**Response:** First, it is important to note that Shell did include all of the regional onshore sources in its annual average modeling analysis. See Beaufort Statement of Basis p. 107-110 including Table 5-3. No sources were ignored. EPA agrees that including the short-term averaged effects of all regional sources would have strengthened the analysis, had the information been available. In EPA’s view, contrary to the commenter, it would not have been possible to calculate the true maximum short term emissions from each emission point using only annual emissions data, since no information about the variability of emissions during the year is available. A short-term impact analysis which assumed a continuous short-term emission rate based on annual emission totals could have been done, but that approach would underestimate the true short term impacts. However, Shell did provide an analysis which showed that the short term effects from the largest SO<sub>2</sub> source, BP Endicott, and the second largest PM<sub>10</sub> source, BP Northstar, for which more accurate short term emissions data were available. The modeling analysis showed that the short-term impact of both sources fell below significance levels well before reaching

the edge of the 50-km radius from Shell's nearest lease block. Since the annual SO<sub>2</sub> emissions from BP Endicott are approximately 25% of the regional total and the PM<sub>10</sub> emissions from BP Northstar are approximately 16% of the regional total, and given the distances between the regional sources and the Shell lease blocks, EPA believes that even the cumulative impact of all of the regional sources' short-term emissions would still have been low at the edge of Shell's 50-km radius where the impacts would have been combined with the impacts of the project in the air quality analysis. See Beaufort Statement of Basis Figure 5-3. This impact would have been even lower at the location of maximum impact of the project sources, 50 km farther away at the edge of the hull of the Discoverer.

In addition, the actual annual emissions used in Shell's regional source modeling came from a 2005 inventory, while the background data used for PM<sub>10</sub> SO<sub>2</sub> in Shell's overall analysis was collected in 2007 and 2008 near the industrial area, so the background concentration could include some of the industrial facilities' short-term effects. (Shell Application Jan 2010 Sections 6.2.2 and 7.1.) Therefore, EPA believes that it is unlikely that a more extensive short-term analysis of the regional onshore sources would have shown that there was a significant enough impact such that the combined modeled impacts, plus background, would result in a violation of any NAAQS in the impact area of the project.

See Chukchi Sea Response to Comments Category BB (Choice of Model) Comment BB.4.

## **X.2 SUBCATEGORY- REGIONAL INVENTORY**

**Comment:** We request that EPA verify that the regional source inventory used for the proposed permit includes: (1) all major and minor sources for which applications have been deemed complete even if a permit has not been issued by the State of Alaska; and (2) all fugitive and area sources in the region.

**Response:** Shell worked with ADEC to prepare and verify its regional source inventory. ADEC, not EPA, maintains records of the regional sources through its state regulatory program. EPA is therefore satisfied that the inventory is complete and includes all appropriate sources. See also the above response.

## **Y. CATEGORY – MODEL SCENARIOS**

**Comment:** The group of Conservation commenters questioned some of the assumptions that were used in the modeling scenarios and claims that Shell makes questionable assumptions in its modeling regarding the

activity of its operations. Shell modeled the support vessels “as lines of volume sources representing their typical operating patterns.” Statement of Basis at 105. “Total vessel emissions were evenly distributed among the volume sources in the line for each fleet.” *Id.* For the base operating scenario, Shell distributed the primary icebreaker’s emissions over a 9.6-kilometer line set 4.8 kilometers (km) upwind from the Discoverer, the anchor handler’s emissions over a 4.8-km line set 1 km upwind, and the oil spill response fleet’s emissions over a 2-km line set 3 km downwind. *Id.* In the commenter’s view, distributing the support vessels’ emissions over long lines, instead of treating the emissions sources more like stationary sources, may underestimate short-term impacts to air quality. For instance, the icebreakers may not always operate in a manner consistent with Shell’s assumptions. Shell’s permit application states that “[o]ccasionally there may be multi-year ice ridges that are expected to be managed at a much slower speed than used for first-year ice. Multi-year ice may be managed by riding up onto the ice so that the weight of the icebreaker on top of the ice cracks it.” Beaufort PSD Application at 26. Shell acknowledges that this is a separate operating scenario, but does not model the scenario because it assumes that the slower speeds of the icebreakers will necessarily result in lower concentrations. *Id.* Shell’s conclusion here is not accurate. If the icebreakers are operating over a small area breaking multi-year ice, even if they are doing so at lower power, the vessels’ emissions may increase concentrations beyond Shell’s maximum modeled concentrations because the emissions will occur in essentially the same location, as opposed to being spread out. Greater impacts are especially likely to happen if both icebreakers are operating in this manner directly upwind of the Discoverer. In order to capture these maximum impacts, Shell should model a scenario where the icebreakers’ emissions are represented by stationary sources located directly upwind from the Discoverer. Also, Shell should model its other support vessels as stationary sources when the vessels could operate in one location.

EPA should also explain a potential inconsistency in the Statement of Basis. The Statement of Basis indicates that “[t]he icebreakers are allowed to transit through their respective cones as these transit events will be of short duration and at low loads as they will not be conducting icebreaking activities within the cones. Modeled impacts from transit events in the area would therefore be expected to be lower than the worst case scenario.” Statement of Basis at 57. This statement, however, seems at odds with the fact that the worst case scenario for 24-hour particulate matter concentration is the scenario in which only one of the icebreakers approaches the Discoverer at reduced power, *id.* at 117-18, even though the Proposed Permit allows both icebreakers to transit close to the Discoverer at the same time. Because worst-case 24-hour PM<sub>2.5</sub> concentrations resulted from a scenario in which a single icebreaker not

engaged in breaking ice approached the Discoverer at low power, even higher concentrations may result from a scenario where both icebreakers approach the Discoverer under reduced power. EPA should require Shell to model this possible scenario.

**Response:** EPA disagrees with the commenters that underway ship emissions should be treated as a stationary source. The management of first-year ice and multi-year ice requires the icebreakers to be in motion rather than stationary at a specific point in the OCS. EPA has no information to indicate that Shell expects the icebreaker to stay within a small area for a significant length of time while breaking multi-year ice. Shell expects the first year ice to be most common, and that can be managed by operating the icebreakers at high speed. See Shell Application January 18, 2010 Section 2.2. The representation of an icebreaker as a stationary point source and modeled at its permitted hourly emission rate would result in unrealistic high concentrations. EPA believes a multi-volume source representation and dividing the hourly total emission rate equally among the sources is an adequate approach to modeling the underway ship emissions.

During ice management, the two icebreakers will take a position approximately 1.0- km and 4.8-km upwind of the Discoverer. Similarly, the oil spill response fleet will operate about 3.0-km downwind of the drill ship. The pattern of movement of the two icebreakers resembles that of a helix or ribbon in which the two icebreakers will travel back and forth, at right angles to the prevailing direction. The back and forth travel distance for the nearest and farthest icebreakers upwind of the Discoverer is 4.8-km and 9.6 km, respectively. Shell Application January 18, 2010, pp. 113-114.

To model its movement, each ice breaker was modeled as a single line of volume sources upwind of the Discoverer at 1.0-km and 4.8- km. EPA considers this approach conservative because if the icebreakers were modeled in a helix or ribbon pattern, most if not all the volume sources would be further upwind of the Discoverer and would result in lower peak concentration based on the sum of the impacts from drill ship and the two icebreakers. Modeling each icebreaker as a line of volume sources all at the same distance from the Discoverer should result in higher predicted concentrations. This approach was similarly applied to the oil spill response fleet.

The Commenter cites a potential inconsistency in the permit's allowing icebreaker transits through the cones where they are not allowed to break ice, when a separate scenario showed worst case concentrations with an icebreaker approaching the Discoverer. In the modeling analysis, this scenario, known as ice breaker resupply, was modeled as a series of

volume sources depicting the icebreaker's transit to the Discoverer (assumed to be directly toward the Discoverer from the center of the normal icebreaking path) and the icebreaker's waiting time alongside the Discoverer. Since the resupply operations would only last about two hours, normal icebreaking activities with prorated emissions were also included in the modeling analysis. Therefore, the analysis is not greatly different from that of the Base Case, in which the icebreaker is performing only its icebreaking activities. In fact, the results of the ice breaker resupply scenario are equal to or less than the results of the Base Case. See Beaufort Statement of Basis, Tables 5-14, 5-17 and accompanying discussion.

Shell provided a modeling analysis in support of the Shell Chukchi Sea permit application, which demonstrates that icebreaker vessel travel outside the cone with occasional transits of short duration through the cone still protects the air quality standards. Shell was expected to submit a similar modeling analysis for the Beaufort Sea application, but this analysis was not submitted, and its absence unfortunately went unnoticed until this comment was received. However because the emissions and operating configuration of the Discoverer and the icebreakers are the same in both Shell applications, the cone modeling and analysis relied on in the Chukchi permit is also applicable in the Beaufort permit. The Shell Beaufort Sea permit contains the same language in O.7 and P.7 as in the comparable provisions in the Chukchi Sea permit. See Chukchi Response to Comments Category X (Consideration of Other Sources of Emissions in Air Quality Analysis) Comment X.2.

**Comment:** A commenter states that Permit Condition O sets a distance and direction prohibition between Icebreaker # I and the *Discoverer*. They assume the restrictions are to account for a worst-case pollutant modeling concentration that could occur if the wind aligned with the two vessels along their major axis. However, this may be a rare event (wind direction along the major vessel axis). Safe vessel operation requires the flexibility to evaluate on-scene circumstances that might affect the safe operation of the vessels associated with the operation. Ice and weather conditions and ice management operations may require that the location of the associated fleet vessels be organized in such a way as to enhance safety that does not conform to this generic separation scenario. The permit should clarify and accommodate such emergency configurations.

The MMS commented that the emissions scenario used in the screening model is very conservative because it assumes the anchor handling vessels, icebreakers and oil spill response vessels operating at high load for 24 hours for a day for 128 days when in reality the drill ship will be located at any specific site for a much shorter time. Additionally the modeling scenario aligned the vessels when in reality the alignment will

occur infrequently since one icebreaker will move along a 4.8 km perpendicular path and the other along a 9.6-km path. The Statement of basis does not show a modeling analysis that supports the establishment of a cone-shaped restriction zone for the icebreakers.

Additionally, the analysis assumes a 20 meter per second (45 miles per hour) wind speed which results in the lowest plume rise and the highest surface concentrations. This gale force wind occurs infrequently and it is not appropriate to apply this meteorology to the conservative scaling factors of 0.6 and 0.1 to obtain 24-hour and annual average concentrations. Commenter further contends that it is highly unlikely that the operation of an icebreaker within the cone for an entire 24-hour will happen to coincide with a 20 m/sec wind speed. The commenter suggested that it would be helpful to derive scaling factors from modeling performed for a North Slope facility (Northstar for example) to compare with the standard scaling factors. One also needs to consider that scaling factors are based on a full year of meteorology and emissions and that they may be different when applying meteorology specific to a particular season.

**Response:** The permit contains terms and conditions sufficient to ensure compliance with applicable NAAQS and increments. Thus the cones as modeled do not represent an additional restriction on the fleet's activity, but rather an acknowledgement that fleet vessels must sometimes travel away from their typical icebreaking patterns for various reasons, including approaching the Discoverer to transfer supplies or personnel (without attaching to the Discoverer). The effect on air quality of vessels operating for extended periods within the cones has not been fully examined. However, since operation outside the cones would preclude the icebreaking vessels' emissions from coinciding with the Discoverer's plume centerline, the effect of vessel emissions outside the cones would be less than that of the base case. Occasional transits through the cones of short duration are also acceptable and are not expected to interfere with NAAQS or increments.

See Chukchi Response to Comments Category V (General Comments on Ambient Air Quality Analysis and Supporting Data) Comments V.1 and Comment V.2; Category AA (Meteorological Data) Comment AA.1.b; Category BB (Choice of Model) Comments BB.1 and BB.2; and Category CC (Plume Height) Comment CC.1 for responses on the use of a volume source to represent underway ship emissions.

## **Z. CATEGORY – BACKGROUND AIR MONITORING DATA**

### **Z.1 SUBCATEGORY - PM<sub>2.5</sub> BACKGROUND CONCENTRATION DATA**

**Comment:** A number of commenters state that EPA should require Shell to collect additional background data. In their view, Shell has not gathered enough background data to meet the requirements of EPA regulations, and EPA has failed to establish that the minimal data Shell has collected provide a sufficient basis to issue a permit. Commenters explain that EPA's regulations require a full year of background data, and allow EPA to accept a shorter period – but no less than 4 months – only if the data are sufficient to provide a “complete and adequate” analysis, 40 C.F.R. § 52.21(m)(1)(iv) and claim that EPA has not met that standard here.

These commenters also state that the EPA is proceeding with less than the minimum 4 months of background data for PM<sub>2.5</sub> required by its regulations.

These commenters are very concerned with the limited amount of data used as the basis for the background PM<sub>2.5</sub> concentrations. The Badami station began collecting PM<sub>2.5</sub> data on August 20, 2009. EPA is accepting data collected through December 15, 2009 from the Badami station in fulfillment of the preconstruction monitoring requirement of 40 C.F.R § 52.21(m). (ICAS p. 49) In the commenter's view it is questionable that even the bare-minimum requisite four months of PM<sub>2.5</sub> data have been obtained and believe that EPA has based this proposed permit on a data set that does not meet the minimum requirements for pre-construction monitoring in 40 C.F.R. § 52.21. EPA has not reviewed a complete and validated four month record of data from the Badami site (EPA only has valid data from August 20 -December 15, which is not a complete four month period). On top of that, there are a full 14 days, or two full weeks, of invalid data in the August 15 -December 15, 2009 dataset. This includes eight consecutive days of invalid data collection in October 2009, which is the same month during which the maximum concentration was recorded. The commenters contend that this seriously calls into question the completeness of this record.

They believe Shell should be required to collect a full year's worth of pre-construction monitoring data prior to beginning exploration activities. Commenters mention that this same issue was raised to Shell as far back as 2007 when EPA requested additional site-specific monitoring data to be collected for their proposed exploratory drilling program; Shell has had adequate time to collect the data.

Nevertheless, if EPA will be accepting less than twelve months worth of pre-construction monitoring data for PM<sub>2.5</sub>, the commenters urge EPA to

consider the fact that the background concentrations are based on a much more limited data set than optimal and, therefore, must pursue conservative assumptions in defining background concentrations.

**Response:** EPA disagrees with the commenter that the legal minimum requirement for preconstruction monitoring has not been met. The EPA regulations allow for as little a 4 month monitoring period and EPA's quality assurance requirements only require a minimum of 80% valid days during a period. While the PM<sub>2.5</sub> data set collected at Badami is indeed minimal and fails to collect valid data on all of the days during the period, it does have 110 valid days which constitutes 90% of the days during a 4-month period, meeting EPA's minimum data requirements.

In addition to this minimal data set, EPA has conducted additional analyses, looking at other available PM<sub>2.5</sub> data for the North Slope. Specifically, EPA has evaluated the data that AECOM (Shell's and Conoco-Phillips consultant) has collected at Nuiqsut and Wainwright to see whether the current background level from Badami is representative of PM<sub>2.5</sub> concentrations during the drilling season. April 8, 2010 memorandum from Chris Hall, Air Data Analyst/Air QA Coordinator to Mary Portanova, Environmental Engineer, titled Badami PM<sub>2.5</sub> Data Review – August 19 through December 15, 2009.

EPA has PM<sub>2.5</sub> data from the Nuiqsut monitoring site for the period of July 21, 2009 through September 30, 2009. However, this site does not meet the data quality requirements of 40 C.F.R. Part 58, Appendix A so it cannot be utilized in a regulatory context. In addition, data from this site, which is located in the Village of Nuiqsut and in the Colville River delta, appears to be heavily influenced by windblown glacial silt from the exposed riverbeds so is unlikely to be representative of concentrations at offshore locations.

