AECOM
1601 Prospect Parkway
Fort Collins, Colorado 80525

970.493.8878 tel
970.493.0213 fax

April 26, 2010

Mr. Herman Wong
1200 Sixth Avenue
OEA-095
Seattle, WA 98101-1128

Subject: ConocoPhillips' Part 71 Chukchi Sea OCS Air Permit Application – Revised PM_{10} Analysis

Dear Mr. Wong,

On February 12, 2010 ConocoPhillips filed a Part 71 permit application for its planned 2010 Chukchi Sea exploration project. Volume II of that application contained a cumulative ambient air quality impact analysis that demonstrated compliance with the NO_2, SO_2, PM_{10}, $PM_{2.5}$, and CO National Ambient Air Quality Standards (NAAQS). However, that analysis overestimated cumulative PM_{10} impacts as a result of simplifying techniques used. Therefore, the PM_{10} impact analysis has been refined to remove some of the simplifications and produce more realistic impacts.

On behalf of ConocoPhillips, with this letter, I am submitting an update to the Part 71 application that presents the refined PM_{10} ambient air quality impact analysis. The results of the attached refined analysis supersede those presented in the Part 71 application. Also included with this letter is a complete digital record of the refined analysis, including the analysis itself, and all supporting model input and output files.

If you have any questions please don't hesitate to contact me. As has been the case, we remain committed to working with Region 10 to resolve any issues needed to keep the review of the application moving forward.

Sincerely,

TA Damiana

Tom Damiana
Air Quality Meteorologist
Thomas.damiana@aecom.com
970 530 3465

cc: Doug Hardesty (USEPA Region 10)
Brad Thomas (ConocoPhillips Company)
Dave Newsad (Hoefler Consulting Group)

Attach: Revised PM_{10} Cumulative Impact Analysis
DVD Containing a Digital Record of the Submittal

Revised PM_{10} Cumulative Impact Analysis

1.0 Introduction

On February 12, 2010, ConocoPhillips (CP) submitted an ambient air quality impact analysis for an exploratory drilling activity to be conducted within the Devil's Paw Prospect on the Chukchi Sea (CP Chukchi AQIA) (Ambient Air Quality Impact Analysis for Proposed Exploratory Drilling (Devil's Paw Prospect) in the Chukchi Sea – ConocoPhillips 2010). That analysis contained a cumulative ambient air quality impact analysis for NO_2, SO_2, PM_{10}, $PM_{2.5}$, and CO. To simplify the cumulative impact analysis conducted, conservative techniques were used to include potential impacts from the Shell Gulf of Mexico Inc. (Shell) exploratory activity. Those conservative techniques resulted in unrealistically elevated short-term PM_{10} impacts in the near-field of the Shell activity. Among those conservative techniques, preventing the Shell exploratory activity to adjust orientation with the prevailing wind direction for a particular hour, led to the greatest overestimation of impacts. Therefore, this supplemental analysis was prepared to predict more realistic short-term cumulative PM_{10} impacts by adjusting the short-term simulation to better account for the proper orientation of the Shell activity to the prevailing wind.

Section 8.2.1 of the CP Chukchi AQIA describes the technical approaches for including the Shell exploratory activity in the cumulative modeling. As described in that section, the Shell exploratory activity was positioned with the bow of the Frontier Discoverer pointed east in a worst-case location with respect to the CP exploratory activity. Because the Shell exploratory activity was always oriented east-west, and the simulation used actual meteorological input data in which the winds could blow from any direction, impacts were predicted from the Shell exploratory activity during cross and tail-wind situations that cannot occur. This is because operationally and according to permit limitations, the Frontier Discoverer must always point into the wind while it is an OCS source.

