4.0 Environmental Impacts

This introductory section is included in the Draft EIS and is not being amended in this supplement.

4.1 Air Quality

The purpose of the air quality analysis was to assess local and regional air quality impacts from current and future reasonably foreseeable development in the Uinta Basin Region, in conjunction with the proposed project. The general approach was to develop an emissions inventory for a “project base year” (defined below) to tabulate emissions and conduct modeling.

The air quality analysis incorporated the planned development and a prepared set of emissions data for project modeling, including project development alternatives and reasonably foreseeable development as discussed below. Those emissions data were incorporated into the modeling system for the project base year, and used to predict potential impacts on visibility, acid deposition, and air quality, including ozone. The analysis identifies potential impacts on resources evaluated, and characterizes the major source or source groups that contribute to those impacts.

The 2006 emissions data was used as the basis for comparing emissions and impacts for the base year. This selection was made to coincide with the 2006 Western Regional Air Partnership (WRAP) Phase III emissions inventory for the Uinta and Piceance basins, which was developed by a collection of government and industry stakeholders for ozone modeling in the same area. As such, these data serve as the best available data for base year emissions and comparisons.

Emissions of criteria pollutants and source characteristics for the proposed project alternatives were based on project data provided by ***Kerr-McGee Oil and Gas Onshore LP (***KMG***)***. To support the modeling effort, emissions scenarios were developed for the base year and 3 forecast years and included reasonably foreseeable development, the proposed project, and maximum production. Emissions inventories were developed for each of the following scenarios:

- 2006 Baseline – 2006 base year actual emissions;
- 2018 Projected Baseline – 2018 projected emissions without the proposed project;
- 2017 Proposed Action Alternative – 2018 Projected Baseline emissions with project emissions from the proposed alternative in 2017; and
- 2026 Optimal Recovery Alternative – 2018 Projected Baseline emissions with project emissions from the maximum recovery development alternative in 2026.

The 2018 Projected Baseline essentially is the No Action Alternative, but also includes non-project emissions. The Resource Protection Alternative focuses on minimizing land disturbance for the installation and operation of wells and other support facilities. From an air emissions perspective, ambient impacts from the Resource Protection Alternative are well-characterized by the impacts from the Proposed Action. For that reason, the Resource Protection Alternative was not modeled as a separate evaluation.

The 2018 Projected Baseline was used as the baseline for the Optimal Recovery Alternative, though peak production under this alternative is anticipated in 2026. This approach provides a consistent basis of comparison between the alternatives and reduces uncertainty in baseline emissions from projecting development beyond the WRAP inventory time horizon.

GHGs are produced and emitted by various sources during phases of oil and gas exploration, well development, and production. The primary sources of GHGs associated with oil and gas exploration and production are CO_2, N_2O, and CH_4. In addition, volatile organic compounds (VOCs) are a typical source of emissions associated with oil and gas exploration and production. Under specific environmental conditions, N_2O and VOCs form ozone, which also is considered a GHG.

Climate change analyses are comprised of several factors including, but not limited to, GHGs, land use management practices, and the albedo effect. While emissions from oil and gas activities may contribute to the effects of climate change to some extent, it currently is not possible to associate any of these particular actions with the creation of any specific climate-related environmental effects. The tools necessary to quantify climatic impacts presently are unavailable. As a consequence, impact assessment of specific effects of anthropogenic activities cannot be determined. Additionally, specific levels of significance have not yet been established. Therefore, climate change analysis for the purpose of this document ***focuses on*** accounting and disclosing of GHG emissions that may contribute to climate change ***(see Section 3.1.3.7 for text acknowledging related potential impacts)***.

Emissions Data Development

Emissions data for the Proposed Action and the Optimal Recovery Alternative were developed from available emission factors, analytical data, applicable ***applicant-committed environmental protection measures (Appendix A)***, applicant-provided equipment specifications, and anticipated activity levels. Emission rates were developed for the criteria pollutants and for selected HAPs. A summary of criteria pollutant emissions from stationary sources in the Uinta Basin is provided in **Table 4.1-1**, and the project-related increases in the major components of HAPs for the Proposed Action and Optimal Recovery Alternative are provided in **Table 4.1-2**. Emissions for a full list of HAPs were reviewed, but only those with the greatest emissions in relation to health effects were evaluated. A summary of emission calculation methods for each source type and pollutant is shown in **Table 4.1-3**.

Table 4.1-1 Summary of Criteria Pollutant Emissions for Each Scenario

Criteria Pollutant	Emissions (tpy)					
	2006 Baseline	2018 Projected Baseline	2017 Proposed Action		2026 Optimal Recovery Alternative	
			Project	Total	Project	Total
NO_X	10,754	10,138	2,***213***	12,***351***	4,946	15,084
CO	7,800	9,732	1,**300**	**11,032**	2,994	12,726
SO_2	391	30	25	55	78	108
PM_{10}	592	565	***1,011***	1,***576***	2,658	3,223
VOC	70,226	184,262	6,***617***	190,***879***	24,976	209,238

Source: Air Quality Technical Support Document (**Appendix G**).

Table 4.1-2 Summary of Potential Increases in Emissions of HAPs for Project-related Alternatives

Pollutant	Potential HAP Increase (tpy)	
	Proposed Action Alternative	Optimal Recovery Alternative
Benzene	67.***0***	255.2
Toluene	17***2.4***	662.1
Ethyl Benzene	12.7	48.5
Xylenes	18***5.7***	714.1
Formaldehyde	7***1.3***	156.5
n-Hexane	19***4.9***	748.5

Source: Air Quality Technical Support Document (**Appendix G**).