The Wainwright monitoring site meets EPA's quality control requirements and is the site providing the conservative onshore background values for Shell's Chukchi Sea OCS/PSD permit. However, the site is too far from the Beaufort Sea and the onshore development in the Prudhoe Bay area to be representative of the Beaufort Sea project location. EPA has performed a statistical comparison of the daily values from the Wainwright and Badami monitoring sites for the period of August 20 through December 7 where data from both sites were available and found:

- (1) There is almost no correlation between the daily PM<sub>2.5</sub> values at the two sites;
- (2) The highest concentrations at Badami are consistently lower than the highest concentrations at Wainwright; and

- (3) Concentrations at Wainwright in July and August were, on average, higher than the concentrations during the later part of the year.

Based on this analysis, EPA does not feel that it is appropriate to utilize the Wainwright July and August data as a substitute for the missing Badami data during that period. The Wainwright data do tell us something about PM<sub>2.5</sub> values in that area, and EPA determined from this data that an offshore background value of 11.4 micrograms per cubic meter (“µg/m<sup>3</sup>”) was conservative for the Chukchi Sea. We expect, based on the available data that a conservative background value offshore of Badami would be less than the 11.4 µg/m<sup>3</sup> selected for the Chukchi Sea (see Chukchi Response to Comments Category Z (Background Air Monitoring Data) Comment Z.2.d).

EPA also evaluated other available data on fine particle concentration in the Arctic, including four IMPROVE monitoring sites in Alaska – the IMPROVE monitoring sites in the Simeonof Wilderness Area, Tuxedni Wilderness Area, Denali National Park, and the Trappers Creek Wilderness Area. EPA also looked at data from the National Oceanic and Atmospheric Administration (“NOAA”) particulate matter monitoring site at Barrow.

Long-term PM<sub>2.5</sub> data are available at the IMPROVE monitoring sites and the 98<sup>th</sup> percentile PM<sub>2.5</sub> concentrations for the 2006 through 2008 period are shown in the following table.

Site	Year & p98 value			2006-08 3-yr DV
	2006	2007	2008	
Simeonof	9.5	7.3	5.6	7
Tuxedni	6.0	4.9	6.6	6
Denali NP	5.9	3.5	5.1	5
Trappers Creek	5.2	3.7	4.9	5

Long-term PM<sub>10</sub> data is available at the Barrow site and the 98<sup>th</sup> percentile (based on a non-EPA approved monitoring device) is around 9 µg/m<sup>3</sup> (PM<sub>2.5</sub> is a subset of PM<sub>10</sub> so the PM<sub>2.5</sub> value could be no greater than 9 µg/m<sup>3</sup>.)

However, none of these sites are using a Federal Reference Method (“FRM”) or Federal Equivalent Method (“FEM”) for measuring PM<sub>2.5</sub> so the data is not suitable for use in a NAAQS demonstration. While the information from these sites does not help to address the missing period at the Badami site, it does show that PM<sub>2.5</sub> background concentrations at remote sites in the Arctic are likely to be around 7 µg/m<sup>3</sup> or less.

Based on the analyses described above as well as review of the additional information and analysis submitted by Shell (see Comment Z.1.3 below), EPA has determined that the highest measured concentration at Badami of  $7.1 \mu\text{g}/\text{m}^3$  is a reasonable onshore value to use to represent background concentrations at Shell's Beaufort offshore project locations.

Note that the proposed permit used a background concentration of  $10 \mu\text{g}/\text{m}^3$  based on preliminary data submitted by Shell. Subsequent to both the permit application and EPA's proposed permit, Shell submitted final QA/QC'd data and invalidated the data from several days, including the  $8 \mu\text{g}/\text{m}^3$  value Shell used in the permit application and the  $10 \mu\text{g}/\text{m}^3$  value EPA used for the proposed permit. However, regardless of whether a background value of  $7.1 \mu\text{g}/\text{m}^3$ ,  $10 \mu\text{g}/\text{m}^3$  or even the  $11.4 \mu\text{g}/\text{m}^3$  from Wainwright is used, the modeling analysis demonstrates that the  $\text{PM}_{2.5}$  NAAQS will be met at the point of maximum impact.

**Comment:** Referencing the Beaufort Statement of Basis at 111-113, commenters claim that EPA has not provided a sufficient justification to support the conclusion that it believes, based on the  $\text{PM}_{2.5}$  data Shell collected only between August 20, 2009, and December 15, 2009, that the maximum measured 24-hour  $\text{PM}_{2.5}$  concentration of  $10 \mu\text{g}/\text{m}^3$  is a conservative background estimate suitable for Shell's use, and there is evidence that this background estimate may not be conservative. EPA acknowledges that emissions from local fuel-burning heating units would be higher in the fall and winter months, but EPA has not relied on  $\text{PM}_{2.5}$  data for all of these months. Also, EPA recognizes that no information is available on the seasonality of particulate matter transported from overseas, but has not detailed how this lack of information bears on the validity of its conclusion. *Id.* To establish conservative background concentration estimates sufficiently, the commenters state that EPA should require Shell to obtain background data for the full year required by the regulations.

Commenters assert that EPA must provide a full justification for relying on lesser data and should nevertheless require, at minimum, data for all the months Shell will be operating, plus data for months on either end of the operating period that have conditions reasonably related to predicting the conditions Shell will encounter.

In a related comment the commenter stated that EPA's proposed permit for Shell's exploration drilling in the Beaufort Sea uses a 24-hour average  $\text{PM}_{2.5}$  background concentration of  $10 \mu\text{g}/\text{m}^3$ . First of all, EPA must explain why this concentration is protective given the fact that it is using a higher concentration as representative of offshore background  $\text{PM}_{2.5}$  concentrations for the Chukchi Sea permit. This does not appear to be the most prudent course considering the limited (and incomplete) data set available to date for the Beaufort Sea. EPA's compliance demonstration is

already so incredibly tight that a change in the background concentration from  $10 \mu\text{g}/\text{m}^3$  to  $11 \mu\text{g}/\text{m}^3$  would mean that Shell would not be able to demonstrate compliance with the 24-hour  $\text{PM}_{2.5}$  NAAQS considering a margin of error based on the accuracies of the input data. The commenters state that they had commented earlier that if, as indicated, the uncertainty in the stack test data is upwards of 15%, then Shell must be able to demonstrate compliance with the NAAQS considering a margin of error no less than 15%. This would mean the predicted 24-hour  $\text{PM}_{2.5}$  concentration would need to be less than  $29.8 \mu\text{g}/\text{m}^3$  when considering the applicable background concentration. Using a background concentration of  $11 \mu\text{g}/\text{m}^3$  results in a 24-hour  $\text{PM}_{2.5}$  concentration of  $30.2 \mu\text{g}/\text{m}^3$ , which means that – given the uncertainty in the input data – Shell cannot reasonably demonstrate compliance with the 24-hour  $\text{PM}_{2.5}$  NAAQS.

Given the limited and incomplete  $\text{PM}_{2.5}$  data set that is the basis for EPA's compliance demonstration for the proposed permit, EPA must use the most conservative background concentration possible which, at a minimum, would be equal to the value used as representative of offshore sources for the Chukchi Sea permit. There is no reason why that value of  $11 \mu\text{g}/\text{m}^3$  would not be applicable in the Beaufort Sea as well. EPA must then revise emission limits, as needed, in order to demonstrate compliance with the 24-hour  $\text{PM}_{2.5}$  NAAQS based on an appropriate margin of error that is based on the uncertainties in the emissions data.

Due to the limited data record for  $\text{PM}_{2.5}$ , the commenter strongly supports the use of actual maximum monitored  $\text{PM}_{2.5}$  concentrations at representative onshore locations as representative of background concentrations when determining compliance with NAAQS onshore. For example, there appear to be localized  $\text{PM}_{2.5}$  monitoring data recently collected in the community of Nuiqsut. These data should be used as appropriate background concentrations when determining  $\text{PM}_{2.5}$  impacts at this location.

**Response:** EPA disagrees with the commenter that there is evidence that the  $\text{PM}_{2.5}$  background level relied upon for the proposed permit is not conservative. The commenter first argues that EPA does not have data for the fall and winter months when emissions from local fuel burning would be higher. However, the Badami site has data from mid-August through December 15, which encompasses most of the fall and winter period during the permit allowed drilling season. Second, the commenter argues that EPA does not have information on the seasonality of particulate matter transported from overseas and hence EPA must require collection of data for a full year. EPA disagrees that it needs data covering a full year, or data for the months preceding or following the drilling season, because Shell is only authorized to conduct exploratory drilling from the period of July 1 through December 31. Data from time periods outside of the

drilling season, including information on the seasonality of transported particulate matter, is not necessary for determining representative background levels during the drilling season. EPA has determined that it has adequate data from the Badami site during the drilling season to determine a representative PM<sub>2.5</sub> background level (see Comment above).

EPA also disagrees that it should use the background level from the Wainwright site instead of the level from Badami because the Wainwright level is higher. Both of these monitoring sites are onshore, rather than offshore, and both reflect the impact of local, onshore sources. The Wainwright site is located within a Native Village and immediately adjacent to unpaved roads and the unpaved airport. The Badami site is located within an industrial site far from human habitation and village activities. It is not unexpected that the Wainwright site would experience higher levels than the Badami site and in fact, the Badami site provides a more representative background level for offshore locations. Note, however, that even if EPA used the Wainwright offshore background value of 11.4 µg/m<sup>3</sup>, the project would still comply with the PM<sub>2.5</sub> NAAQS at the location of maximum impact.

EPA also disagrees with the commenter's contention that EPA must revise the permit limits to account for the uncertainty in some of the emission factors used in the modeling analyses. While there is always some uncertainty in published emission factors, that uncertainty is not biased for under-prediction. The factors could also over-predict emissions for specific emission units. Given that EPA is obliged to make the permitting decision based on the best information and tools available, there is no need to further restrict emissions to try to account for all of the uncertainties in the analysis. Furthermore, in this case, any potential negative effect of uncertainty in emissions is offset by the conservative modeling approach used in this analysis.

Finally, EPA disagrees that the Nuiqsut data should be used to establish the onshore PM<sub>2.5</sub> background levels. As discussed above in Comment the Nuiqsut site does not meet the requirements of 40 C.F.R. Part 58, Appendix A.

**Comment:** Shell submitted a comment regarding the background PM<sub>2.5</sub> concentrations and explained that Shell has established an ambient air quality monitoring station at Badami near the coast of the Beaufort Sea. The Badami location is remote from the majority of the oil exploration and production areas of the North Slope. Shell asserts that the data collected at Badami are a conservative representation of background concentrations in the Beaufort Sea ambient air. Shell recognized that the station was established and began collecting PM<sub>2.5</sub> data in mid-August of 2009 but contends that because the proposed Shell exploration program in the

Beaufort Sea will not commence until July 1 and will not extend past the end of December the majority of the period from July 1 through December 15 has been monitored for PM<sub>2.5</sub> concentration at the Badami station. Only the period from July 1 through August 19 is not included in the ambient monitoring period.

Shell comments that an examination of historical data for the Beaufort Sea area reveals that the period from July through mid-August is not typically a high particulate concentration period which shows that the July 1 – August 19 period is not the highest concentration period during the year. (See Shell Comment Figure 1 (plot of 1999 historical PM<sub>10</sub> data collected at the Badami site)).

Shell further comments that data collected in 2006-2007 at the Central Compressor Plant in Prudhoe Bay by BP (shown in Figure 2 of their comment letter), depict the same pattern. Consistent with the historical observations at Badami, the July 1 – August 19 period is definitely not representative of peak particulate concentrations.

The conclusion is drawn that for the Beaufort Sea area, the July 1 – August 19 period would be expected to have lower concentrations than the period later in the fall. Thus the ambient monitoring that has been performed by Shell is reflective of peak particulate concentrations.

**Response:** EPA has considered Shell's comments and the PM<sub>10</sub> data summary included in their analysis as part of EPA's overall analysis of the PM<sub>2.5</sub> background levels. While this analysis provides some information on seasonal PM<sub>10</sub> patterns at some historical onshore monitoring sites, it does not provide definitive information on the seasonal PM<sub>2.5</sub> patterns at Badami. As discussed in response to Comments above, EPA has determined that the highest measured PM<sub>2.5</sub> background level of 7.1 µg/m<sup>3</sup> from the Badami site is a reasonable value to use as representative of the Beaufort Sea offshore project locations.

## **Z.2 SUBCATEGORY- BACKGROUND CONCENTRATIONS-OTHER POLLUTANTS**

**Comment:** A group of commenters claim EPA has not justified its estimates of background concentrations for pollutants other than PM<sub>2.5</sub>. EPA has allowed Shell to mix and match data from different monitoring locations with different pollutants, and has not always required Shell to use the highest recorded background levels. Further, EPA does not give a justification for using data from a specific monitoring station for a pollutant, but simply indicates that it believes the data are acceptable. EPA should require Shell to use the highest recorded levels among these sites for each pollutant, or at minimum, EPA must explain why these high

measurements are inapplicable, even though the stations taking the measurements are near Shell's lease blocks. For example, EPA should explain why the higher NO<sub>2</sub> levels measured by the BP Prudhoe Bay Central Compressor Plant are not representative, while lower levels from the BP Prudhoe Bay Liberty station are.

**Response:** EPA guidance allows for the use of air quality data from other monitoring sites in lieu of an applicant conducting its own monitoring program provided the data is representative of current air quality in the impact area of the proposed new source or modification. There is no requirement that all of the pollutant-specific data come from one location, and it is unlikely that one monitoring site would have data for all criteria pollutants. In this application, Shell proposes not to collect new data (except for PM<sub>2.5</sub>) but rather to rely on data from other North Slope monitoring sites. Shell submitted a summary of data from a number of sites, both older (e.g., 1999 data from BP-Badami) and distant (e.g., current data from Shell/CPAI-Wainwright) and proposed to use 2007-2008 data from the BP-Liberty site for the gaseous pollutants (NO<sub>2</sub>, CO, SO<sub>2</sub>) and 2007 data from the BP-Prudhoe Bay site for PM<sub>10</sub>.

For an existing site to be acceptable in lieu of site specific monitoring, the data should be recent, represent the same airshed, and be impacted by existing sources in a similar manner as would be expected at the project location. In the case of the existing monitoring on the North Slope, the BP-Liberty site best fits these characteristics. Other sites are too distant to represent the Beaufort Sea airshed or the data is too old to represent current air quality. Some of the sites with more recent data are located in the industrial area of Prudhoe Bay and are likely impacted by local sources such that they would not be representative of levels at the project location nearly 100 km away. The highest levels recorded at these sites are expected to be much higher than would be found at the project location and are therefore not representative of air quality at the project location. However, since BP-Liberty site does not have data for PM<sub>10</sub>, Shell has proposed to use the BP-Prudhoe Bay Central Compressor Plant site even though it is located in the heavily developed area. EPA believes that this is acceptable as a conservative estimate of PM<sub>10</sub>.

In summary, EPA has determined that the background concentrations proposed by Shell in its application, which are based on the recent data from the BP-Liberty site for NO<sub>2</sub>, CO, and SO<sub>2</sub> and the recent data from the BP-Prudhoe Bay site for PM<sub>10</sub>, are appropriate for use as conservative representative background values for Shell's Beaufort Sea project location.

### Z.3 SUBCATEGORY- COLLOCATED MONITORS

**Comment:** Some commenters state that given the fact that both the Wainwright and Badami PSD monitoring sites have been collecting data for less than a year, it is extremely important to have a good measure of the precision and bias of the monitoring network to ensure that the monitoring that is done has tight Quality Assurance controls. There is no reference to a collocated sampler or to the requirement for Shell to operate a collocated sampler in the Beaufort Sea permit or statement of basis.