In this supplemental analysis, the Shell exploratory activity simulation was refined to ensure that impacts from the activity were only predicted with the activity properly oriented into the wind. This refined simulation involved post-processing to superimpose highest-second-high impacts predicted from the CP exploratory activity using the OCD dispersion model and six years of actual meteorology with maximum impacts predicted from the Shell exploratory activity using the ISC-Prime dispersion model and screening meteorology developed to keep the Shell exploratory activity upwind of the CP exploratory activity, and properly oriented to the prevailing winds. Impacts predicted using this technique are still conservative because the simulation assumes the Shell exploratory activity is always upwind of the CP exploratory activity; however, it is more realistic since it can account for the fact that the Shell exploratory activity must always be pointed into the wind.

The following sections provide specific details related to the revised PM_{10} short-term analysis, and present the cumulative impacts resulting from the revised simulation.

2.0 Simulation of the Shell Exploratory Activity

Maximum PM_{10} impacts resulting from Shell exploratory activity emissions were predicted using ISC-Prime model with screening meteorology, as described in Shell's supplemental permit application materials dated September 17, 2009 (Shell 2009c). Modeling was conducted with input files provided by Shell to USEPA as part of several May 2009 submittals (Shell 2009a, and Shell 2009b). The following adjustments were made to the modeling files to make them consistent with the latest Shell application materials, to make them specific to this cumulative analysis, and to maximize Shell impacts on the CP modeling domain.

- The Shell exploratory activity was located approximately 27 kilometers northwest of the CP exploratory activity in the worst-case location previously determined and fully described in Appendix L Section L-4.0 of the CP Chukchi AQIA.

- The wind direction in the ISC-Prime screening meteorological input file was changed from the 90 degrees used by Shell to 315 degrees to always place the Shell exploratory activity upwind of the CP exploratory activity.

- The Shell exploratory activity, including structures, point and volume sources, were rotated 225 degrees (315 minus 90 degrees) clockwise to properly orient it to the modeled wind directions. Figure 1 shows the position of Shell exploratory activity relative to the CP exploratory activity after the rotation. Building downwash information was regenerated after the rotation.

- PM_{10} short-term emissions and stack parameter data found in the statement of basis to the January 8, 2010 proposed permit for the Shell exploratory activity (USEPA 2010) were used for this analysis.

- Modeling of Shell emission units was conducted on the receptor grid described and shown in Section 5.4 of the CP Chukchi AQIA, which extends out to 50 km from the CP drill rig.

Using procedures documented in the statement of basis to the January 8, 2010 proposed permit for the Shell exploratory activity (USEPA 2010), maximum 1-hour PM_{10} impacts produced by the screening model were converted to maximum 24-hour PM_{10} impacts using a scaling factor of 0.6. The maximum impact on the aforementioned CP receptor grid was found to be located next to one of the Shell transiting supply vessel volume sources downwind of the Shell Oil Spill Response Vessel Activity volume sources on a portion of the receptor grid with 1,000 m spacing. Therefore, additional receptors spaced at a density of 25 meters and extending out to 1 km from the maximum impacted receptor were created to ensure the highest impact was captured. The refined grid is shown in Figure 1. The maximum 24-hour PM_{10} impact predicted from only the Shell exploratory activity, which occurred on the refined grid, is equal to 20.49 $\mu g/m^3$.

3.0 Simulation of the CP Exploratory Activity

Short-term PM_{10} impacts resulting from CP exploratory activity emissions were predicted using OCD model and 6 years of actual meteorology (i.e., utilizing 5 years of the Wainwright NWS based

meteorology and one year of research vessel), as described in the CP Chukchi AQIA. Short-term PM_{10} project emissions were the same as those described in the CP Chukchi AQIA, and were modeled on the refined receptor grid described above which includes additional refined receptors at a density of 25 meters around the Shell exploratory activity. The highest-second-high predicted PM_{10} 24-hour impact from only the CP exploratory activity was equal to 13.5 $\mu g/m^3$.