Table 4.1-3 Summary of Emissions Calculation Methods by Source Type and Pollutant

Source Type	Pollutant	Emissions Calculation Methodology
Drill Rig Engines	NO_X	40 CFR 1039.101 ***Tier 2 – Near-field Impact Analysis*** ***Tier 4 – Near-field Impact Analysis and Regional Emissions***
	CO	
	VOC	
	$PM/PM_{10}/PM_{2.5}$	
	SO_2	Mass balance of fuel sulfur (15 ppm weight [ppmw] fuel sulfur)
	HAP	National Mobile Inventory Model Database (USEPA 2005)
Drill Rig Boilers	All	USEPA AP-42 Volume I: Stationary Sources *Chapter 1.3* (USEPA 1998***b***)
Drilling and Completion Traffic	NO_X	USEPA AP-42 Volume II: Mobile Sources (USEPA 1995a)
	CO	
	VOC	
	$PM_{10}/PM_{2.5}$	USEPA AP-42 Volume I *Chapter 13.2.2* (USEPA 2006) and USEPA AP-42 Volume II: Mobile Sources (USEPA 1995a)
	SO_2	USEPA AP-42 Volume II: Mobile Sources (USEPA 1995a)
Condensate Flashing	VOC	American Petroleum Institute E&P Tanks v2.0 based on Analysis of Condensate
	HAP	
Separator Heaters	NO_X	USEPA AP-42 Volume I: Stationary Sources *Chapter 1.4* (USEPA 1998***c***)
	CO	
	VOC	
	$PM/PM_{10}/PM_{2.5}$	
	SO_2	Mass balance of fuel sulfur [20 ppmw fuel sulfur]
	HAP	USEPA AP-42 Volume I: Stationary Sources *Chapter 1.4* (USEPA 1998***c***)
Production Well Fugitives	VOC	USEPA Protocol for Equipment Leak Estimates (USEPA 1995b)
	HAP	Mass fraction of VOC based on Analysis of Condensate
Production Traffic	NO_X	USEPA AP-42 Volume II: Mobile Sources (USEPA 1995a)
	CO	
	VOC	
	$PM_{10}/PM_{2.5}$	USEPA AP-42 Volume I *Chapter 13.2.2* (USEPA 2006) and USEPA AP-42 Volume II: Mobile Sources (USEPA 1995a)
	SO_2	USEPA AP-42 Volume II: Mobile Sources (USEPA 1995a)
Produced Water Tank Batteries	VOC	TANKS 4.09 based on Analysis of Condensate
	HAP	Mass Fraction of VOC based on Analysis of Condensate
Gas-fired Compression Engines	NO_X	Engine Manufacturer Specifications
	CO	
	VOC	
	$PM_{10}/PM_{2.5}$	USEPA AP-42 Volume I: Stationary Sources *Chapter 3.2* (USEPA 2000)
	SO_2	Mass balance of fuel sulfur [20 ppmw fuel sulfur]
	HAP	USEPA AP-42 Volume I: Stationary Sources *Chapter 3.2* (USEPA 2000)

Source: Air Quality Technical Support Document (**Appendix G**).

The air quality model AERMOD was used to evaluate impacts on air quality in the near-field. Several scenarios, including various well spacing and drill density plans, were evaluated to determine their projected impacts on the near-field. A square mile area was used to characterize the scenario sources arrangement, and impacts were calculated within that area and at the boundary of the square mile area. For drilling operations, it was assumed that ***up to four*** drill rig***s*** would operate in this area at any one time. ***Annual impacts from drilling operations were based on the assumption that 64 wells could be drilled in a square mile to accommodate the proposed 10-acre downhole spacing.*** For operations, the source arrangement depicted wells located on a 10-, 20-, and 40-acre spacing. For compression, a single compressor station was sited in the area and impacts were calculated in the near-field.

The CALPUFF modeling system was used to estimate impacts on visibility (regional haze), air quality, and acid deposition in areas 50 kilometers (km) or more from the development area. The Models-3 Community Multiscale Air Quality (CMAQ) model was used to evaluate impacts on ambient air ozone in the region.

An inventory of actual emissions developed specifically for this analysis were input to the AERMOD and CALPUFF models to analyze compliance with the NAAQS and evaluate impacts to regional haze, acid deposition, and acid neutralizing capacity at sensitive lakes in Class I areas. Comparison of impacts to PSD increments is provided for informational purposes only; this study does not represent a PSD increment-consumption analysis. The inventory for the CMAQ ozone modeling utilized actual project base year emissions along with emissions from other sources (i.e., electric generation, motor vehicles, and biogenics).

The CAA lists HAPs that could be emitted during project operations: primarily BTEX (benzene, toluene, ethyl benzene, and xylene) from the well dehydrators and formaldehyde from the pipeline compressor engines. Control of these and other HAPs would be achieved through compliance with applicable MACT standards. HAP emissions for each activity were developed on a per unit basis and were based on approved emissions factors, mass balance, or process simulation, where appropriate. Site-specific supporting information such as operation schedules, equipment specification, and physical and chemical properties of fuel and materials were used to develop the emissions inventory for the various alternatives. Where site-specific information was not available, the analysis used published references or assumptions based on professional experience as described in the Technical Support Document (**Appendix G**).

NESHAP and MACT regulations for oil and natural gas production facilities include provisions for ethylene glycol dehydrators and vents, storage vessels with flash emissions, and ancillary equipment. Under these provisions, any source that emits or has the potential to emit 10 tpy or more of any HAP is considered a major source; would require an operating permit under Title V of the CAA; and must install and operate control equipment to control air emissions. Under these same provisions, glycol dehydration units emitting less than 1 tpy benzene are considered "small," and would not require controls under MACT rules.