According to the PSD requirement for collocated monitors, 40 C.F.R. Appendix A Section 3.2.5.5 states that, for collocated monitors, "[a] site with the predicted highest 24-hour pollutant concentration must be selected." EPA should discuss how this requirement is met, either through monitoring or modeling. The Quality Assurance Project Plans ("QAPP") (p. 13 of 64) only mentions that "[a] station located in Deadhorse likely will have the highest concentrations in the network" but there is no concrete information in support of this claim. This requirement will help ensure the use of a collocated sampler that is best able to measure precision and bias for the network. Further, according to the project schedule, the first quarterly report for the collocated monitor is not due until 30 days after the end of the quarter. Since the collocated sampler was not operational until October 22, 2009 it appears that the report will not be available until mid-February. We would like assurance from EPA that the precision and bias goals established in the QAPP are being met.

**Response:** EPA agrees with the commenter that it is important to ensure that the monitoring network underlying a PSD permitting action has good quality assurance controls. The PSD regulations provide that a PSD application "shall contain an analysis of ambient air quality in the area that the major stationary source...would affect." 40 C.F.R. § 52.21(m)(1)(i). The regulations further provide that, for NAAQS pollutants, "the analysis shall contain continuous air quality monitoring data gathered for purposes of determining whether emissions of that pollutant would cause or contribute to a violation of the standard or any maximum allowable increase." See 40 C.F.R. § 52.21(1)(iii). Section 52.21(m)(1)(iv) states that "[i]n general, the continuous air quality monitoring data that is required shall have been gathered over a period of at least one year and shall represent at least the year preceding receipt of the application, except that, if the Administrator determines that a complete and adequate analysis can be accomplished with monitoring data gathered over a period shorter than one year (but not to be less than four months), the data that is required shall have been gathered over at least that shorter period." The regulations also require that owner or operator of the source meet the requirements of 40 C.F.R. Part 58, Appendix B (which has since been combined with and relocated to Appendix A) during the operation of monitoring stations for purposes

of satisfying paragraph (m) of this section. See 40 C.F.R. § 52.21(m)(3). The substantive requirements of the 40 C.F.R. Part 58 appendix referenced in 40 C.F.R. § 52.21(m)(3) shall be referred to hereafter as “Appendix A.”

Section 3.2.5.5 of Appendix A requires that, within a network under a single primary quality assurance organization (“PQAO”), there be at least one collocated PM<sub>2.5</sub> monitor that is a Federal Reference Monitor (“FRM”) and that the site in the monitoring network with the highest predicted 24-hour concentration must be selected. See also 40 C.F.R. Appendix A, Section 3.2.5.1. The purpose of collocation sampling for PM<sub>2.5</sub> is to help assess data quality, by estimating the comparability of two monitors sited next to each other and operating on similar schedules. A collocated FRM has been determined by EPA to be a reference instrument to use for data quality assessments in air monitoring networks. Section 3.2.5.7 of Appendix A suggests that “about” 25 valid pairs should be used for the precision and bias estimates for which collocation is required.

As discussed in Section 5 in the Beaufort Statement of Basis, to fulfill the preconstruction monitoring requirement of 40 C.F.R. § 52.21(m)(1), for their Beaufort Sea permit Shell is relying on data from their Badami monitoring station which is approximately 2.2 miles SE of their Badami Central Processing Unit and 1.2 miles south of the Beaufort Sea abutting the west side of the East Badami Creek. The Badami monitoring station is one monitor in a network of ambient air monitoring stations on the North Slope of Alaska operated by AECOM<sup>3</sup>. This North Slope PSD monitoring network also includes monitoring stations at Deadhorse, Nuiqsut, Reindeer Island, and Wainwright. AECOM began operation of the Badami Station on August 15, 2009 with one Met One PM<sub>2.5</sub> monitor (Met One model BAM 1020), one NO<sub>2</sub> monitor (Thermo Scientific model 42i), as well as standard meteorological instrumentation.

On October 23, 2009, AECOM began operation of collocated PM<sub>2.5</sub> monitors in Deadhorse, Alaska, predicting that PM<sub>2.5</sub> concentrations would be highest in this location of all monitoring stations in its network. The Deadhorse monitoring station includes two PM<sub>2.5</sub> FRM monitors and two Met One PM<sub>2.5</sub> beta attenuation samplers (BAM 1020). These BAM samplers are the same model and configuration as the PM<sub>2.5</sub> BAM sampler at the Badami monitoring site as well as at the Nuiqsut and Wainwright sites. All BAM samplers in this network are considered Federal Equivalent Method (“FEM”)<sup>4</sup> samplers. The Deadhorse collocated

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<sup>3</sup> AECOM operates these monitors with primary oversight from either Shell or Conoco-Phillips Alaska, Inc. (CPAI). For some monitors, such as the Deadhorse Station, Shell and CPAI share the monitoring results.

<sup>4</sup> A Federal Equivalent Method (FEM) is an air sampling collection and analysis method that does not follow the reference procedures in 40 C.F.R. Part 50, but has been certified and designated by the EPA as obtaining "equivalent" results.

monitors are operating at the sampling frequency required by 40 C.F.R. Part 58, Appendix A.

EPA has worked closely with AECOM to ensure the adequacy of the Badami, Wainwright and Deadhorse QAPPs and to put into place quality control requirements for each monitoring instrument and process that are as good as or better than that required by regulation or guidance. The Badami, Wainwright and Deadhorse QAPPs have been reviewed in detail and approved by EPA.

Data quality objectives or the results of other systematic planning processes are statements that define the appropriate type of data to collect and specify the tolerable level of potential decision errors that will be used as a basis for establishing the quality and quantity of data needed to support the monitoring site. See 40 C.F.R. Part 58, Appendix A, Section 2.3.1. Appendix A contains precision and bias goals for collocated PM<sub>2.5</sub> State and Local Air Monitoring sites (referred to as “SLAMS”), see 40 C.F.R. Part 58, Appendix A, Section 4.3, but provides that the development of data quality objectives or the results of other systematic planning processes are the responsibility of the PQA/O for PSD and other monitoring stations. See 40 C.F.R. Part 58, Appendix A, Section 2.3.1. Appendix A states that both PM<sub>2.5</sub> collocated monitors must read concentrations greater than 3 µg/m<sup>3</sup> to be used for the precision and bias calculations for which collocation is required because “[a]t low concentrations, agreement between the measurements of collocated samplers, expressed as relative percent difference or percent difference, may be relatively poor.” See 40 C.F.R. Part 58, Appendix A, Section 4(c).

In consultation with EPA, AECOM developed precision and bias objectives and metrics for evaluating PM<sub>2.5</sub> values from the collocated monitors at the Deadhorse monitoring site, which have been incorporated into Section A.5.3 of the Deadhorse QAPP. EPA has acknowledged that, at low concentrations, agreement between the measurements of collocated PM<sub>2.5</sub> samplers, expressed as relative percent difference or percent difference, may be relatively poor. The PM<sub>2.5</sub> concentrations recorded by the monitors in the AECOM network on the North Slope have generally been quite low, averaging approximately 3 µg/m<sup>3</sup> over 24 hours at the Wainwright Station from May to October 2009. Therefore, AECOM developed and EPA approved as part of the Deadhorse QAPP objectives (or goals) and associated metrics that recognize and address the limited utility of the statistical equations prescribed and provided in Appendix A for SLAMS PM<sub>2.5</sub> monitors given in light of the typically low PM<sub>2.5</sub> concentration environment. EPA concurred with AECOM that an appropriate upper bound goal for the data set is 3 µg/m<sup>3</sup> for precision and 4 µg/m<sup>3</sup> for bias for this project and therefore approved these goals and objectives as part of the Deadhorse QAPP. Using the AECOM precision

and bias equations for the Deadhorse data collected through November 28, 2009, calculations show that these monitors are more than meeting these goals by achieving a precision of  $1 \mu\text{g}/\text{m}^3$  and a bias of  $1 \mu\text{g}/\text{m}^3$  for all sample pairs  $\geq 2 \mu\text{g}/\text{m}^3$  (32 pairs) and for all sample pairs  $\geq 3 \mu\text{g}/\text{m}^3$  (27 pairs). EPA has therefore concluded that the precision and bias goals are being met for the primary FEM and audit FRM  $\text{PM}_{2.5}$  monitors in the AECOM monitoring network.

Appendix A Section 3.2.5.5 does not specify how to determine the predicted highest 24-hr concentration site. For the SLAMS program, operators of monitoring networks typically review historic concentrations at existing monitors to determine the predicted high site in the network. This was not possible for the monitoring network in this case, however, since these sites are new and do not have historic records. Deadhorse was selected in part due to local industrial activity and the numerous sources of particulate pollution in the vicinity as compared to Wainwright and Badami. Given the remote locations of the monitoring stations in this network, logistical and operational considerations suggested that a Deadhorse location would have the best chance for success as a collocated site.

Data from the collocated samplers at Deadhorse have been submitted to EPA through December 15, 2009. From a review of the data submitted, EPA has determined that the precision and bias goals through December 15, 2009 are being met. See the January 7, 2010, Deadhorse Quality Assurance memo.

#### **AA. CATEGORY – METEOROLOGICAL DATA**

See the Chukchi Response to Comments for responses related to this category of comments.

#### **BB. CATEGORY – CHOICE OF MODEL (AND THE WAY THE MODEL WAS RUN)**

**Comment:** The non-guideline and obsolete ISC3-PRIME model is unsuitable for predicting project and cumulative impacts and guideline models AERMOD and CALPUFF are more suitable.

A comment states that Shell modeling relies on a non-guideline model that is not well suited for modeling emissions over large distances in overwater conditions. EPA should require Shell to use a guideline model, like AERMOD or CALPUFF, that is more likely to model accurately potential impacts from Shell's emissions. Appendix A to the comments asserts EPA's reasoning is inadequate, because a more recent model evaluation study has shown that AERMOD with the PRIME algorithm is much more

accurate than ISC3-PRIME in predicting the maximum 1-hour concentrations measured during the North Slope tracer study. (US EPA, 2003a). This superiority of AERMOD over ISC3-PRIME is very important since the modeled 1-hour concentrations are converted into 3-hour, 8-hour, 24-hour and annual averages by using scaling factors (Section 5.2.8 of the Beaufort Statement of Basis).

The EPA's guidelines call for the use of newer, guideline models such as AERMOD. The commenters explain that in their view ISC3-PRIME is not as conservative as AERMOD for use in the conditions in which Shell will be working, and as a result, Shell's use of ISC3-PRIME may lead to an under-prediction of impacts.

The comment indicates that EPA states that the unavailability of "over-ocean meteorological data" makes AERMOD unavailable for use (Beaufort Statement of Basis at 102) and claims that the record does not provide a reasoned basis for Shell's use of a non-guideline model, or for why a guideline model, like AERMOD, is inappropriate.

Commenter states that EPA's rejection of AERMOD is arbitrary because, appropriate guideline models can be run using the same type of meteorological screening data used in the older ISC3-PRIME model and, moreover, usable offshore and onshore meteorological data are available. The commenter indicates the same set of screening meteorological data Shell has used with ISC3-PRIME can also be used with guideline models such as AERMOD and Offshore and Coastal Dispersion ("OCD"), and real offshore and onshore data do exist and can be used.

**Response:** EPA agrees with the commenter that OCD is an appropriate model for over water application but disagrees with the commenter that AERMOD is also appropriate for the same type of application. AERMOD is the recommended model to predict concentration impacts at terrestrial locations. OCD on the other hand, is the recommended model to estimate concentration impacts at over water locations. Since Shell proposes to conduct exploratory drilling at specific lease blocks located on the OCS, OCD would be the model of choice.

OCD however requires hourly meteorological data that is representative of the area in which a source is located. In Shell's case, that would be hourly data representative of conditions in the Beaufort Sea. There were no such data available when Shell prepared its PSD application. The commenter states that representative meteorology is available but did not provide any specifics.

In response to EPA concerns regarding the adequacy of existing meteorological ambient data, Shell started a surface meteorological data

collection program representative of a marine environment on August 15, 2009 at Reindeer Island, located over five miles from the nearest shoreline in the Beaufort Sea. (See Reindeer Island Meteorological Monitoring Station QAPP, February 2010) To gain additional information and data on mixing heights in the Arctic Ocean, Shell, at the request of EPA, will be installing a temperature profiler at a location also representative of a marine environment in early summer 2010. Collecting upper air temperatures will give Shell and EPA a better understanding of the mixing heights over water and could help indicate whether any changes need to be made in over water dispersion models used in air permitting. Once a year of quality assured data becomes available, hourly meteorological data will be available for use in the OCD model. Until the data is available, EPA determined that the ICS3-Prime screening model is appropriate.

CALPUFF is the EPA preferred long range transport model (beyond 50-km). For PSD applications, it has been generally used to estimate air quality impacts at Class I areas including increment, visibility and deposition. While CALPUFF does contain an over water algorithm, it has not been reviewed, tested, evaluated and recommended by EPA for near field applications and thus in EPA's view was not appropriate for this permit.

EPA also agrees with the commenter that AERMOD predicted concentrations are less conservative than ISC3-PRIME when both models are run in the refined mode (i.e., with hourly sequential meteorology). In this application however, Shell used ISC3-PRIME in the screening mode due to the lack of representative hourly meteorological data. As a result, EPA believes the model produced conservative concentration predictions that showed any possible uncertainties, including under prediction.

See Chukchi Response to Comments Category V (General Comments on Ambient Air Quality Analysis and Supporting Data) Comments V.1 and V.2; Category AA (Meteorological Data) Comments, AA.1a, and AA.1.b; and Category BB (Choice of Model) Comments BB.1, BB.2, BB.3 and BB.4.

**Comment:** Commenters describe a number of problems with Shell's use of ISC3-PRIME:

ISC3-PRIME is inappropriate to model air pollution dispersion in offshore conditions, as it is not well suited for overwater plume transport calculations. Overwater pollutant plume transport and dispersion are significantly different than overland dispersion. Mixing heights over water are generally lower than over land due to lack of sensible heat flux from the surface. These low mixing heights can trap pollutant plumes near the surface and create areas of high concentration. However, Shell's

modeling results likely miss maximum impacts resulting from this effect, because Shell has incorporated the wrong mixing heights into ISC3-PRIME.

**Response:** See Chukchi Response to Comments Category BB (Choice of Model) Comments BB.1, BB.2, BB.3 and BB.4.

**Comment:** Shell may have missed maximum concentrations that may result from its vessels' building downwash, meaning the wind shadow of a structure where air pollution is likely to concentrate. ISC3-PRIME has been shown to underestimate the impacts of sources with significant building downwash by up to 29 percent compared to AERMOD. EPA, Comparison of Regulatory Design Concentrations: AERMOD vs. ISCST3, CTMPLUS, ISC-PRIME, EPA-454/R-03-002 (2003) available at <http://www.epa.gov/scram001/7thconf/aermod/compar.pdf>.

**Response:** See Response to comments BB and Chukchi Response to Comments Category V (Ambient Air Boundary) Comments V.1, V.2; Category AA (Meteorological Data) Comments AA.1, AA.2; and Category BB (Choice of Model) Comments BB.1 and BB.3

**Comment:** Shell's use of incorrect Building dimensions calculated by the incorrect BPIP program may have caused ISC3-PRIME to under predict impacts. Moreover, Shell used the wrong program to calculate building dimensions in ISC3-PRIME, which can also cause an impact analysis to miss building downwash effects and underestimate project impacts severely.

**Response:** Contrary to comments, Shell used the correct program as discussed in Section 5.2.11 of the Statement of Basis, Building Profile Input Program for Prime ("BPIP-PRM") (EPA Users Guide dated April 21, 2004) was used to calculate the direction specific building dimensions in the modeling analysis. The output from BPIP-PRM was used with the ISC3-PRIME to predict project concentration impacts. If anything this approach is likely to over predict rather than under predict the project impacts. Thus there was no error in the modeling analysis.