4.0 Cumulative Short-Term PM_{10} Modeling Results

Maximum 24-hour PM_{10} impacts from the Shell exploratory activity were added on a receptor-by-receptor basis to the highest-second high 24-hour PM_{10} impacts predicted during each of the six modeled years from the CP exploratory activity. **Table 1** presents the maximum cumulative impact for each modeled year after post-processing. The results for PM_{10} presented in this table supersede those presented in Table 8-1 on page 8-5 of the CP Chukchi AQIA. As shown in **Table 1**, the maximum predicted cumulative impact across all years is 21.7 $\mu g/m^3$. Adding the PM_{10} short-term background concentration of 49 $\mu g/m^3$ described in the CP Chukchi AQIA yields a maximum cumulative impact of 70.6 $\mu g/m^3$ which clearly demonstrates that the model predicted maximum cumulative 24-hour PM_{10} impact is in compliance with the NAAQS of 150 $\mu g/m^3$, and is lower than the maximum of 86.3 $\mu g/m^3$ presented in the CP Chukchi AQIA.

The maximum short-term PM_{10} cumulative impact occurs at the receptor dominated by impacts from the Shell exploratory activity. At that receptor, modeling results show that the maximum cumulative 24-hour PM_{10} concentration resulting from the Shell exploratory activity is 20.49 $\mu g/m^3$ and the contribution from the CP exploratory activity is only 1.15 $\mu g/m^3$.

A digital record containing all model input output files, and a spreadsheet used to conduct post-processing of model predicted impacts is included with this supplemental analysis on DVD. A README file describing the DVD contents is included with the digital record.

5.0 References

ConocoPhillips 2010. ConocoPhillips Outer Continental Shelf Air Permit Application (Air Quality Modeling Analysis) – Chukchi Sea Devil's Paw Prospect - Volume 2. Submitted to USEPA Region 10 February 12, 2010.

Shell 2009a. Shell Gulf of Mexico Inc. Response to EPA Region 10 March 12, 2009 2nd Letter of Incompleteness - Revised Preconstruction Permit Application for Frontier Discoverer Drillship in Chukchi Sea, Alaska, beyond the 25-mile Alaska Seaward Boundary. Submitted to EPA Region 10 on May 18, 2009.

Shell 2009b. Shell Gulf of Mexico Inc. Updated Attachments D and E - Response to EPA Region 10 March 12, 2009 2nd Letter of Incompleteness. Submitted to EPA Region 10 on May 29, 2009.

Shell 2009c. Shell Gulf of Mexico Inc. Comments on the August 2009 EPA Permit R10OCS/PSD-AK-2009-01. Submitted to EPA Region 10 on September 17, 2009.

USEPA 2010. Statement of Basis for Proposed Outer Continental Shelf Prevention of Significant Deterioration Permit No. R10OCS/PSD-AK-09-01. Frontier Discoverer Drillship – Chukchi Sea Exploration Drilling Program. Date of Proposed Permit: January 8, 2010.