Ambient air concentrations of HAPs were determined based on these emissions rates using the same AERMOD model scenarios used for near-field criteria pollutant analysis. These ambient concentrations were compared to the USEPA Toxic Screening Levels (TSLs) to determine if any adverse impact would be predicted from project-related source emissions.

Based on the minimal content of hydrogen sulfide (H_2S) in the natural gas found in the GNBPA, potential H_2S impacts would be negligible. However, should H_2S be encountered, operations on federal or Indian leases would be regulated by Onshore Oil and Gas Order No. 6 (Hydrogen Sulfide Operations). This order requires monitoring of H_2S beginning at levels of 10 ppm at each drilling well (40 CFR part 63, subpart HH §63.760[b][1] through [4]; and 40 CFR part 63, subpart A of the General Provisions, effective June 17, 1999). Should H_2S levels increase, specific drilling and production equipment, along with drilling and public protection plans, would be required ***under Onshore Order No. 6 in zones where H_2S can reasonably be expected to be present at concentrations of 100 ppm or more***.

The analysis was based on several conservative assumptions, including:

- Maximum measured and/or estimated background criteria air pollutant concentrations were assumed to occur at all locations in the region throughout the life of the project.
- All existing emissions sources were assumed to operate at their reasonably foreseeable emission rates simultaneously throughout the life of the project. Given the number of sources included in this analysis, the probability of such a scenario actually occurring over an entire year (or even 24 hours) is small. While this assumption is typically used in modeling analyses, the resulting predicted impacts would be overstated.

- For the near-field modeling, total predicted short-term air pollutant impact concentrations were assumed to be the sum of the first maximum background concentration, plus the maximum modeled concentrations, which actually would occur under very different meteorological conditions and would not be likely to coincide.
- The HAP analyses assumed all existing equipment would continue to operate simultaneously at the assumed emission levels continuously throughout the life of the project. ***Since no data are available to characterize HAP concentrations in the vicinity of the GNBPA, no background HAP concentrations were assumed for near-field modeling.***

4.1.1 No Action Alternative

On BLM-administered lands, current management plans would continue to guide oil and natural gas exploration and development activity. Air quality effects for the No Action Alternative would include an increase in air pollutant emissions resulting from drill and development projects previously approved.

Emissions for the No Action Alternative are represented by the 2018 Projected Baseline, specifically including the WRAP III data for the Uinta and Piceance basins, and the WRAP II data for other basins.

4.1.1.1 Impacts on Air Quality

The USEPA dispersion model AERMOD was used to predict maximum potential near-field air quality impacts from existing emission sources, which would continue to operate under the No Action Alternative. As of October 2007, there were 1,102 undrilled wells within the GNBPA that have been described in approved NEPA decision documents or identified in the ***Utah Division of Oil, Gas, and Mining*** database. The analysis results identify predicted air pollutant concentrations in the vicinity of ***producing*** wells ***(drill rigs),*** compressor engines***, and related oil and gas facilities***. ***Specific modeling scenarios for the near-field impact analysis are discussed in more detail in Appendix G.***

CALPUFF modeling was used to predict impacts at distant ***receptors*** (greater than 50 km from the GNBPA), mandatory federal PSD Class I areas for comparison with applicable air quality standards, PSD increments, HAP exposures, visibility standards, and atmospheric deposition (**Appendix G**).

Because this alternative includes wells that have not yet been drilled, there would be construction-related air quality impacts. Construction emissions would occur during road and well pad construction, well drilling, and well completion testing. In addition, particulate matter ($PM_{2.5}$ and PM_{10}) concentrations likely would increase during construction. Potential SO_2 emissions would be generated by drilling rigs and other diesel engines used during rig-up, drilling, and completion operations (sulfur being a trace element in diesel fuel). Maximum air pollutant emissions from each well would be temporary (i.e., occurring only during the construction period), would occur in isolation, and would not significantly interact with adjacent well locations. Since construction emissions would be temporary, PSD increments are not applicable.

The maximum impacts of criteria pollutants in the near-field for this alternative are presented in Table 4.1-4.

Table 4.1-4 Air Quality Impacts for Criteria Air Pollutants in the Near-field, No Action Alternative

Pollutant	Standard	Modeled Impact ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	NAAQS / SAAQS ($\mu g/m^3$)
NO_2	***1-hour***[1]	***217.7***	***69.6***	***287.3***	***188***
	Annual[1]	***7.7***	***8.0***	***15.7***	100
CO	1-hour[1]	***399***	6,325	6,***724***	40,000
	8-hour[1]	***251***	3,910	4,***161***	10,000

Table 4.1-4 Air Quality Impacts for Criteria Air Pollutants in the Near-field, No Action Alternative

Pollutant	Standard	Modeled Impact (µg/m³)	Background Concentration (µg/m³)	Total Impact (µg/m³)	NAAQS / SAAQS (µg/m³)
SO_2	***1-hour***[2]	***2.6***	***21.7***	***24.3***	***196***
	3-hour[2]	***1.9***	***16.7***	***18.6***	1,300
	24-hour[2]	***0.9***	***5.9***	***6.8***	365
	Annual[2]	***0.1***	***1.5***	***1.6***	80
PM_{10}	24-hour[3]	***4.5***	18.***0***	***22.5***	150
$PM_{2.5}$	24-hour[1]	***4.5***	***16.0***	***20.5***	35
	Annual[1]	***0.8***	***6.0***	***6.8***	15

Source: Air Quality Technical Support Document (**Appendix G**).