**Comment:** Shell's use of ISC3-PRIME is also unjustified due to ISC3-PRIME's inability to model the long distance transport of Shell's pollution. Shell has only modeled impacts out to 50 km, even though EPA's guidelines state that "[i]f long range transport is determined to be important, then refined estimates utilizing the CALPUFF modeling system should be obtained." 40 C.F.R. Part 51, App. W at 6.2.3 (b). Long range transport is important here. The Statement of Basis indicates that Shell's modeled predictions for NO<sub>2</sub> "had not fallen below the significant impact level" at a distance of 50 km. Beaufort Statement of Basis at 98. In other words, the significant impact radius for NO<sub>2</sub> extends by an unknown distance beyond

the limits of Shell's analysis. This is particularly troubling because Shell has not even obtained short-term emissions data from most of the major onshore sources that are nearby; Shell's emissions may merge with emissions from these other sources and cause high concentrations of air pollution. CALPUFF would provide a more technically defensible analysis because it generates not only accurate near-field modeling results that account for building downwash, but also accurate long distance modeling results out to 300 km. Appendix A to the comment states that not only large emission sources are ignored in the full impact modeling, receptors located beyond 50 km are also omitted. The New Source Review Workshop manual states that all potential sources within the significant impact area ("SIA") should be included (US EPA, 1990). Thus, omitting sources beyond 50 km severely underestimate the cumulative impacts.

**Response:** See above response and Chukchi Response to Comments Category BB (Choice of Model) Comments BB.4.

**Comment:** Commenter asserts that the project impacts are severely under-predicted since only a single wind direction is modeled because for modeling offshore sources, the ISC3-PRIME model only calculates the impacts for a single wind direction (east to west). This severely underestimates the impacts for sources and receptors that are not lined up, e.g. for modeling scenarios with the ice breakers and anchor vessels moving in the north-south direction while the drill ship is stationary. Since the ISC3-PRIME modeling runs do not require long computer execution time, 180 wind directions (from north to south at 1 degree increment) should be modeled. These additional wind directions will ensure that maximum project impacts are modeled.

**Response:** A 90 degrees scalar wind direction and 16,530 receptors were utilized to locate and predict the peak concentration impacts. During exploratory drilling operations, the Discoverer will be pointed into prevailing winds. Should the bow of the Discoverer be pointed by more than 15 degrees from the prevailing wind direction, the Discoverer will re-align itself into prevailing wind direction. (See Shell Application January 18, 2010 p. 111-112, 117 for general description of the Discoverer.) The combustion units on board the Discoverer (e.g., main generator engines, mud line cellar air compressors, hydraulic power unit engines, deck crane engine, logging winch engine) are located along the length of ship. Based on the required drill ship orientation into the wind, the location of the combustion units, the upwind location of the ice breakers, and the downwind location of the oil spill response fleet, EPA believes that forcing all the combustion unit plumes in one direction should result in a maximum cumulative impact downwind of the Discoverer. See also Beaufort Statement of Basis Section 5.

**Comment:** Short-term impacts from support vessels are underestimated by modeling as volume sources. Section 5.1.4 of the Permit Application indicates that vessels used in ice management and anchor handling are modeled as volume sources. This approach is acceptable for annual modeling but it underestimates short-term impacts (e.g. for 1-hour NO<sub>2</sub>, 1-hour and 3-hour SO<sub>2</sub>) of activities that take place over a smaller area.

**Response:** EPA disagrees with the comment. The use of ISC3-PRIME with screening meteorology is intended to predict the worst case concentration impacts for each emission source type, criteria air pollutant, and the applicable averaging time. The assumptions used in this case produced conservative results. The commenter has not provided any documentation or specific information that these assumptions were in error.

See Chukchi Response to Comments Category V (General Comments on Ambient Air Quality Analysis and Supporting Data) Comments V.2; Category AA (Meteorological Data) Comment AA.1.b; Category BB (Choice of Model) Comment BB.1; Category CC (Plume Height) Comment CC.1; and above Response to Comments Category Y.

**Comment:** Project impacts are severely under predicted since several stacks are merged and the receptors are located very close to the sources. Shell should model the true locations of these stacks in order to ensure that the impacts analysis captures maximum impacts close to the drill ship.

**Response:** EPA guidance allows the same air pollutants emitted from several stacks that are relatively close to each other and have similar stack parameters (e.g., flow rates) to be modeled from a representative stack. Hence, EPA approved Shell's use of a representative stack for several emission units since the concentration is likely to be higher than if the individual stacks were modeled.

**Comment:** The MMS commented that the ICS3-Prime modeling system used here is conservative and more than sufficient to support the permit and recommends that EPA consider using OCD model for future analysis since that model was designed for over-water meteorology and includes downwash effects as well.

**Response:** For the reasons described above, EPA determined ICS3-PRIME was the appropriate model to use in this instance. See Chukchi Response to Comments Category BB (Choice of Model).

## **CC. CATEGORY – PLUME HEIGHT**

**Comment:** Commenter asserts that project impacts are under-predicted with the final plume rise option. A review of the ISC3-PRIME modeling input files

indicates that the final plume rise has been used in modeling offshore sources which can severely underestimate the impacts at receptors located close to the emission sources, e.g. receptors located a few meters off the drill ship Discoverer. Shell's vessels, especially the Discoverer, will create building wake effects. Thus, impacts close to the drillship are severely underestimated with the use of final plume rise. Modeling runs involving the drillship should be rerun with the option "gradual plume rise" to ensure that maximum project impacts are modeled.

The commenter also claims that modeling results for offshore sources with large plume rise are invalid by the incorrect calculation of unrealistically low mixing heights, elevated plumes from the drill ship under neutral and unstable conditions in the screening meteorological data. Commenter claims this results in severe underestimation of project impacts for both receptors located near the emission sources and far away. Thus, all ISC3-PRIME modeling results for offshore sources with high plume height using the wrong mixing height are invalid. These modeling results should be rejected and the ISC3-PRIME modeling runs should be performed again.

The comment further states that modeling results for offshore sources are invalid by large mixing height under stable conditions in the screening meteorological data. Thus, all ISC3-PRIME modeling results for offshore sources using the wrong mixing height (10,000 m) are invalid, because they severely underestimate the concentrations that may occur closer to the surface. These modeling results should be rejected and the ISC3-PRIME modeling runs should be performed again.

The comment asserts that impacts from support vessels are also underestimated due to high plume rise. Section 5.1.4 of the Permit Application indicates that ice management and anchor handling vessels that are the source of most of Shell's emissions are modeled as volume sources with their release height based on the plume height.

The commenter believes that a lower wind speed (10 meters per second or less) and more stable conditions (E stability) should be used to calculate a lower plume rise since the ISC3-PRIME model only predicts the maximum 1-hour concentrations and such conditions may occur over several 1-hour periods. Accounting for the lower plume rise that may occur will ensure that the maximum impacts are captured, especially for receptors located near the ships.

**Response:** In EPA's view the projects impacts are not under-predicted as the commenter suggests. Rather, the modeling was conducted using conservative inputs and assumptions and if anything over predicted rather than under-predicted the concentrations. The air quality modeling analysis

performed for the project used the ISC3-PRIME model with the parameter keyword “DFAULT” to the right of the CO pathway and MODELOPT keyword. The DFAULT keyword informs the model that the regulatory default settings are used, including the final plume rise option. However, when PRIME is selected to estimate wake impacts, the gradual plume rise is used instead. Thus contrary to the comment, the appropriate plume rise was used. As explained in the Beaufort Statement of Basis, pp.103-104, the analysis did consider the specific building dimensions to account for building downwash. Hence, there was no error in the model option selected for the purpose of predicting an adequate air quality concentration impact.

See Chukchi Response to Comments Category V (General comments on Ambient Air Quality Analysis and Supporting Data) Comments V.2; Category AA (Meteorological Data) Comments AA.1.a, AA.1.b, and AA.2; Category BB (Choice of Model) Comment BB.3 Category CC (Plume Height) Comment CC.1; and above response to comments Category BB.

## **DD. CATEGORY – AIR QUALITY ANALYSIS FOR PM<sub>2.5</sub> NAAQS (INCLUDING SECONDARY PM<sub>2.5</sub>)**

### **DD.1 SUBCATEGORY SECONDARY PM<sub>2.5</sub> FORMATION**

**Comment:** A group of comments state the Proposed Permit does not take into account secondary PM<sub>2.5</sub> formation and explain that EPA must consider the effects of such secondary formation of PM<sub>2.5</sub> in order to complete a sufficient analysis of the operations’ potential impacts on air quality. See 40 C.F.R. § 52.21(k). Shell’s operations could result in the formation of a substantial amount of secondary PM<sub>2.5</sub>. In analyzing this potential for secondary PM<sub>2.5</sub> formation, EPA should consider conditions on the North Slope and the potential emissions of Shell’s operations. Local North Slope conditions could be conducive to secondary PM<sub>2.5</sub> formation; strong temperature inversions are known to occur on the North Slope, and such inversions contribute to secondary PM<sub>2.5</sub> formation by limiting pollution dispersion. Also, Shell will emit large amounts of pollutants, such as NO<sub>x</sub>, volatile organic compounds (“VOC”), SO<sub>2</sub>, and ammonia, known to contribute to secondary PM<sub>2.5</sub> formation. Shell’s operations have the potential to emit 1,371 tpy of NO<sub>x</sub> and 96 tpy of VOCs, Statement of Basis at 27, and Shell’s use of SCR will likely result in the release of unreacted ammonia. Further, Shell will increase NO<sub>x</sub> levels significantly in regional villages, such as Kaktovik, potentially resulting in local secondary PM<sub>2.5</sub> formation.

The commenters state that the PM<sub>2.5</sub> impacts reported in the Statement of Basis and Permit Application were estimated using the ISC3-PRIME

model and PM<sub>2.5</sub> primary emissions and do not account for the secondary formation due to chemical conversion of precursors such as NO<sub>x</sub>, SO<sub>2</sub> and VOC. These precursors are emitted not only by the Shell project but also other facilities in the North Slope area. Table 5-8 of the Statement of Basis shows that cumulative sources emit 65,644 tpy of NO<sub>x</sub> and 21,683 tpy of SO<sub>2</sub>. Secondary chemical conversion has been estimated by the US EPA to account for over half of total ambient PM<sub>2.5</sub> nationwide (Seitz, 1997). Thus, 24-hour PM<sub>2.5</sub> impacts reported in the Statement of Basis (18.2 µg/m<sup>3</sup> in Table 5-3) may be doubled, which would result in a violation of air quality standards.

These commenters further explain that an analysis of secondary PM<sub>2.5</sub> formation is important because PM<sub>2.5</sub> poses significant dangers to health and the environment and provide additional facts regarding health and welfare impacts associated with PM<sub>2.5</sub>. They specifically describe why they believe that increased PM<sub>2.5</sub> concentrations on the North Slope will expose Alaska Natives to heightened risk of morbidity and mortality. In order to help ensure that Shell's PM<sub>2.5</sub> emissions will not harm North Slope individuals and communities, the commenters believe EPA should require Shell to analyze the impacts of the secondary PM<sub>2.5</sub> formation that may result from its operations.

**Response:** EPA acknowledges the commenter's concerns with respect to the secondary formation of PM<sub>2.5</sub>. There are, however, limitations in the tools and models currently available to address secondary PM<sub>2.5</sub> emissions. See Memorandum from Stephen D. Page, Director, Office Air Quality Planning and Standards, March 23, 2010, Re: Modeling Procedures for Demonstrating Compliance with PM<sub>2.5</sub> NAAQS.

Nevertheless, as explained in the Chukchi Response to Comments, in EPA's view, the conservatism built into the modeling assumptions that were used in conducting the air impact analysis for this project mitigate against the possibility that PM<sub>2.5</sub> would cause or contribute to a violation of the NAAQS. Consequently, EPA believes the cumulative effect of the conservative assumptions has adequately accounted for the possibility of secondary formation of PM<sub>2.5</sub>.

Additionally, the final permit includes a post-construction requirement to install and operate a FRM sampler in addition to the FEM continuous sampler required in the proposed permit. An FRM is a manual sampler that pulls air through a filter for 24 hours (midnight to midnight). The filter is then weighed in a lab and a PM<sub>2.5</sub> concentration is calculated based on the mass increase of the filter and the volume of air drawn through it. Use of a manual sampler will allow the filter to be analyzed for the chemical speciation of PM<sub>2.5</sub> constituents such as sulfates, nitrates, organics, sea salt and metals. With this data, EPA, Shell and the public

will be better able to evaluate the significance of secondary formation of PM<sub>2.5</sub> from sources in the area. The manual sampler will also assist in determining the contribution of local sources of fugitive dust to PM<sub>2.5</sub> concentrations.

See Chukchi Response to Comments Category DD (Air Quality Analysis for PM<sub>2.5</sub> NAAQS (Including Secondary PM<sub>2.5</sub>))

## **DD.2 SUBCATEGORY- AMMONIA**

**Comment:** Commenters assert Shell’s permit application appears to misrepresent the amount of ammonia its operations may emit. Shell states that the “only substantive source of ammonia emissions is ammonia slip from the SCR applied to the six main engines on the Discoverer.” Beaufort PSD Application at 167. However, the anchor handler also will be equipped with SCR, Statement of Basis at 11, and as a much larger source of pollutants than the six main engines on the Discoverer, it may be a substantial source of ammonia that Shell has failed to consider.

**Response:** Although EPA agrees that the main propulsion engines of Icebreaker #2 will also be a source of ammonia emissions, EPA disagrees that they would be significantly larger source. The combined horsepower of the six main engines on the Discoverer is 7950 horsepower while the combined horsepower of the two main engines on Icebreaker #2 is 8830 horsepower which means that Icebreaker #2 would be a similar, albeit slightly larger source of ammonia. Since Shell’s modeling analysis showed that the ammonia emissions from the six main generator engines would only result in a maximum 1-hour ammonia concentration of 2.4 µg/m<sup>3</sup> as compared to the ADEC ambient ammonia standard of 2,100 µg/m<sup>3</sup> (8-hour average), doubling or even tripling the impact by including ammonia from Icebreaker #2 would still result in concentrations far below the ADEC standard.

## **DD.3 SUBCATEGORY- PM<sub>2.5</sub> INCREMENT**

**Comment:** EPA must include a modeling demonstration for this new PSD increment in its final permit for Shell’s Beaufort Sea operations. Shell cannot ignore the imminent requirement of this new PSD standard. In the likely event that EPA issues Shell’s permit prior to the Agency’s final decision on the PM<sub>2.5</sub> increment, EPA must still consider compliance with the increment for Shell’s operations in the Beaufort Sea since the regulation will likely be effective during some portion of Shell’s operations. Shell must be able to demonstrate compliance with all requirements that are effective during its period of operation.

Commenters also assert that the project's PM<sub>2.5</sub> 24-hour impacts will exceed the proposed PSD Class II 24-hour increment and explain that in September 2007, US EPA has proposed PM<sub>2.5</sub> significant impact increments (1.2-5 µg/m<sup>3</sup> for 24-hour averages and 0.3-1.0 µg/m<sup>3</sup> for annual averages) and PSD Class II increments (9 µg/m<sup>3</sup> for 24-hour averages, and 4-5 µg/m<sup>3</sup> for annual averages). The Commenters point to the Beaufort Statement of Basis p. 115 which shows a maximum 24-hour concentration of 19.2 µg/m<sup>3</sup> from the Shell project alone. This maximum 24-hour concentration will exceed the proposed PSD Class II increment of 9 µg/m<sup>3</sup>. As shown in Section 5.2.23 of the Beaufort Statement of Basis, this PSD Class II increment is exceeded not only by the base operating scenario but by eight other operating scenarios. Among nine additional operating scenarios that were modeled, only the tanker scenario does not cause the exceedance of the proposed PSD Class II increment.