Figure 1 Location of Receptors, CPAI and Shell Sources

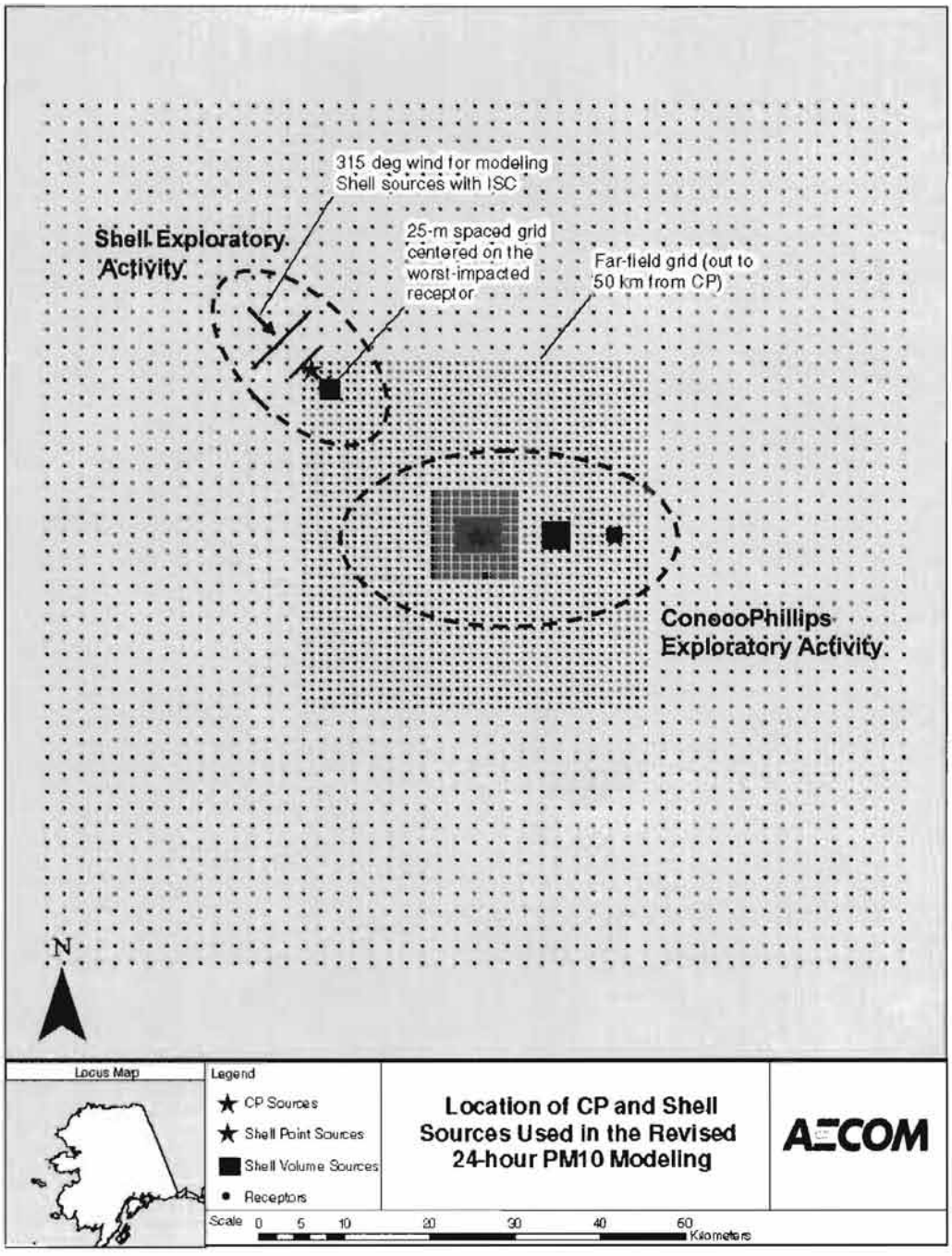

Table 1 Revised Short-Term PM_{10} Cumulative Analysis Results (Concentrations in $\mu g/m^3$) – Replaces PM_{10} Results Row in the CP Chukchi AQIA (ConocoPhillips 2010)

Pollutant	Avg Period	Impacts Predicted with Wainwright NWS Meteorological Data [1]					Vessel Met Data [1]	Overall Maximum Impact	CP Contribution to Overall Maximum Impact	Bkgrnd. Conc.	Total	NAAQS
		1999	2002	2004	2005	2006	2008					
PM_{10}	24-hr	21.2	21.6	21.2	21.2	21.5	20.8	21.6	1.2	49	70.6	150 [2]

[1] Highest-second-high model predicted impact from the CP exploratory activity added on a receptor by receptor basis to the highest-first-high model predicted impact from the Shell exploratory activity.

[2] Standard compared to the highest-sixth-high model predicted impact when modeling with 5 years of meteorological data.