Near-field modeling was conducted to determine the impacts from simultaneous operation of drill rigs on adjacent pads spaced at intervals from 400 meters to 800 meters. This modeling showed that such simultaneous operation of drill rigs on adjacent pads could cause an exceedance of the NAAQS for 1-hour NO_2 regardless of the space between rigs. However, compliance with the NAAQS for 1-hour NO_2 is based on the 98th percentile of the daily 1-hour maxima for each of 3 consecutive years. Because the duration of this drilling scenario is limited, the drilling activity likely would not coincide with the 8 highest impact days in 1 year. Also, because drill rigs move to different locations during the course of development, it is not possible that the same level of drilling would occur for 3 consecutive years at the same location. Therefore, although the project has been modeled to exceed the 1-hour NO_2 standard, the project may not result in a violation of the standard under this method of operation. Compliance with the NAAQS was obtained for all other scenarios and pollutant/averaging periods.

As shown in Figure 4.1-1, the extent of these impacts is limited, with peak impacts occurring immediately adjacent to the drill rig and rapidly decreasing to approach background levels.

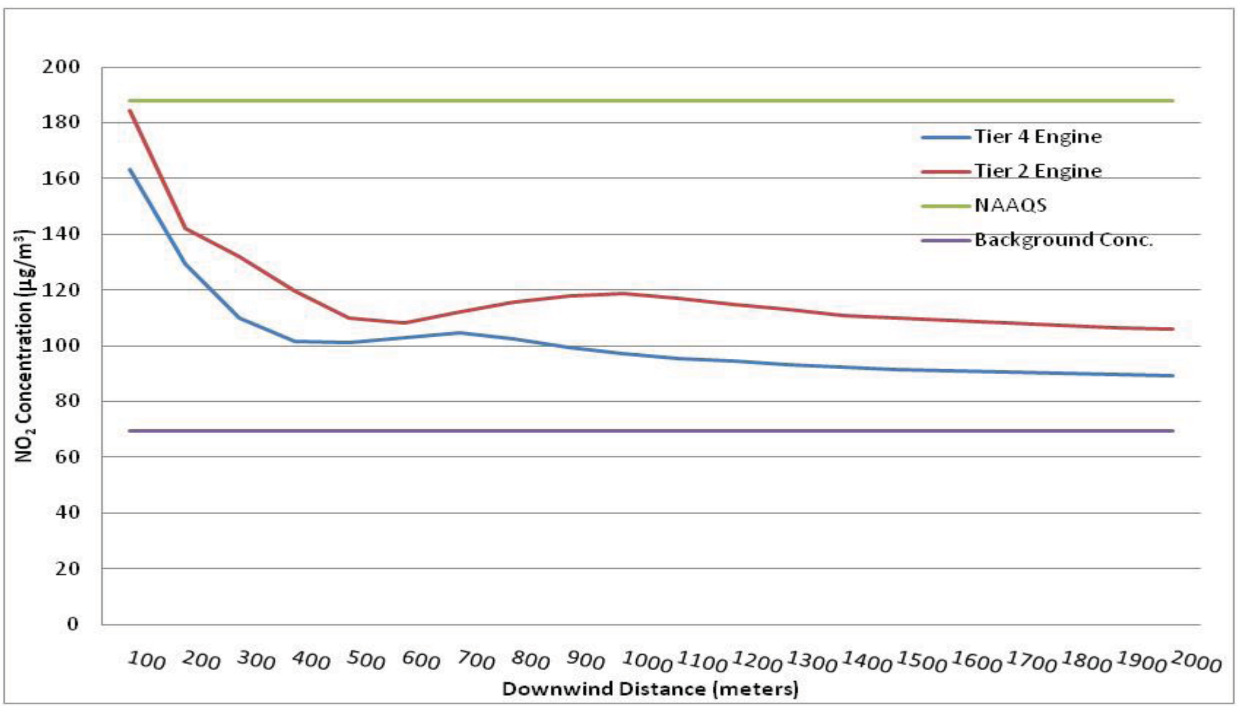

Figure 4.1-1 Modeled 1-hour NO_2 Impact for Well Drilling as a Function of Downwind Distance for Tier 2 and Tier 4 Engines at a Single Drill Rig

Comparison of modeled HAP concentrations against USEPA TSLs and Reference Concentrations (RfC) indicates no adverse impacts from emissions of HAPs from project sources. The maximum concentrations are predicted from the 10-acre production scenario (64 operating wells per section) for all pollutants. These results are shown in Table 4.1-5.

Table 4.1-5 Air Quality Impacts for HAPs in the Near-field, No Action Alternative

Pollutant/Averaging Period	Concentration per Production Well Density (μg/m³)			Non-Carcinogenic RfC[1] (μg/m³)	TSL[2] (μg/m³)
	10-Acre Spacing	20-Acre Spacing	40-Acre Spacing		
Benzene					
24-hour	5.25	4.14	2.99	-	53.3
Annual	1.55	1.22	0.71	30	-
Ethylbenzene					
24-hour	0.32	0.26	0.18	-	14,473
Annual	0.17	0.13	0.08	1,000	-
Formaldehyde					
24-hour	3.89	3.76	3.76	-	37
Annual	0.85	0.64	0.50	9.8	-
n-Hexane					
24-hour	14.85	11.70	8.45	-	5,875
Annual	4.47	3.52	2.05	700	-
Toluene					
24-hour	12.17	9.59	6.93	-	2,512
Annual	3.63	2.86	1.67	5,000	-
Xylene					
24-hour	9.08	7.15	5.16	-	14,473
Annual	2.68	2.11	1.23	100	-

[1] USEPA Air Toxics Database, Table 1 (USEPA 2010b).

[2] Utah Division of Air Quality (UDAQ) Air Toxic Modeling Guidance for TSLs (UDAQ 2007).

Source: Air Quality Technical Support Document (Appendix G).

4.1.1.2 Impacts at Class I and II Areas – Acid Deposition

This section is included in the Draft EIS and is not being amended in this supplement.