**Response:** As a general matter, permitting and licensing decisions of regulatory agencies must reflect the law in effect at the time the agency makes a final determination on a pending application. *See Ziffrin v. United States*, 318 U.S. 73, 78 (1943); *State of Alabama v. EPA*, 557 F.2d 1101, 1110 (5<sup>th</sup> Cir. 1977); *In re: Dominion Energy Brayton Point, LLC*, 12 E.A.D. 490, 614-616 (EAB 2006); *In re Phelps Dodge Corp.*, 10 E.A.D. 460, 478 n. 10 (EAB 2002). There is no requirement that a PSD permit ensure compliance with requirements that come into effect after the PSD permit has been issued. In 72 Fed. Reg. 54112 (September 21, 2007), EPA proposed for PM<sub>2.5</sub>, Class I, II and III air quality increments and significant impact levels ("SILs"), and a significant monitoring concentration ("SMC") as part of the PSD program. For air quality increments and SILs, EPA identified three sets of options which the commenter summarized in terms of numerical ranges. The proposed rulemaking also detailed EPA's rationale for the proposed numerical values associated with increments, SILs and SMCs.

As noted in the Federal Register, it is a proposed rulemaking and EPA is seeking public comments on the three options for the increments. Consequently, EPA cannot require to Shell to demonstrate that it will not cause or contribute to a violation of the proposed Class II increments until a final rule is promulgated. See Chukchi Response to Comments Category DD (Air Quality Analysis for PM<sub>2.5</sub> NAAQS (Including Secondary PM<sub>2.5</sub>))

## **EE. CATEGORY – AIR QUALITY ANALYSIS FOR OZONE**

**Comment:** Shell's emissions may not comply with proposed 8-hour ozone standards. On January 6, 2010, US EPA has proposed to strengthen the existing 8-hour ozone standard from 0.075 parts per million ("ppm") to a new lower standard between 0.06-0.07 ppm. Table 8-3 of the Permit Application

shows a maximum 8-hour concentration of 0.05 ppm was measured at Barrow which is close to the lower end of the proposed standard (0.06 ppm). The Shell project will add to the regional background and may interfere with attainment of the new lower ozone standard that will be promulgated by the US EPA by August 31, 2010.

**Response:** The commenter is correct that EPA has proposed changing the primary and secondary NAAQS for ozone, 75 Fed. Reg. 2938 (January 19, 2010). The rulemaking is not yet final. As explained in response to comments regarding the new NO<sub>x</sub> NAAQS in Category II there is no requirement that a PSD permit ensure compliance with requirements that come into effect after the PSD permit is issued. Nevertheless, as discussed in Section 5.2.24 of the Beaufort Statement of Basis, EPA believes the low amount of ozone precursor emissions released from the Shell project would result in a small contribution to the regional ozone formation. In addition, EPA believes that this small contribution will not cause or contribute to a violation of existing NAAQS.

See also Chukchi Response to Comments Section EE (Air Quality Analysis for Ozone) for a more detailed response to comments concerning ozone.

## **FF. CATEGORY – VISIBILITY, SOILS AND VEGETATION ANALYSIS**

### **FF.1 SUBCATEGORY – VISIBILITY**

**Comment:** Commenter states that Shell's operations also must comply with limits on degradation of visibility, 18 AAC 50.050(a), 50.055, 50.070. Shell indicates that it will comply with these limits through a combination of controls. Beaufort PSD Application at 35-36. However, Shell has not actually modeled potential impacts on visibility. See id. at 174-76. Shell should do so in order to ensure its compliance with Alaska law.

**Response:** The commenter is confusing the ADEC visible emission standards with the requirement to perform an analysis of the impact of project emissions on local visibility. The cited 18 AAC 50 provisions limit the opacity of a plume, measured using EPA Method 9, immediately downwind of the stack release point. This requirement does not rely on modeling for compliance but rather the use of controls to reduce particulate matter that would result in a visible plume. The permit includes conditions requiring Shell to comply with 18 AAC 50.050(a) (Condition K.11), 18 AAC 50.055 (Condition B.8) and 18 AAC 50.070 (Condition B.6). Shell is also required by 40 C.F.R. § 52.21(o) to conduct an analysis of the effect of the project on local visibility and has included such an analysis in its permit application (see Comment below).

**Comment:** Commenter states that Plume blight from project sources have not been modeled and explains that since some lease blocks are located only 3 miles from shore, plume blight from the drillship, the tanker and other support vessels should be analyzed. These project sources emit significant amounts of NO<sub>x</sub>, PM<sub>10</sub>, PM<sub>2.5</sub> and SO<sub>2</sub> that are known to reduce visibility. The VISCREEN model developed by the EPA should be used to analyze local visibility effects of both project onshore and offshore sources.

**Response:** In Class II areas, Shell is subject to the visibility impairment analysis requirements under Additional Impact Analyses in 40 C.F.R. § 52.21(o)(1). The regulation does not specify a procedure and a criterion to conduct the analysis. However, EPA has previously developed a screening procedure to expedite the analysis of emissions impacts on the visual quality of an area. EPA summarized this procedure in the draft New Source Review Workshop Manual, Prevention of Significant Deterioration and Nonattainment Area Permitting. The manual explains that the screening was designed for Class I area impacts, but notes that the outlined procedures are generally applicable to other areas as well. EPA has recommended application of VISCREEN for a first level visibility analysis under the screening procedures. Overall, however, the Workshop Manual suggested the following components of a good visibility impairment analysis: (1) a determination of the visual quality of the area; (2) an initial screening of emission sources to assess the possibility of visibility impairment; and (3) if warranted, a more in-depth analysis involving computer models. Furthermore, the Workshop Manual recognizes that the permit reviewer must ultimately decide whether the analyses performed by a particular applicant are satisfactory. However, the Workshop Manual is not a regulation and was never issued in final form.

As described in Section 5.3.3 and 5.3.4 of the Statement of Basis, a qualitative visibility impact analysis has been provided for two National Parks Service (“NPS”) Class II monument areas (Cape Krusenstern National Monument and Bering Land Bridge National Monument), and for the formation of freezing and ice fog. Because both of these areas are located a considerable distance from Shell’s Beaufort Sea lease blocks, the National Park Service determined that the Shell project should not adversely affect visibility at either of these monuments.

Additionally, in response to the comment, EPA conducted the visibility analysis for the FWS Arctic National Wildlife Refuge (“ANWR”) Class II area located approximately eight miles south of Shell’s nearest lease block using VISCREEN with default assumptions appropriate for first level screening. Furthermore, per the NPS recommendation, the analysis assumed that the visual range was 126-km and the source to ANWR distance was 13-km. The model output showed a calculated exceedance

of delta-E “color change” against terrain and sky inside the Class II area (i.e., a plume can be observed). However, the model output also indicated that at a source to ANWR distance between 30- and 35-km, the visibility impact is mitigated (i.e., a plume is not observable). Thus, the model output does not indicate the permitted activities will have a detrimental impact on visibility in ANWR. Model output is included in the record for the final permit.

As discussed in the Beaufort Statement of Basis Section 5.3.7, and pursuant to 40 C.F.R. § 52.21(p) the federal land manager responsible for Denali National Park, the Class I area closest to the proposed activity, determined that the proposed activity will not have an affect on any Class I areas and EPA determined that further visibility analysis was not required for the proposed permit. See correspondence with NPS in the record.

After receiving the comment requesting VISCREEN be used, EPA also requested Shell conduct an analysis using this model. Shell submitted the analysis on March 30, 2010 and it is included in the record for the final permit. The analysis focused on the Class I Denali National Park located 714 km from Shell’s project area rather than on Class II areas within the source’s potential impact area.

EPA does not interpret the applicable regulations to require use of visibility modeling (or the VISCREEN model in particular) in all circumstances. Section 52.21(o) does not specify any particular analytical requirements for assessing impairments to visibility. Section 6.2.1(d) of Appendix W does not describe the use of any models using mandatory language. Furthermore, in less formal guidance, EPA has recognized the discretion of the permitting authority to determine the adequacy of an additional impacts (including visibility) analysis. Under the circumstances, after review of the qualitative and quantitative visibility analyses conducted for Class II area and considering the duration of operation at each well site and the relative location to the shore EPA has determined that the visibility analysis conducted for Shell's operations in the Beaufort is sufficient to support the permit as proposed. The qualitative visibility assessment in the application was sufficient in light of the information available at the time that there were no sensitive receptors in the ocean. The U.S. Fish and Wildlife Service (“FWS) did not identify ANWR as a sensitive receptor for visibility impacts. Nevertheless, EPA has completed a VISCREEN analysis for ANWR in response to the comment and has included the analysis in the record.

## **GG. CATEGORY – CUMMULATIVE IMPACTS**

See the Chukchi Response to Comments for responses related to this category of comments.

## **HH. CATEGORY – GLOBAL WARMING/GREENHOUSE GASES**

### **HH.1 SUBCATEGORY: CO<sub>2</sub>**

**Comment:** A number of commenters state that EPA should regulate Shell’s CO<sub>2</sub> emissions because pursuant to the Supreme Court’s ruling in *Massachusetts v. EPA* established that CO<sub>2</sub> is a “pollutant” under the CAA, and EPA has the statutory authority to regulate it. 549 U.S. 497, 529, 532 (2007). Annual emissions of carbon dioxide from the Discoverer alone are estimated to be approximately 22,500 tons/year. Potential annual emissions of carbon dioxide from the Discoverer and its associated fleet are estimated to be approximately 94,000 tons/year. Shell’s proposed operations will emit about 94,000 tpy of CO<sub>2</sub>, Beaufort PSD Application at 98 – an amount approximately equivalent to the annual household CO<sub>2</sub> emissions of 21,000 people, roughly three times the entire population of the North Slope Borough. It is also nearly four times greater than the threshold triggering regulation under EPA’s proposed PSD and Title V GHG Tailoring Rule. 74 Fed. Reg. at 55,292.

Additionally regarding CO<sub>2</sub>, the commenters state that in applying BACT, EPA will not be limited to end-of-pipe control technologies. EPA should consider a variety of options for controlling Shell’s CO<sub>2</sub> emissions, including the “application of production processes and available methods, systems, and techniques, including fuel cleaning, clean fuels, or treatment or innovative fuel combustion techniques . . . .” 42 U.S.C. § 7479(3). Shell may be able to reduce CO<sub>2</sub> emissions from its marine engines through the incorporation of improvements in efficiency and the inclusion of “higher compression ratios, higher injection pressure, shorter injection periods, improved turbocharging, and electronic fuel and air management.” 73 Fed. Reg. 44,354, 44,467 (July 30, 2008)

Finally, the commenters assert that BACT exists to reduce CO<sub>2</sub> emissions. In light of the numerous available control technologies, EPA must analyze their application to these activities as part of the instant permitting process.

**Response:** EPA has just finalized its reconsideration of when a pollutant becomes “subject to regulation” for the purposes of the PSD program. See Final Action on Reconsideration of Interpretation: Reconsideration of Interpretation of Regulations that Determine Pollutants Covered by CAA Permitting Programs, 75 Fed. Reg. 17004 (April 2, 2010). As explained in that action, EPA will continue applying the Agency’s existing

interpretation of the regulation that determines the scope of pollutants subject to the federal PSD program under the CAA. In a December 18, 2008 memorandum, EPA established an interpretation clarifying the scope of the phrase “subject to regulation” found within the definition of the term “regulated new source review (“NSR”) pollutant.” On February 17, 2009, EPA granted a Petition for Reconsideration of the December 18, 2008 memo and later issued a public notice seeking comment on alternate interpretations of the scope of this phrase. After considering the comments received in that reconsideration action, which included comments similar to those presented in the comments above, EPA decided to continue to interpret the phrase “subject to regulation” to include each pollutant subject to either a provision in the CAA or regulation adopted by EPA under the CAA that requires actual control of emissions of that pollutant. As explained in the final action on reconsideration, EPA will continue following the interpretation in the December 18, 2008 memorandum with one exception – EPA is refining its interpretation to establish that the PSD permitting requirements will not apply to a newly regulated pollutant until a regulatory requirement to control emissions of that pollutant “takes effect.” For EPA’s complete final action on reconsideration, including the response to comments document, please see <http://www.regulations.gov>, Docket ID No. EPA-HQ-OAR-2009-0597.

For the purposes of GHG emissions, including CO<sub>2</sub>, EPA’s final action on reconsideration explains that in applying this interpretation of “regulated NSR pollutant,” PSD permitting requirements will not apply to these emissions until at least January 2, 2011, based on the anticipated finalization of the light-duty vehicle rule for GHG emissions. EPA explained that, if finalized as proposed, the light-duty vehicle rule “takes effect” on January 2, 2011 -- the earliest date 2012 vehicles meeting the standards can be sold in the United States. On April 1, EPA finalized the light-duty vehicle rule, setting GHG emissions standards for new passenger cars, light-duty trucks, and medium-duty passenger vehicles in model years 2012 through 2016. See Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards; Final Rule (signed April 1, 2010), available at <http://www.epa.gov/otaq/climate/regulations/ldv-ghg-final-rule.pdf>. Accordingly, since CO<sub>2</sub> and other GHGs are not currently a “regulated NSR pollutant” for the purposes of PSD permitting requirements and will not be so until at least January 2, 2011, EPA does not have a legal basis to include BACT limits for CO<sub>2</sub> and other GHGs in the final Shell permit.

Because CO<sub>2</sub> is not currently a “regulated NSR pollutant” for the purposes of PSD permitting requirements, there is no applicable permitting threshold applicable to CO<sub>2</sub> emissions at this time. EPA also notes that the GHG emission thresholds from EPA’s proposed PSD and Title V Greenhouse Gas Tailoring Rule that are referenced in the comments have

not been finalized and thus are not applicable to the Shell exploratory drilling activities addressed in the final permit.

As for the comment on available control technologies for CO<sub>2</sub>, EPA has not undertaken a BACT analysis of control technologies for these emissions because CO<sub>2</sub> is not currently a “regulated NSR pollutant” for the purposes of PSD permitting requirements. Thus, the final permit does not contain BACT limits for CO<sub>2</sub> emissions and an accompanying BACT analysis is unnecessary.

## **HH.2 SUBCATEGORY BLACK CARBON**

**Comment:** A group of commenters contend that EPA should factor the effects of Shell’s black carbon emissions into its permit decision and explain that black carbon is one of the most important contributors to Arctic warming, and Shell’s black carbon emissions will accelerate this warming. The CAA requires EPA to analyze the effects of black carbon on the North Slope region, 42 U.S.C. § 7475(e)(3), and EPA has the authority to require the reduction of Shell’s black carbon emissions based on the environmental impacts of those emissions, 40 C.F.R. § 52.21(b)(12). However, the Proposed Permit and its supporting documents fail completely to consider the effects of Shell’s emissions of black carbon. EPA should analyze the effects of Shell’s black carbon emissions and require Shell to reduce those emissions through the use of particulate filters that effectively filter black carbon. Commenters state that a significant fraction of the 57 tpy of PM<sub>2.5</sub> the Proposed Permit authorizes will be black carbon. EPA, Current Policies, Emission Trends and Mitigation Options for Black Carbon in the Arctic Region (EPA Draft White Paper) at 21-22 (April 28, 2009). Black carbon is generally regarded as the second most important contributor to Arctic warming after CO<sub>2</sub>. These commenters further indicate that Shell’s black carbon emissions will cause warming in an environment that is already stressed. Climate change is happening more quickly in the Arctic than other places in the world and these changes are already harming Arctic communities and Alaska Native cultural traditions that are thousands of years old. Shell’s black carbon emissions may contribute to this harm substantially. Harm to subsistence resources endangers the welfare of people of the North Slope. Subsistence activities are very important to Native people and communities, because they support community health and play a central role in cultural traditions.