4.1.1.3 Impacts at Class I and II Areas – Visibility

This section is included in the Draft EIS and is not being amended in this supplement.

4.1.1.4 Impacts on Ambient Ozone Levels

The CMAQ modeling system was used to estimate impacts on ambient air ozone levels from the emissions for 2006, representative of the base year operations. Results from that modeling effort were compared to actual monitored levels in the region (though not directly in the GNBPA). A formal Model Performance Evaluation

(MPE) was conducted for 2006, which was used to evaluate the performance of the model with actual conditions, and to provide an adjustment of modeled impacts for future development scenarios. The MPE showed that the modeling system meets the USEPA-established criteria for acceptable model accuracy and error statistics at the existing monitoring stations within the modeling domain. The lack of concurrent ***monitored ozone*** data ***for 2006*** prevents validation and calibration of the model results; however, the model does provide a means to compare the relative change in ambient ozone concentration between the project alternatives and baseline air quality.

The CMAQ modeling system was used to model impacts for 2018 for the projected No Action Alternative, the Proposed Action, and the Optimal Recovery Alternative. The results were used to show the expected change in ozone levels at receptors in the region resulting from each of the alternatives as well as the cumulative impact from expected development. The model results showed no impacts above the current ozone standard of 75 ppb for the fourth highest annual level in the Uinta Basin for the No Action Alternative.

As shown in Section 3.1.2 and Figure 3.1-2, ozone levels monitored at the Ouray and Redwash monitoring stations in the Uinta Basin, showed numerous days during the winter of 2010 with 8-hour concentrations above 75 ppb, the current ozone level that forms the basis for the standard. However, the 8-hour average ozone levels monitored during the summer were below the 75 ppb level, which is consistent with the modeling results. The ability of current photochemical models to replicate winter ozone formation has not been established. Therefore, the comparison of modeled values to isolated winter values is not appropriate.

The No Action Alternative would involve continued development in the GNBPA as disclosed in approved NEPA decision documents. Given a continued level of NO_X and VOC emissions, and the current levels of ozone observed in the winter, there likely would be continued observations of winter ozone concentrations above the NAAQS resulting from this alternative.

4.1.1.5 Summary of GHG Emissions

This section is included in the Draft EIS and is not being amended in this supplement.

4.1.2 Proposed Action Alternative

4.1.2.1 Impacts on Air Quality

Construction emissions would occur during road and well pad construction, well drilling, and well completion testing. Potential SO_2 emissions would be generated by drilling rigs and other diesel engines used during rig-up, drilling, and completion operations (sulfur being a trace element in diesel fuel). Maximum air pollutant emissions from each well would be temporary (i.e., occurring only during the construction period), would occur in isolation, and would not significantly interact with adjacent well locations. Since construction emissions would be temporary, PSD increments are not applicable.

The highest near-field impacts for the Proposed Action would occur during drilling and completion activities ***and the maximum production scenario. These impacts*** would be the same as the near-field impacts for the No Action Alternative (**Table 4.1-4**). The AERMOD modeling to assess near-field impacts used the same hypothetical drilling and production arrangement for all ***project alternatives***. Therefore, near-field impacts ***for the Proposed Action would be*** the same ***as the No Action Alternative, provided that drill rigs are not simultaneously operated at closer than 40-acre surface spacing***.

The regulated HAPs listed in Section 112 of the CAA that contribute the highest levels of emissions for the proposed project are benzene, toluene, ethylbenzene, xylenes, formaldehyde, and n-hexane. Emissions of the remaining HAPs are orders of magnitude smaller. Increases in HAPs due to the Proposed Action Alternative are shown in **Table 4.1-2**. ***The AERMOD modeling used to assess ambient air concentrations for the Proposed Action Alternative was the same as used to assess the No Action. As shown in Table 4.1-5,***

the ambient air concentrations of HAPs would not exceed the USEPA RfCs or TSLs, so no adverse impacts from HAPs are predicted.

4.1.2.2 Impacts at Class I and II Areas – Acid Deposition

This section is included in the Draft EIS and is not being amended in this supplement.

4.1.2.3 Impacts at Class I and II Areas – Visibility

The CALPUFF model system was used to evaluate impacts on visibility at the Class I areas and at the listed sensitive Class II areas. **Table 4.1-7** provides results of the CALPUFF visibility analysis for the Proposed Action for both Class I and Class II areas. Only the areas with the highest impacts in each group are presented on this table; impacts for all areas analyzed are provided in **Appendix G**. These data were developed from the Method 6 approach using annual average background visibility conditions. The results showed that there are no days with a contribution to visibility impacts greater than 10 percent in extinction at listed Class I areas, indicating that the Proposed Action would not contribute to an impact on visibility at these sites.

The modeling results at the listed sensitive Class II areas showed project-related impacts above 1.0 dv (eighth highest, Method 6) at Dinosaur National Monument and Flaming Gorge National Recreation Area. The results predicted 102 days greater than 1.0 dv at Flaming Gorge and 32 days greater than 1.0 dv at Dinosaur National Monument. Modeled results for all other Class II areas showed that impacts would be less than 1.0 dv using Method 6.

The Utah BLM has proposed an Air Resource Management Strategy (ARMS), which includes a goal of providing greater certainty and transparency for agencies, project proponents, and the public regarding the conduct and review of air quality and AQRV impact analyses in the NEPA process, and the application of mitigation. Regional visibility impacts will be evaluated by a photochemical grid model through the ARMS, and the BLM will identify reasonable mitigation, control measures, and design features to address adverse air quality or AQRV impacts.