The commenters assert that the CAA requires EPA to analyze the potential effects of black carbon on the North Slope region. The PSD program is designed to “assure that any decision to permit increased air pollution in any area to which this section applies is made only after careful evaluation of all the consequences of such a decision . . . .” See 42 U.S.C. § 7470. It

requires an analysis of factors that are relevant to determining the effect of emissions from a proposed facility on an air quality control region. 42 U.S.C. § 7475(e)(3). Shell's black carbon emissions are a relevant factor to a determination of the effect of Shell's emissions on the North Slope region, and EPA must analyze the effect of those emissions.

**Response:** Black carbon is not a "regulated NSR pollutant" under the PSD program, nor is it regulated under any other federal standards that apply to Shell's exploration drilling operations. To the extent black carbon is comprised of particulate matter, it is regulated as particulate matter – PM<sub>10</sub> and PM<sub>2.5</sub> – in this permit, and EPA notes that emissions of those pollutants are substantially reduced by the emission limitations and control requirements in this permit. In addition, EPA's review of Shell's permit application shows that emissions from Shell's operations allowed under this permit will not interfere with attainment or maintenance of the NAAQS for PM<sub>10</sub> or PM<sub>2.5</sub> or applicable increments.

The requirements of Section 165(e) of the CAA are implemented through Sections 52.21(m) and 52.21(o) of EPA's regulation. EPA has completed the analysis called for in these portions of the regulations, which do not require independent consideration of black carbon emissions in this context. The analysis described in Section 165(e)(3) of the CAA is applicable to "each pollutant regulated under this chapter." 42 U.S.C. § 7475(e)(3)(B); *see also*, 42 U.S.C. § 7475(e)(1). EPA does not presently consider black carbon to be a pollutant subject to regulation under the CAA because emissions of this substance are at most included among an aggregate pollutant (particulate matter) and not independently subject to any control or limitation on emissions. *See, e.g.*, Memorandum from Stephen L. Johnson, Administrator to Regional Administrators, EPA's Interpretation of Regulations that Determine Pollutants Covered By Federal Prevention of Significant Deterioration (PSD) Permit Program, page 6 fn. 6; 75 Fed. Reg. 17004 (Apr. 2, 2010) (including Response to Comments document, Section 11.2).

**Comment:** Commenters assert that after assessing the potential effects of Shell's black carbon emissions, EPA must consider these effects in determining BACT. In determining BACT for Shell's emissions units, EPA evaluates the pollution controls, *inter alia*, in light of the environmental impacts of the control options. 40 C.F.R. § 52.21(b)(12); Statement of Basis at 61-62. In considering pollution controls for PM<sub>2.5</sub>, EPA should evaluate whether some filters will provide the additional environmental benefit of reducing black carbon emissions, and select as BACT control technology that will reduce Shell's black carbon emissions significantly.

**Response:** As explained above, black carbon "is not a regulated NSR pollutant" for the purposes of PSD permitting requirements. Accordingly, the final

permit does not contain BACT limits for black carbon emissions, and EPA has not undertaken the accompanying analysis of control technologies for these emissions. EPA did analyze a variety of control technologies for PM<sub>2.5</sub> emissions, of which black carbon is a component, and determined that either CDPF or oxidation catalyst control was BACT for each particular emissions unit on the Discoverer. CDPF was eliminated as BACT for PM<sub>2.5</sub> for some engines in the top-down analysis based on technical and economic considerations. Moreover, the tools necessary to evaluate the impacts of black carbon are not yet refined enough to be applied in the manner suggested by the commenter. While general research regarding black carbon emissions and their impacts is available, there continues to be uncertainty regarding the specific quantities of black carbon emitted from different types of sources and from different types of control technologies. In addition, the current tools do not allow us to characterize and quantify the specific environmental impacts of those emissions from individual sources, such as the drill ship at issue in this permitting action. Because the commenters have not shown that consideration of the environmental impacts of black carbon emissions would have changed the BACT assessment, there is nothing in the permit record to indicate that EPA should alter the PM<sub>2.5</sub> BACT determinations in this permit.

We also note that, as identified in our analysis, a majority of the PM<sub>2.5</sub> emissions, and thus black carbon emissions, will originate from the various support vessels. As explained above, those support vessels are generally not subject to emission controls under the PSD program.

## **II. CATEGORY – NEW NAAQS FOR NITROGEN DIOXIDE**

**Comment:** Some commenters explained that EPA has established a new 1-hour NO<sub>2</sub> standard at a level of 100 ppb (188 µg/m<sup>3</sup>). 75 Fed. Reg. 6474 (2010). This new standard likely will be in force before the effective date of Shell's permit, if issued, see 40 C.F.R. § 124.15, and commenters believe that Shell's operations may not comply with this new standard. Shell's operations alone will cause a maximum annual NO<sub>2</sub> concentration of 19.1 µg/m<sup>3</sup>. Beaufort Statement of Basis at 98. Applying EPA's scaling factor to this concentration – the maximum 1-hour concentration being equal to ten-times the maximum annual concentration – yields a maximum 1-hour NO<sub>2</sub> concentration of 191 µg/m<sup>3</sup>. This exceeds the new NAAQS of 188 µg/m<sup>3</sup>, without even accounting for background concentrations. The commenters state EPA should not issue a permit that it knows may result in the violation of standards EPA has already promulgated in a final rule, and should ensure that Shell's operations will comply with the new 1-hour NO<sub>2</sub> standards.

The Proposed Permit would authorize Shell to emit 1,371 tpy of NO<sub>x</sub>, resulting in concentrations potentially reaching 78.8 percent of the PSD increment. Shell has not provided a modeling demonstration that these emissions will comply with EPA's final 1-hour nitrogen dioxide standard.

**Response:** This permit, when finalized, will meet all applicable requirements in effect at the time of permit issuance. There is no requirement that a PSD permit ensure compliance with requirements that come into effect after the PSD permit has been issued. The new hourly NO<sub>2</sub> NAAQS was published in the Federal Register on February 9, 2010, but is not currently in effect. See 75 Fed. Reg. 7473 (February 9, 2010) (April 12, 2010 effective date).

Similar comments were provided on the proposed Chukchi permit. Please see the Chukchi Response to Comments Category II for further detailed response to comments concerning this issue. See the April 1, 2010 memorandum titled "Applicability of the Federal Prevention of Significant Deterioration Permit Requirements to New and Revised National Ambient Air Quality Standards" from Steven D. Page, Director, Office of Air Quality Planning and Standards, to Air Division Directors and Deputies, Regions 1.

## **JJ. CATEGORY – OTHER REGULATORY APPROVALS**

See the Chukchi Response to Comments for responses related to this category of comments.

## **KK. CATEGORY – NATIONAL ENVIRONMENTAL POLICY ACT**

**Comment:** EPA received comments regarding the National Environmental Policy Act ("NEPA) that are similar to the comments received on the proposed Chukchi permit.

**Response:** As discussed in the Beaufort Statement of Basis, Section 7(c) of the Energy Supply and Environmental Coordination Act of 1974 specifically exempts actions under the CAA, including issuance of an OCS/PSD permit, from the requirements of NEPA. Beaufort Statement of Basis, p. 135. EPA is therefore not required to comply with NEPA or develop an EIS or Environmental Assessment ("EA") prior to issuance of this permit. MMS, which is subject NEPA, has prepared an EA and a FONSI in support of MMS's approval of Shell's 2010 exploration drilling program in the Beaufort Sea. See:  
[http://www.mms.gov/alaska/ref/EIS%20EA/mms2009\\_052\\_ea/2009\\_1015\\_EA.pdf](http://www.mms.gov/alaska/ref/EIS%20EA/mms2009_052_ea/2009_1015_EA.pdf)  
[http://www.mms.gov/alaska/ref/EIS%20EA/mms2009\\_052\\_ea/2009\\_1015\\_FONSI.pdf](http://www.mms.gov/alaska/ref/EIS%20EA/mms2009_052_ea/2009_1015_FONSI.pdf)

See also the Chukchi Response to Comments Category KK (NEPA) for the full agency response regarding this topic.

**LL. CATEGORY – ENVIRONMENTAL JUSTICE**

**Comment:** EPA received numerous comments relating to environmental justice that were similar to the comments received on the proposed Chukchi permit.

**Response:** See the Chukchi Response to Comments for responses related to this category of comments and Sections 1 and 6 of the Beaufort Statement of Basis. Also, Region 10 held informational meetings on the proposed Beaufort permit in addition to the public hearings in the three North Slope communities of Barrow, Kaktovik, and Nuiqsut.

**MM. CATEGORY – GOVERNMENT-TO-GOVERNMENT CONSULTATION AND TRUST RESPONSIBILITY**

**Comment:** EPA received comments relating to government-to-government consultation on the proposed Beaufort permit that were similar to the comments received on the proposed Chukchi permit. Additionally, a commenter at the Kaktovik public hearing specifically urged EPA to correspond with tribal governments on this and other permits.

**Response:** See the Chukchi Response to Comments for responses related to this category of comments and a description of the government to government consultation for these permits. See Beaufort Statement of Basis Section 6 and March 26 2010 EPA Memorandum regarding Government-to-Government Consultation, for consultation activities specific to the Beaufort permit.

**NN. CATEGORY – ENDANGERED SPECIES ACT**

**Comment:** The North Slope commenters appreciate EPA consulting informally with the FWS and NOAA under the Endangered Species Act. The commenters request that in light of the importance of Camden Bay as feeding and resting ground for bowhead whales and the whale's strong olfactory senses, which, in the commenters' view, will be affected by both Shell's air and water emissions, EPA reinstate section 7 consultations to ensure bowhead whales will not be adversely affected by Shell's proposed operations. Additionally, unless EPA re-defines the scope of the final Permit to encompass only those well-sites for which Shell sought authorization under OCSLA for its 2010 exploration program, then formal consultations are, in the commenters' view, necessary to address the ongoing impacts from Shell's many years of operations in both the Beaufort and Chukchi Seas and their ramifications for marine life.

Additionally, the commenters state that while they agree that MMS is the lead the agency for Section 7 consultations, MMS decided not to initiate the Section 7 consultation process to review Shell's Exploration Plans. Further commenters are concerned that the isolated consultations on just the air emissions of these operations is insufficient to ensure against the jeopardy of listed species that may, in the commenters' view, be affected by the entirety of Shell's proposed operations. For this reason, the commenters encourage EPA to work with MMS, FWS, and NOAA in ensuring full compliance with Section 7 of the Endangered Species Act.

Additional commenters expressed general concern about the impact of the proposed activity on the endangered species in the area.

**Response:** Similar comments regarding endangered species were received on the proposed Chukchi permit. Accordingly, see also the Chukchi response to comment Category NN for the agency's response to these concerns. As stated in the Chukchi response to comment, EPA has worked closely with MMS, FWS and National Marine Fisheries Service ("NMFS"). MMS, as the lead agency, has been working with the FWS and NMFS ("the Services") for many years to ensure that consultations for oil and gas activities in the Chukchi and Beaufort seas are as current, thorough, and accurate as possible. The most recently concluded consultation results are contained in the September 3, 2009, FWS Biological Opinion ("BO") for Beaufort and Chukchi Sea Program Area Lease Sales and Associated Seismic Surveys and Exploratory Drilling, and the July 17, 2008, NMFS revised BO for federal oil and gas leasing and exploration by the MMS within the Alaskan Beaufort and Chukchi Seas. MMS conducted these consultations at the lease sale stage representing a broad range of impacts from potential oil and gas leasing, exploration, and development in the Beaufort and Chukchi Seas, and the Services' BO provide a thorough and comprehensive analysis of those potential impacts to listed species and critical habitat. Shell's exploration activities in the Beaufort Sea are covered within the scope of these consultations. Any impacts from the exploratory drilling activities authorized by the OCS/PSD permit that EPA discussed separately with the Services, such as the air emission impacts, were not an "isolated consultation," but rather they were a closer examination of the impacts from a subset of the broader exploration activities already considered by the Services.

MMS has specifically consulted with NMFS regarding potential impacts to the bowhead whale from a broad range of activities associated with oil and gas exploration. In response, NMFS issued its July 17, 2008, revised Biological Opinion for federal oil and gas leasing and exploration by the MMS within the Alaskan Beaufort and Chukchi Seas. The BO concluded that the proposed activities may adversely affect individual endangered bowhead, fin and humpback whales, but that the proposed action is not

likely to jeopardize the continued existence of these species. In addition to relying upon these conclusions to meet its obligation under the ESA, EPA has also analyzed additional factors associated with issuing a Clean Air Act permit to Shell, including the emission of air pollutants authorized by our permitting action. For instance, as noted in our February 9, 2010 letters to NMFS and FWS, we analyzed issues relating to the duration and extent of exploratory drilling authorized by our permit as well as certain air pollutant emissions and concluded that our actions would have no effect on the listed species beyond those already addressed by NMFS and FWS. In its March 30, 2010 letter to EPA, NMFS concurred with our determination and specifically stated that it does not appear that the type or concentrations of the air emissions associated with this activity would have a measurable effect on the bowhead, fin or humpback whales. In its April 5, 2010 letter to EPA, the FWS concluded that the emissions authorized by this permit are not likely to bioaccumulate or have toxic effects on polar bears or listed eiders or candidate species and that adverse effects to listed species above those considered in previous BOs are not anticipated to result from EPA's issuance of this permit. These and other materials in the record demonstrate that EPA has fully considered and addressed ESA requirements in connection with all air emission issues raised by the comment.

As noted in our discussions with the Services, the actual amount of exploratory drilling that can occur is limited by the MMS' approval of any exploration plan for any year that Shell requests approval. EPA believes MMS must re-initiate consultation with the Services before approving any EP that allows exploration activity outside the scope of the activity already consulted on and as otherwise required under applicable ESA regulations, and MMS appears to share a similar view. See FWS April 5, 2010 letter to EPA (stating that "changes in the duration or timing of drilling would require MMS to reinitiate section 7 consultation should the authorization result in any potential impacts to listed species not previously consulted upon"). As provided in 50 C.F.R. § 402.16, re-initiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if, among other things, the agency action is subsequently modified in a manner that causes an effect to listed species or critical habitat not considered in the BO. See Chukchi Response to Comments Category NN (Endangered Species Act)

## **OO. CATEGORY – BASELINE DATA**

See the Chukchi Response to Comments for responses related to this category of comments.

**PP. CATEGORY – IMPACT ON LOCAL COMMUNITIES, SUBSISTENCE ACTIVITIES, AND TRADITIONAL USE**

**Comment:** Similar to the proposed Chukchi permit, EPA received numerous comments from North Slope community members, including a subsistence hunter, a whaling captain, community health practitioners and others, regarding the impact of Shell’s proposed exploration operations in the Beaufort Sea on local communities, cultural lifestyle, and subsistence activities. In addition to the comments that were the same as for the Chukchi permit, comments included:

- The Inupiat people have a profound vested interest in the sustainable harvest of all natural renewable resources within the Chukchi and Beaufort Sea and arctic waters. EPA should minimize the impacts of air pollution on the arctic environment and the cumulative effects of global warming within all Arctic communities across the circumpolar arctic.
- The Inupiat people are very concerned for maximizing protections of our highly sensitive arctic environment from future industrial emissions into our atmosphere.
- The proposed permit can and should incorporate more stringent regulations to ensure protection of the marine environment, which is the source of most of our food.
- The Arctic ecosystem is threatened by a rapidly warming climate. Our ice is receding and we are struggling to understand how our changing climate will impact our culture and subsistence lifestyle.
- The ocean and the food are used by subsistence hunters and allowing this activity is fooling around with the lives of the local people.
- There are concerns related to the amount of noise that will be generated because we are a whaling community that relies on the migration of the whale.
- The leasing of Cross Island should never have occurred and it is important to our community and our traditional and cultural uses.
- We are concerned for our Inupiat people’s welfare in the event of a major oil spill while industry conducts exploration drilling.
- Shell should calculate emissions that would result from having to clean up an oil spill and respond to some other emergency. Everyone knows there are risks with operating in the Arctic and Shell should have to

account for all of these risks by disclosing what they might mean for air quality.

**Response:** EPA appreciates the commenter's involvement in the public comment process and understands the seriousness of their concerns regarding potential impacts to the Arctic environment and subsistence whaling, hunting and Inupiat culture. Similar to and as explained further in the Chukchi Response to Comments for that permit, EPA analysis indicates that this project, as regulated by the terms and conditions in the final Beaufort permit, will not cause or contribute to a violation of any currently applicable NAAQS or exceed any applicable increment. Since NAAQS are established to protect public health and welfare, the project is not expected to have an adverse impact upon public health or welfare. Issues such as impact on subsistence hunting and fishing and on employment are outside the scope of the PSD program. *Kulluk* EAB Decision, slip op. at 68-69, fn. 66; *In re Knauf Fiber Glass GmbH*, 8 E.A.D. 121, 147 (EAB 1999) (stating that the Board's jurisdiction, and thus review power, is limited, extending only to those issues that are directly related to permit conditions that implement the federal PSD program).

However, EPA notes that there are other regulatory programs in place to address the commenter's concerns in this regard. *Kulluk* EAB Decision, slip op. at 68-69, fn. 66. For example, in the Finding of No Significant Impact ("FONSI") developed by the MMS for Shell's 2010 Offshore Exploration Drilling Program, and in its approval letter for the exploration plan, for example, the MMS did consider the effect and impacts of Shell's exploration activities on subsistence activities and the Inupiat culture and way of life; risk of oil spills and their potential impacts to area fish and wildlife resources; disturbance to bowhead whale migration patterns; harassment and potential harm to wildlife from noise, discharges, and vessel operations; impacts to threatened and endangered species; and local economic effects. See FONSI, dated October 15, 2009, for Shell Offshore Inc.,

[http://www.mms.gov/alaska/ref/EIS%20EA/mms2009\\_052\\_ea/2009\\_1015\\_FONSI.pdf](http://www.mms.gov/alaska/ref/EIS%20EA/mms2009_052_ea/2009_1015_FONSI.pdf);

Letter from Jeffrey Walker, MMS, to Susan Childs, Shell, dated October 21, 2009, re: Shell's 2010 Outer Continental Shelf Lease Exploration Plan, Camden Bay, Alaska.

[http://www.mms.gov/alaska/ref/ProjectHistory/Shell\\_BF/2009\\_1021\\_BF\\_ODPCP.pdf](http://www.mms.gov/alaska/ref/ProjectHistory/Shell_BF/2009_1021_BF_ODPCP.pdf)

**QQ. CATEGORY – HEALTH IMPACTS AND GENERAL AIR QUALITY CONCERNS**

**Comment:** Similar to the proposed Chukchi permit, EPA received numerous comments from North Slope community members raising concerns about the health impacts of Shell’s exploration drilling operations and general air quality concerns. In addition to the comments that were the same as for the Chukchi permit, comments included:

- Although the flaws in the Beaufort permit are similar to those of the Chukchi permit, the proximity of the Beaufort operations to the shore makes them more problematic for the local communities.
- Shell’s emissions pose potential health hazards for our people. Particulate matter can cause damage to hearts and lungs. Air pollutants also end up on the land and in the sea and can change the nutrient balance in nature with potential effects on our food sources and especially of concern close to shore.
- The North Slope has chronic lung disease rates that are higher than in most US populations, which means that local Inupiat populations will likely suffer greater consequences from Shell’s emissions than other populations. The majority of the Beaufort lease plots are located within 25 miles of shore, so the emissions of pollution from the Beaufort operations are likely to impact the local communities on shore in Kaktovik and Nuiqsut in particular. It is very expensive to leave the community for healthcare when we can’t breathe.
- The proposed permit can and should incorporate more stringent regulations to protect human health, including adopting EPA’s recently revised NAAQS for NO<sub>2</sub>. The proposed permit does insufficient job of protecting air and health.
- The cumulative air quality impact of this project and other future projects must be considered and more baseline studies are needed in the area specific to where the drilling is taking place before the permit is granted.
- Like Nuiqsut, Kaktovik has shown in the last eight to ten years increasing lung problems and the studies that are being considered for Nuiqsut should be considered for Kaktovik too or at least the results of the studies should be available before considering drilling for oil in the community.
- There are increased respiratory distress events occurring when there are multiple natural gas flares occurring with oil and gas development

around the community and this is compounded by the extreme temperatures in the areas, the lack of understanding of what these emissions are doing to our bodies, emissions that are not adequately controlled, and lack of enforcement with the rapid expansion of oil and gas activities.

- The drinking water as well as the ocean water should be tested because, during the summer time, whatever falls in the water, people end up drinking it in the winter time.
- The importance of our traditional and cultural uses, of the health of our people, of the health of our resources, and the health of our future generations are why we continue to participate in the process in spite of feeling like our comments are not heard in an effective way to address the issues and concerns.)

Response: EPA recognizes and understands the commenter's serious concerns regarding health impacts and local air quality. However as explained in the Chukchi Response to Comments, criteria pollutants are those pollutants for which EPA has established NAAQS. Primary NAAQS set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly, with an adequate margin of safety.

The maximum projected air quality impacts of the proposed project combined with background air quality (ambient air quality measurements assumed to be representative of the existing air quality in the project area due to general industrial development on the North Slope) are expected to be less than the currently applicable NAAQS as well as applicable increments. Project impacts on air quality in or near Barrow, Nuiqsut and Kaktovik, the three communities closest to Shell's leases in the Beaufort Sea are will be substantially less than the project's maximum impacts which occur in the outer OCS. Thus, the proposed project is not expected to cause or contribute to a violation of the current health-related air quality standards. Since this project will not cause or contribute to a NAAQS violation and since NAAQS are established to protect public health, the project is not expected to have an adverse impact upon public health.

To the extent the comments raise concerns with respect to air pollution control practices and requirements at other facilities, they are outside the scope of this OCS/PSD permit action.

See Chukchi Response to Comments Category RR (Clean Water Act) for additional response related to water quality concerns.

## **QQ.1 SUBCATEGORY-HAZARDOUS AIR POLLUTANTS**

**Comment:** Commenters contend that the health impacts of air toxics have not been considered. The proposed Shell project will emit 1.69 tpy of hazardous air pollutants (“HAP”). Except for ammonia that has a State Ambient Air Quality Standard, the Permit Application has not quantified the health impacts of other air toxics emitted by project sources. Health risks of both carcinogens and non-cancer toxics should be quantified individually. Predicted risks for each HAP should be compared against applicable minimum risk levels approved by ADEC (<http://www.dec.state.ak.us/air/anpms/toxics/mrls/mrlshome.htm>). Health risks for each HAP should also be added together to obtain total risks which are then compared against acceptable risk levels, e.g. below 1 in a million for carcinogens.

**Response:** EPA disagrees that the health impacts of air toxics must be considered in the context of an OCS/PSD permit. Section 328 of the Act only requires EPA to promulgate regulations that ensure that State and Federal ambient air quality standards are protected and that the provisions of Part C of title I (PSD) are met. Since ADEC has adopted a State ambient air quality standard for ammonia, EPA has correctly incorporated that standard into the COA requirements of 40 C.F.R. Part 55. However, EPA does not incorporate State air toxics regulations unless they are rationally related to the attainment or maintenance of the federal or state ambient air quality standards or the requirements of Part C Title I of the Act. In this case, ADEC’s guidance for evaluating the impact of air toxics is not an element of the State permitting rules that are incorporated into 40 C.F.R. Part 55 for the inner OCS nor are they part of the federal PSD rules which apply in the outer OCS.

## **RR. CATEGORY – CLEAN WATER ACT**

See the Chukchi Response to Comments for responses related to this category of comments.

## **SS. CATEGORY – OIL SPILLS AND SEISMIC ACTIVITIES**

See the Chukchi Response to Comments for responses related to this category of comments.

## **TT. CATEGORY – NEW SOURCE PERFORMANCE STANDARDS**

**Comment:** To the extent EPA is requiring Shell to comply with NSPS for emission sources that are not stationary, we contend this is incorrect. 40 C.F.R. § 55.13(c) provides that NSPS applies to OCS sources “in the same manner” as in the COA. NSPS only apply to stationary sources. 42 U.S.C. §

7411(b). NSPS do not apply to non-road engines, marine engines or mobile sources regulated under Title II of the CAA. See, e.g., 40 C.F.R. §§ 60.4219 (excluding non-road and mobile engines from the definition of stationary internal combustion engine for NSPS applicability); 1068.30 (excluding engines that are subject to an NSPS from the definition of “non-road engine”). Therefore, EPA must evaluate each “source” on the Discoverer to determine whether it is subject to a particular NSPS or to a non-road, marine or mobile source standard, in which case it would be specifically exempt from consideration as an NSPS source. Accordingly, EPA’s inclusion of emission units on the Discoverer as NSPS sources such as the crane engines, cementing units, logging winch engines, and high power unit engines is unlawful.

**Response:** Section 328 of the CAA plainly requires that emission units on OCS sources be regulated as stationary sources except with respect to propulsion engine emissions from vessels attached to an OCS source. Similarly, the exclusion of vessel emissions in 40 C.F.R. § 52.21 in the PSD definition of “stationary source” is plainly overridden by the specific reference to the regulation of vessels as OCS sources in the definition of OCS source in CAA Section 328(a)(4)(C) and 40 C.F.R. § 55.2. Finally, we note that in drafting the OCS provisions of the CAA, Congress specifically indicated that “[t]his legislation is intended to supersede any inconsistent authorities, including, but not limited to, section 5(a)(8) of the [OCSLA].” S. Rep. No. 101-228 at 78 (1989) (emphasis added). Accordingly, we find no basis for the claim that EPA erred the applicability determination of NSPS on emission units on the Discoverer. See Category F above and the Chukchi Response to Comments Category F (Definition of OCS Source) for more detailed information.

## **UU. CATEGORY – CORRESPONDING ONSHORE AREA RULES**

### **UU.1 SUBCATEGORY COMPLIANCE WITH COA RULES**

**Comment:** Commenter asserts that Shell’s application materials and the Statement of Basis do not sufficiently explain how Shell will comply with these COA rules and indicates that EPA should provide additional explanation regarding Shell’s compliance with these limits. The commenters specifically point to 18 AAC. 50.110 which prohibits emissions which are “injurious to human health or welfare, animal or plant life, or property, or which would unreasonably interfere with the enjoyment of life or property.” EPA only states that Shell must comply with this requirement that air quality standards should ensure such compliance, and that Shell will have to monitor for violations and respond to complaints. Statement of Basis at 43-44. EPA should provide additional analysis regarding the likelihood that Shell will cause harm that 18 AAC 50.110 prohibits. The commenter explains that while NAAQS standards are designed to protect

public health, CAA limitations do not prevent all possible injury to human health due to air pollution emissions. For instance, as explained supra, there is compelling evidence that PM<sub>2.5</sub> levels below NAAQS can result in serious harm to human health, including death, and Shell's operations may cause a violation of EPA's new 1-hour NO<sub>2</sub> standard. Moreover, EPA's monitoring requirement is of questionable utility, because someone who is injured by Shell's emissions is far from certain to realize the cause of the injury. Thus, EPA should provide additional protections to ensure that Shell will not violate 18 AAC 50.110.

**Response:** Section 328 of the CAA only requires EPA to promulgate regulations that ensure that State and Federal ambient air quality standards are protected and that the provisions of Part C of Title I (PSD) are met. However, EPA incorporates State regulations only to the extent that they are rationally related to the attainment or maintenance of the federal or state ambient air quality standards or the requirements of Part C Title I of the Act.

## **UU.2 SUBCATEGORY – EPA MUST APPLY ALL APPLICABLE COA RULES TO ANCILLARY VESSELS COMMENT:**

**Comment:** Commenter states that EPA promulgated 40 C.F.R Part 55 to establish requirements to control air pollution from OCS sources in order to ensure attainment and maintenance of Federal and State ambient air quality standards and to comply with the provisions of Part C of Title I of the CAA. The commenter argues that EPA applied the requirements in 40 C.F.R. 55 to the sources on the Discoverer but failed to apply all applicable COA regulations to the ancillary vessels supporting the OCS source, as intended by Section 328 of the CAA. EPA must apply the applicable legal requirements of the State of Alaska that were Incorporated by Reference into 40 C.F.R. 55, effective February 22, 2010, to all of the ancillary vessels in Shell's exploratory drilling program. This would include, for example, applying the COA incinerator visible emissions regulations (18 AAC 50.050) found in Condition K.11 of the proposed permit to the incinerators found on the two icebreakers (e.g., TV-8 of the Tor Viking) and the oil response vessel (N-6). It would also include the addition of all fuel-burning emission sources from the supply ship (e.g., FD31), the two icebreakers (e.g., units TV 1-7 of the Tor Viking) and the Oil Spill Response fleet (e.g., units PBT 1-4, units AEB 1-4, units N 1-5, units K 1-6 and units R 1-3) to the list of sources subject to the PM, SO<sub>2</sub> and visible emissions standards, monitoring, recordkeeping and reporting requirements in proposed Permit Conditions B.8, B.9, B.12, B.13, B.14, B.15, B.16 and B.17.

**Response:** As discussed in the Chukchi Response to Comments G.1 under the regulatory definition of "OCS source", only vessels that are "attached to the seabed and erected thereon and used for the purpose of exploring,

developing, or producing resources therefrom...” or that are attached to an OCS facility are considered an OCS source and subject to regulation as stationary sources under the PSD program. None of the support vessels (other than the supply ship) can attach to the Discoverer and emit pollutants so COA rules apply only to the Discoverer when it is an OCS source and to the supply ship when attached to the Discoverer at that time. See also the response in Category O above and the Chukchi Response to Comments Category O (BACT on Associated Fleet).

**Comment:** EPA must address the COA ice fog standards in 18 AAC 50.080 and in Appendix A of 50 C.F.R Part 55. All fuel-burning and incinerator emission units on the Discoverer and the associated support fleet in an area of potential ice fog must be required to obtain a permit and reduce water emissions. EPA must include an analysis of this COA regulation as it applies in the Inner OCS and include the needed permit conditions in the final permit.

**Response:** EPA disagrees that it needs to include conditions for water vapor emissions in the OCS/PSD permit at this time. This provision, which is incorporated into 40 C.F.R Part 55, provides the discretionary authority to require limitations on water vapor emissions if determined necessary to protect public safety. At this time, EPA is not aware of any potential for danger to public safety from ice fog due to water vapor emissions from the Discoverer. However, should it be determined that such danger exists in the future, EPA can include such conditions in the Part 71 operating permit for the Discoverer.

## **VV. CATEGORY – ADDITIONAL PERMIT CHANGES**

The ADEC submitted several comments that involve minor edits to the permit statement of basis.

**Comment:** The final sentence on page 31, Section 2.9 is missing a word. The sentence should read: “Because the PTE for this project is greater than 100 tpy for several criteria pollutants, it is a major source under Title V and Part 71 and Shell must apply for an operating permit as provided in 40 C.F.R. § 71.5(a)(1)(i) within 12 months of first becoming an OCS source on its current leases in the Beaufort Sea.”

**Response:** EPA acknowledges that there is a typographical error in the Statement of basis. However, this typographical error does not require a change to a permit condition.

**Comment:** Under the heading COA Regulations: Permit Revisions, Termination and Reissuance, page 35 Section 3.2, the next to last sentence contains an apparent typographic error. The sentence should read: “The State of

Alaska adopted this standard permit condition under 18 AAC 50.345(f) as part of the construction permit program ~~the~~ and this condition is included in State construction permits.”