Given the level of emissions from the Proposed Action that would act as precursors to visibility impairment (primarily NO_X and SO_2 emissions, with less effect from PM emissions), it is likely that any mitigation that would reduce ozone levels, if it incorporates NO_X emissions reductions, also would reduce impacts on visibility levels at nearby sensitive areas. Furthermore, mitigation activities that would control particulate emissions from construction (e.g., fugitive emissions from traffic on roadways) also would lead to improvements in visibility at these same areas.

The primary contributors to cumulative impacts on visibility from the regional sources vary with the location of each area evaluated and the nature of the sources that affect receptors in that area. For areas that are already modeled as being impacted for the No Action Alternative, the cumulative effects of the Proposed Action would be greater in some areas and negligible in others.

4.1.2.4 Impacts on Ambient Ozone Levels

Impacts on ambient air ozone were evaluated using the CMAQ model system. As noted above, the modeling system meets the USEPA-established criteria for acceptable model accuracy and error statistics at the existing monitoring stations in the region. Increases in the fourth-highest ozone levels above baseline were modeled at 2.4 ppb for the Proposed Action Alternative ***for the summer months***. No ozone concentrations in excess of the 75 ppb standard were modeled in the GNBPA ***for that period***.

As noted in Section 4.1.1.4, there have been several occurrences of 8-hour ozone levels above 75 ppb during the winter months. Due to limitations of the model, this analysis does not address winter ozone levels. It is anticipated that the Proposed Action would add approximately 2,213 tpy of NO_X and

Table 4.1-7 CALPUFF Modeled Results for Regional Haze, Proposed Action

Area	All Sources (Project + Non-Project)				Project Sources				Non-Project Sources			
	Days > than		MAX% Δ	8th Highest	Days > than		MAX% Δ	8th Highest	Days > than		MAX% Δ	8th Highest
	5% Δ B_{ext}	10% Δ B_{ext}	B_{ext}	% Δ B_{ext}	5% Δ B_{ext}	10% Δ B_{ext}	B_{ext}	% Δ B_{ext}	5% Δ B_{ext}	10% Δ B_{ext}	B_{ext}	% Δ B_{ext}
Class I Areas												
Arches National Park	359	311	118.47	82.29	0	0	2.56	1.30	359	311	118.47	81.84
Canyonlands National Park	328	236	106.52	68.85	0	0	1.98	1.12	328	236	106.50	68.85
Flat Tops Wilderness Area	365	348	55.02	45.70	0	0	1.86	1.01	365	348	54.72	45.58
Class II Areas												
Dinosaur National Monument	365	364	166.24	131.74	73	32	30.54	16.60	365	363	147.81	123.53
Flaming Gorge National Recreation Area	365	365	280.99	240.99	150	102	41.89	32.57	365	365	256.70	221.14

Source: Air Quality Technical Support Document (**Appendix G**).

6,617 tpy of VOC emissions (representing increases of 22 and 4 percent, respectively) to the regional air quality emission levels. Given this level of emissions and the current levels of ozone in the winter, there likely would be an incremental increase in regional ozone levels resulting from the Proposed Action.

4.1.2.5 Summary of GHG Emissions

This section is included in the Draft EIS and is not being amended in this supplement.

4.1.2.6 Mitigation and Mitigation Effectiveness

The short-term near-field analysis was conducted to determine how various rig spacing scenarios affect predicted exceedances of the 1-hour NO_2 NAAQS in the near-field during drilling and completion operations. This modeling exercise assumed four drill rigs at various spacing intervals between 400 meters and 800 meters between rigs. This modeling predicted a near-field 1-hour NO_2 standard exceedance at distances less than 200 meters from the drill rig location for all spacing scenarios modeled. Based on this predicted 1-hour NO_2 exceedance and in view of the fact that these emission sources would be mobile, temporary, and operated at least 1 mile from any populated area, the BLM proposes two mitigation options:

AIR-1: The proponent would employ measures to mitigate the modeled exceedance of the 1-hour NO_2 standard during drilling operations by employing effective public health buffer zones out to 200 meters from the nearest emission source. Examples of an effective public health protection buffer zone include demarcation of a public access exclusion zone by signage at intervals of every 250 feet that is visible from a distance of 125 feet during daylight hours and a physical buffer such as active surveillance to ensure the property is not accessible by the public during drilling operations.

AIR-2: The proponent may demonstrate compliance with the 1-hour NO_2 NAAQS with appropriate and accepted near-field modeling. As part of this demonstration, the proponent may propose alternative mitigation that could include but is not limited to natural-gas fired drill rigs, installation of NO_X controls, time/use restrictions, and/or drill rig spacing.

Details of the mitigation measure and, if necessary, compliance demonstration modeling would be submitted by the applicant and enforced as a condition of the BLM-issued Application for Permit to Drill.

Monitored ozone exceedances in the Uinta Basin are cause for concern and potentially could result in a nonattainment designation for the region. In view of this, and unless otherwise specified, the applicant has committed to employ the following measures at the outset of the proposed project as part of an "Ozone Action Plan" to mitigate additional adverse ozone impacts:

- *Low emission glycol dehydrators at all existing and new compressor stations and production wells.*
- *Electric compression, where feasible (approximately 50 percent of the compression hp to be electrically driven).*
- *Emission controls having a control efficiency of 95 percent on existing condensate tanks with a potential to emit of greater 20 tpy, and on new condensate tanks with a potential to emit of 5 tpy VOCs.*
- *Low-bleed pneumatic devices would be installed at all new compressor stations and production facilities. Within 6 months after of the Record of Decision (ROD), all existing high-*

bleed pneumatic devices would be replaced with low bleed pneumatic devices. High-bleed devices may be allowed to remain in service for critical safety and/or process reasons.