**Response:** EPA acknowledges that there is a typographical error in the Statement of basis. However, this typographical error does not require a change to a permit condition.

**Comment:** The text under the heading Prohibited Activities, page 42 Section 3.3, does not appear to include exclusions that are detailed in the condition cited. Please consider changing the sentence to read: “Condition B.21 prohibits Shell from flow testing wells, flaring gas, storing liquid hydrocarbons recovered during well testing, or refueling any vessel (excluding the Discoverer, the Kvichak workboats, and Rozema Skimmer) ~~refueling~~ within 25 miles of the Discoverer while the Discoverer is an OCS source.”

**Response:** EPA acknowledges that there is a typographical error in the Statement of basis. However, this typographical error does not require a change to a permit condition.

**Comment:** Under the heading COA Regulations: Good Air Pollution Control Practice, page 43 Section 3.3, the second sentence in the second paragraph should read: “The State of Alaska adopted this condition as a Standard Permit Condition II (revised as of August 25, 2004) under 18 AAC 50.346(b) as part of the construction permit program and this Standard Permit Condition is included in State construction permits.”

**Response:** EPA acknowledges that there is a typographical error in the Statement of basis. However, this typographical error does not require a change to a permit condition.

**Comment:** Paragraph two, sentence two on page 54, Section 3.5 notes that Shell estimates that ice breaking capability in its lease holdings would only be required 38 percent of the time. This appears to reference information on forecast ice floe frequency and intensity forecasts based upon the data provided in Appendix L. In Shell’s application, page 25, Section 2.2, paragraph two, sentence three Shell states that ice breaker operations in the application are based upon the conservative assumption that ice is on location 38 percent of the season. It is not clear how the 38 percent figure was arrived at, since the data in Appendix L consists mostly of data collected in the months of September and October, while the implication elsewhere is that the season would start in July.

The context of this concern is that it appears that this forecast icebreaker usage is translated into a permit requirement in the EPA PSD permit as a limitation on the total fuel usage for the two icebreakers. Under Section N

for icebreaker #1, Section N.1 states “for a given drilling season” and other conditions under Section N list all operations as “in aggregate”. Given this language, it is not clear if this limitation on fuel usage is for the drilling season of July 1 to December 31 of each year or if it is an aggregate limitation on fuel usage during a given 12-month period as described in Section 3.3 Source-Wide Requirements- Duration of Exploration Operations on page 39 of the Statement of Basis document.

**Response:** EPA disagrees that the language in the permit conditions does not clearly identify if the limitation on fuel usage is for the drilling season or for a given 12-month period. The permit conditions for Icebreaker #1 and Icebreaker #2 are under Section O and P of the permit. The fuel usage limit in Conditions O.6 and P-6 are based on a rolling 12-month aggregate.

**Comment:** Page 55, Section 3.5 – Sentence five in paragraph two on page 55 Section 3.5 should read: Murmansk Shipping of Russia operates on vessel ~~vessels~~ – the Vladimir Ignatjuk.

**Response:** EPA acknowledges that there is a typographical error in the Statement of basis. However, this typographical error does not require a change to a permit condition.

#### **WW. CATEGORY – NEED FOR MEANINGFUL PUBLIC INVOLVEMENT AND ACCURACY IN MAKING PERMIT DECISION**

**Comment:** The North Slope commenters expressed concern about the speed at which EPA has been asked to process this permit. They state that throughout the permitting process, Shell has asked EPA to issue the OCS PSD permits as quickly as possible. The record abounds with examples of a rushed approach by the Shell toward the need for time to properly evaluate and issue the first set of major source OCS PSD permits. For example, in September 2009, Shell sent a letter to EPA to "reaffirm Shell's need to have both permits issued in final form by R10 by at least the end of 2009."

The commenters claim that this approach is unwarranted because the delay in the permitting process is a result of applicant’s own actions. EPA informed Shell “[a]s early as April, 2008” that it needed to “start a preconstruction ambient air quality monitoring program for all criteria air pollutants consistent with the PSD regulation and guidance if they intended to propose projects in the Beaufort Sea OCS in the near future.” Shell neglected to collect this data waiting instead for another company to set-up a monitoring station that generated data Shell is now utilizing in its permit applications. In response to an earlier letter from Shell asking EPA to expedite the permitting process, EPA explained to Shell Alaska's General Manager:

I must reiterate that the delay in receiving updated emissions information in turn delayed our ability to work on drafting the permit and support documents. . . Shell has still been slow to provide other information, such as the Wainwright monitoring data and the requests for Letters of Authorization (LOA's) . . . [t]he lateness of some of this information is making it extremely difficult for us to meet our target of putting a draft permit out for public notice by mid-August.

The commenters state that Shell's request that EPA finalize the Chukchi permit "within 10 days of the close of the comment period" and expedite the Beaufort permitting process. Logistically, it would be next to impossible for EPA to meet its obligations to even respond to all comments in a meaningful way within a 10-day period. EPA has also received correspondence, through a July 30, 2009 letter to EPA from Alaskan Congressmen, advocating for EPA to complete permits for "certain offshore oil and gas exploration . . . in the Chukchi Sea and Beaufort Sea" within 2009 and stating that oil exploration "must . . . proceed without bureaucratic impediments."

We applaud EPA for taking the requisite time to analyze Shell's application materials, to require Shell to complete deficiencies in its application, and to re-issue a draft permit for the Chukchi operations. Despite Shell's request for EPA to issue these permits by a certain date, EPA must ensure that these permits meet the CAA's legal requirements. Finalizing inadequate or legally deficient permits would circumvent the CAA's goals.

The comment states the problems with Shell's request to EPA for a rushed permitting process came to light through a recent agency oversight. On March 16, 2010, less than a week before the comment period for the Beaufort permit closed, EPA released Appendix A to the public. Prior to this date, EPA had neglected to attach the Appendix to the statement of basis or upload it to the agency's website with the other relevant permitting documents. Appendix A includes information that is crucial to the public's analysis of the permit and the delay in receiving it is fatal to an informed public commenting process. The commenter further claims that the generally disorganized state of the record for the permit also made it difficult to effectively provide public comment during the shortened public comment period. As these examples demonstrate, a rushed permitting process now may result in legally deficient permits that will even further delay Shell's proposed operations.

**Response:** EPA acknowledges that throughout the permitting process Shell encouraged EPA to process the permit as expeditiously as possible and that the complete Beaufort application was submitted on January 18, 2010

just a month before the proposed permit was issued. However, as reflected in the record, EPA and Shell had a number of years of correspondence and meetings and information exchanges before the complete application was submitted. Contrary to the comment, EPA has taken the necessary time to carefully analyze the permit and carefully consider the legal and factual issues before issuing the permit as evidenced by the permit record.

Regarding Appendix A to the Statement of Basis, EPA acknowledges that unfortunately, due to an administrative oversight the Appendix was not included in the electronic version of the document when it was posted on the Region 10 permits page or in the electronic copy of the record that was previously sent to the commenter. However, as soon as the oversight was brought to our attention the Appendix was promptly sent to the NSB and to Earth Justice on March 16 and 17 respectively and posted on the EPA Region 10 air permits webpage.

**Comment:** The NBS commenters state the comment period for the permit was too short and request that EPA re-open the comment period on Shell's Beaufort permit to provide the public with the time and permit record it deserves to provide meaningful input on operations with significant meaning for air quality. They expressed disappointment that their organizations, locally affected communities, and the general public were not provided at least 45 days to comment on Shell's draft Beaufort air permit despite NSB's request for an extension of the comment period. While Shell is proposing to use the same vessels for both its Chukchi and Beaufort operations, there are significant differences between the draft permits for these operations proposed by EPA. Most notably, the Beaufort permit required additional analysis under Alaska's requirements for air permits that the Chukchi permit did not require. The commenters state that numerous public comment periods, hearings, and meetings with agency officials pertaining to Shell's operations have been held in recent months in the North Slope communities, so it is important that our requests for extensions of time be considered in light of the tremendous burden these exploration plans have placed on these communities.

**Response:** EPA fully supports the commenters' need to have ample time to review the proposed permit and to provide comments. In this case, the public notice for the public hearing was issued on February 12, 2010 and the public notice for the proposed permit was issued on February 17 2010 and the comment period did not close until March 22, 2010. This period is more than the minimum 30 days required in 40 C.F.R. § 124.10. Additionally informational meeting and public hearings were held in three different North Slope communities. After full consideration of the competing interests including the time provided on the public comment period, the availability of information regarding the permit and the

company's desire to drill in 2010, EPA has determined that adequate time has been provided for meaningful public involvement and re-opening the comment period is not necessary.

### III. OTHER CHANGES TO THE PERMIT

EPA made several general changes to the final Beaufort permit, based on the following criteria:

- The proposed permit included standard permit conditions that are required in all construction and operating permits in Alaska, and thus in all OCS permits issued by EPA for operations within 25 miles of Alaska's seaward boundaries ("inner OCS"). However, several of these permit conditions contain statements that EPA believes apply equally to all permits issued by EPA for operations more than 25 miles beyond Alaska's seaward boundaries ("outer OCS") and that it has inherent authority to include in a OCS/PSD permit. As a result, EPA changed several permit conditions that only applied in the inner OCS ("COA Regulation") and made it applicable to the OCS source at all locations.
- Some of the proposed inner OCS permit conditions were duplicative of other permit conditions that applied while the source was in the outer OCS. To correct this overlap, EPA either merged the inner OCS and "outer OCS" conditions into one, or deleted one of the two conditions.
- Changes were made to clarify or correct information in permit terms.
- New permit terms and conditions.
- EPA has also added a permit issuance date, corrected typographical errors, renumbered to accommodate added provisions, and made minor editorial changes for consistency.
- Changes to permit conditions that relate to stack testing and monitoring and recordkeeping as described further in the Chukchi Response to Comments.

### XX. GENERALLY APPLICABLE REQUIREMENTS

**Condition A.8. Permit Revision, Termination and Reissuance.** This permit condition was an inner OCS condition that now applies at all locations. The permit condition states that a request by the permittee for modification, revocation and reissuance, or termination or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

**Condition A.11 Recordkeeping Requirements.** This Condition includes general recordkeeping requirements, including a record retention requirement of five years. EPA has added a requirement to keep copies of all

reports and certifications submitted pursuant to the permit and the locations where samples were taken.

- Condition A.13 Certification.** This permit condition requires certification of any document required to be submitted under the permit. EPA removed the “COA Regulations Certification”, proposed permit condition A.16 because both the inner and outer OCS certification conditions were duplicative. EPA kept permit condition A.13 because it requires certification of all documents submitted by the permittee to EPA.
- Condition A.17 Excess Emission and Permit Deviation Reports.** This permit condition was an inner OCS condition that now applies at all locations. The permit condition was changed to allow the permittee to fax or email the excess emission and permit deviation reports to EPA. The notification period of unavoidable emergencies, malfunctions, or non-routine repairs that cause emissions of a technology based emission standard has changed from two working days to three business days.
- Condition A.18 Operating Reports.** The date by which the permittee has to submit their Operating Reports to EPA has changed from September 1 to March 31 to maintain reporting consistency thought the permit.
- Condition A.22 COA Regulations: Annual Compliance Certification.** This condition ahs been edited to clarify that Annual Compliance Certification is for the preceding calendar year.
- Condition A.23 COA Regulations: General Source Test Requirements.** The Visible Emissions Field Data sheet has been moved from Section A, Generally Applicable Requirements to Attachment B.

## **YY. SOURCE-WIDE REQUIREMENTS**

- Condition B.5 Sulfuric Acid Mist Owner Requested Limit for Associated Fleet.** EPA corrected an error by removing SO<sub>2</sub> from the title.
- Condition B.6 COA Regulation Marine Vessel Visible Emission Standards.** This standard only applies to vessels in the inner OCS. The permit heading was corrected adding “COA Regulation”.
- Condition B.10 COA Regulations: Visibility Emission Reporting.** This permit condition was edited to because the Visible Emissions Field Data sheet has been moved from Section A, Generally Applicable Requirements to Attachment B.
- Condition B.20 General Test Requirements.** EPA has added provisions to make explicit EPA’s authority to require stack testing in addition to that required by the permit ; set a time frame for the submission of a test

plan in the event of such a request; state that EPA can agree to different time frames for the submission of a test plan; clarify that retesting may be conducted without resubmitting the plan provided it is conducted in accordance with the previously submitted plan; clarify that stack testing must be conducted at a point or points that characterize the actual discharge into the ambient air; and clarify the authority for the permittee to request and EPA to approve an extension to a stack test deadline.

**Condition B.21 Prohibited Activities.** EPA has added language prohibiting any vessels not authorized under the permit from approaching the Discoverer while it is an OCS source.

**Condition B.24 Good Operating and Maintenance Required.** EPA has added language requiring the permittee to keep records of any maintenance that would have a significant effect on emissions and a copy of either the manufacturer's or the operator's maintenance procedures.

## **ZZ. SUPPLY SHIP GENERATOR ENGINE**

**Condition L.6 Supply Barge and Tug Alternative.** EPA has added permit conditions requiring the permittee to record the date and time when the supply barge attaches and detaches from the Discoverer.

## **AAA. CUTTINGS/MUD DISPOSAL BARGE**

**Condition N.1** EPA added permit conditions to require the permittee to notify EPA of the emission units on the selected cuttings/mud disposal barge and to record the date and time when the cuttings/mud disposal barge attaches and detaches from the Discoverer.

## **BBB. SUPPLY SHIP BARGE AND TUG**

**Condition Q.4 Operational Limits.** EPA has added permit conditions requiring the permittee to notify EPA of the selected barge and tug and added operational limits and compliance requirements.

**For the following changes, see generally the Chukchi Response to Comments describing specific permit changes in each applicable section.**

## **DISCOVERER GENERATOR ENGINES**

**Condition C.4 Potential to Emit Emission Limits**

**Condition C.6. Stack Test Requirements**

## **MUD LINE CELLAR COMPRESSOR ENGINE**

**Condition F.6 Stack Test Requirements**

**Condition F.7. Monitoring, Recordkeeping, Reporting**

**HYDRAULIC POWER UNIT ENGINES**

**Condition G.2 BACT Limits**

**Condition G.8 Stack Test Requirements**

**Condition G.9. Monitoring, Recordkeeping, Reporting**

**DECK CRANES**

**Condition H.7 Stack Test Requirements**

**Condition H.8. Monitoring, Recordkeeping, Reporting**

**CEMENTING UNIT AND LOGGING WINCH ENGINE**

**Condition I.7 Stack Test Requirements**

**Condition I.8. Monitoring, Recordkeeping, Reporting**

**HEAT BOILERS**

**Condition J.5 Stack Test Requirements**

**Condition J.6. Monitoring, Recordkeeping, Reporting**

**SUPPLY SHIP GENERATOR ENGINE**

**Condition L.1 Operational Limits**

**Condition L.2 PTE Annual Emission Limits**

**Condition L.3 PTE Daily Emission Limits**

**Condition L.5 Monitoring, Recordkeeping, Reporting**

**ICEBREAKER #1**

**Condition O.1 Aggregate Capacity Limits**

**Condition O.10 Stack Test Requirements**

**Condition O.11 Monitoring, Recordkeeping, Reporting**

**ICEBREAKER #1**

**Condition P.1 Icebreaker #2 Vessel Alternatives**

**Condition P.12 Stack Test Requirements**

**Condition P.13 Monitoring, Recordkeeping, Reporting**

**OIL SPILL RESPONSE FLEET**

**Condition R.8 Monitoring, Recordkeeping, Reporting**

**POST CONSTRUCTION AMBIENT AIR QUALITY MONITORING**

**Condition S.1 Ambient Air Quality Monitoring Stations**