- *Green completions for all well completion activities.*
- *Tier II drill rig engines by 2012, with phase-in of Tier IV engines or equivalent emission reduction technology as soon as possible thereafter, but no later than 2018*
- *A natural gas or liquid natural gas drilling rig engine pilot project would be implemented as soon as operationally feasible, but no later than 1 year after the ROD. This pilot project would ascertain emission reduction benefits, operating experience and, if successful, may result in more natural gas or liquid natural gas engine use in the Uinta Basin.*
- *Lean burn natural gas-fired stationary compressor engines or equipment with equivalent emission rates.*
- *Catalyst on all natural gas-fired compressor engines to reduce the emissions of CO and VOCs.*
- *Dry seals on new centrifugal compressors.*
- *An annual inspection and maintenance program to reduce VOC emissions, including:*
  - *Performing inspections of thief hatch seals and Enardo pressure relief valves to ensure proper operations.*
  - *Reviewing gathering system pressures to evaluate any areas where gathering pressure may be reduced, resulting in lower flash losses from the condensate storage tanks.*

Additionally, the applicant commits to developing a project-specific adaptive management strategy, to be informed by periodic emission inventory updates. Implementation of this strategy and associated application of "enhanced" ozone mitigation measures would be required once the proposed project is initiated if: 1) USEPA designates the area "nonattainment" for ozone; 2) there is a monitored ozone standard exceedance; 3) the ARMS modeling shows that additional mitigation is needed to prevent future ozone exceedances; or 4) the ARMS group establishes industry-wide mitigation requirements through ongoing modeling. If implementation of this adaptive management strategy is triggered, the applicant commits to working with the BLM to analyze project-specific "enhanced" mitigation measures and employ them within 1 year. The measures to be considered could include, but would not be limited to, the following:

- *Reducing the total number of drill rigs.*
- *Installing Tier IV or better drill rig engines.*
- *Seasonally reducing or ceasing drilling during specified periods.*
- *Using only lower-emitting drill and completion rig engines during specified time periods.*
- *Using natural gas-fired drill and completion rig engines.*
- *Replacing internal combustion engines with gas turbines for natural gas compression.*
- *Using electric drill rig or compression engines.*
- *Centralizing gathering facilities.*
- *Limiting blowdowns or restricting them during specified periods.*
- *Installing plunger lift systems with smart automation.*
- *Employing a monthly Forward Looking Infrared, or FLIR, program to reduce VOCs.*
- *Enhancing a direct inspection and maintenance program.*

- ***Employing tank load out vapor recovery.***
- ***Employing enhanced VOC emission controls with 95 percent control efficiency on additional production equipment having a potential to emit of greater than 5 tpy.***

In addition to the commitments discussed above, the applicant commits to complying with applicable air pollution control rules and regulations.

The high ozone levels reported in the Uinta Basin in the winter of 2010 prompted the BLM to begin developing an adaptive management strategy for Uinta Basin operations to address ozone levels in excess of the NAAQS with the goal that this and other oil and gas development projects in the basin under BLM jurisdiction would not contribute to ozone exceedances.

Air quality issues are being addressed on a Utah-wide basis through the Utah Air Resource Technical Advisory Group (UTAG) and the BLM's ARMS. The adaptive management strategy outlined below has been designed to develop an ozone action plan to address ozone levels in the Uinta Basin associated with oil and gas operations. The adaptive management strategy would consist of the following elements:

- ***Refine air quality modeling predictions;***
- ***Develop a Uinta Basin ozone action plan; and***
- ***Implement a regional ozone action plan.***

The first two elements of this strategy are being implemented by the BLM and other agency stakeholders, independent of the decision to be made regarding further development in the GNBPA. Regional operators may participate in these initial planning steps, thereby having the opportunity to contribute to the outcome of the process. The third element would require specific action by KMG and other oil and gas operators in the GNBPA following the approval of the ROD. All three elements are described in more detail in the following paragraphs.

<u>Refine Air Quality Modeling Predictions</u>. The ARMS adaptive management strategy involves conducting a regional photochemical modeling analysis to compare and evaluate the effect of different mitigation activities on the ozone levels in the Uinta Basin. This modeling would be conducted in consultation with appropriate federal, Tribal, and state stakeholders as well as with regional oil and gas operators. The aim of the modeling effort would be to compare the effect of changes in VOC and NO_X ***emissions, under various control strategies, to model-predicted change in ozone levels. Separate comparisons may be made for winter and summer periods. An updated emissions inventory, observed ozone levels within the basin, and corresponding meteorological data would be used. Modeling results would provide an estimate of ozone region-wide and depict spatially the effectiveness of different emission controls on ozone formation in the Uinta Basin. The BLM would isolate the project-specific incremental ozone increases from the ARMS modeling immediately following completion of the region-wide modeling effort.***

The updated air quality modeling analysis utilizing the new inventory and monitored data would be performed within 2 years of signing the ROD. This would be accomplished by isolating project-specific impacts from the ARMS regional scale air quality modeling study, if available. The modeling would consider the current emission inventory data, to be updated periodically, current operating practices, applicant committed mitigation, and any applicable Best Available Control Technology requirements in place at the time the modeling is conducted. The BLM, in consultation with appropriate federal, state, and Tribal stakeholders, would evaluate the modeling results and identify any needed additional reductions in ozone precursor emissions.

As soon as possible following evaluation of the modeling results, the BLM and appropriate stakeholders would use their respective authorities to implement any needed emission control mitigation measures and/or operating limitations necessary to ensure continued compliance with applicable ambient air quality standards for ozone. Absent an effective technology to implement, reductions in the pace of development may be utilized to ensure ambient air quality standards are met.

<u>Develop an Ozone Action Plan</u>. Based on the results of the photochemical modeling study, the BLM would develop an ozone action plan that would describe mitigation to be enacted to address observed ozone levels above the NAAQS. The plan would be developed in consultation with appropriate federal, Tribal, and state stakeholders. Regional oil and gas operators also may participate in the development of the plan. Specific criteria would be identified within the plan for determining when additional mitigation would be initiated and which measures would be recommended. Criteria also would be specified for when the use of additional mitigation could be suspended based on observed ozone concentrations. Potential mitigation strategies are included in the list of "enhanced mitigation measures" presented above.

<u>Implement an Ozone Action Plan</u>. The BLM would evaluate monitored ozone ambient air quality data at sites in the Uinta Basin to determine when to implement the ozone action plan. Monitoring data would be obtained, summarized, and reviewed on an ongoing basis following quality assurance review of each data set. Based on the data review and the criteria set forth in the ozone action plan, the BLM, in consultation with the appropriate federal, Tribal, and state stakeholders, would determine when to trigger implementation of the plan. Following issuance of the ROD for this project, KMG and other operators in the GNBPA would be required to participate in the implementation of the BLM-approved ozone action plan within the GNBPA.

The applicant, in consultation with the BLM and appropriate federal, Tribal, and state stakeholders would employ "enhanced mitigation measures" as warranted through the Ozone Action Plan within 1 year of a nonattainment designation or monitored ozone standard exceedance.

The BLM would ensure that appropriate ambient air monitoring is occurring in the Uinta Basin. The BLM and/or the operator, in consultation with the UTAG, would establish monitoring sites in the event that additional monitored data is necessary. These monitors would conform to USEPA monitoring protocols (40 CFR Parts 50 and 58), with emphasis on obtaining measurements that contribute to the formation of secondarily formed pollutants such as $PM_{2.5}$ ***and ozone, to ensure that monitoring data are valid and useful in calibrating the model and determining control strategies.***

4.1.2.7 Residual Impacts

This section is included in the Draft EIS and is not being amended in this supplement.

4.1.3 Resource Protection Alternative

This section is included in the Draft EIS and is not being amended in this supplement.

4.1.4 Optimal Recovery Alternative

4.1.4.1 Impacts on Air Quality

Maximum potential air quality impacts from emission sources under the Optimal Recovery Alternative include impacts from sources that would continue to operate under the No Action Alternative. There would be more emissions sources under the Optimal Recovery Alternative than the Proposed Action (**Table 4.1-1**).

The highest near-field impacts for the Optimal Recovery Alternative would occur during drilling and completion activities and maximum production alternatives and would be the same as the near-field impacts for the No Action Alternative (Table 4.1-4). The same maximum hypothetical drilling and

production arrangement for an individual square mile was used for the AERMOD modeling to assess near-field impacts for all project alternatives. Therefore, near-field impacts for this alternative would be the same as the other alternatives provided that drill rigs are not simultaneously operated at closer than 40-acre surface spacing.

Increases in HAPs due to the Optimal Recovery Alternative are shown in Table 4.1-2. As shown in Table 4.1-5, the ambient air concentrations of HAPs would not exceed the USEPA RfCs or TSLs, so no adverse impacts from HAPs are predicted.

In the far-field analysis, the maximum 24-hour PM_{10} impact at Class I areas would be 0.24 μg/m^3 at Arches National Park, and the annual average PM_{10} impact would be 0.02 μg/m^3. Impacts from SO_2 and NO_X emissions would be below 0.013 μg/m^3. At sensitive Class II areas, the maximum impacts would be at Flaming Gorge National Recreation Area for all criteria air pollutants. The maximum particulate impact on a 24-hour average would be 7.36 μg/m^3 and the annual PM_{10} impact would be 1.38 μg/m^3. The maximum annual average NO_X impact would be 0.94 μg/m^3. Impacts from all other criteria pollutants would be less than 1.0 μg/m^3. When added to the background concentrations, all impacts from all sources would be below the established NAAQS for criteria pollutants.

4.1.4.2 Impacts at Class I and II areas – Acid Deposition

This section is included in the Draft EIS and is not being amended in this supplement.

4.1.4.3 Impacts on Visibility

This section is included in the Draft EIS and is not being amended in this supplement.

4.1.4.4 Impacts on Ambient Ozone Levels

Impacts on ambient air ozone were evaluated using the CMAQ model system. Increases in the fourth-highest ozone levels were modeled at 4.9 ppb for the Optimal Recovery Alternative. Ozone concentrations were simulated to remain below the 75 ppb ozone standard based on the 2005 meteorological data set. The model results showed ozone concentration up to 79 ppb for limited areas adjacent to the GNBPA ***during summer months*** based on the 2006 meteorological data set. The result indicates that there would be a potential to exceed the NAAQS for ozone in areas adjacent to the GNBPA.

As noted in Section 4.1.1.4, there have been several occurrences of 8-hour ozone levels above 75 ppb during the winter months. Due to limitations of the model, this analysis does not address winter ozone levels. It is anticipated that the Optimal Recovery Alternative would add approximately 4,946 tpy of NO_X and 24,976 tpy of VOC emissions (representing increases of 49 and 14 percent, respectively) to the regional air quality emission levels. Given this level of emissions and the current levels of ozone in the winter, there likely would be an increase in regional ozone levels resulting from this alternative.

4.1.4.5 Summary of GHG Emissions

This section is included in the Draft EIS and is not being amended in this supplement.

4.1.4.6 Mitigation and Mitigation Effectiveness

Modeling results for the Optimal Recovery Alternative showed compliance with all ambient air quality standards except potential exceedances of the ozone standard at scattered locations. The projected impacts are up to 79 ppb, but the limitations on the model must be considered before imposing mitigation measures. Given the level of the predicted ozone impacts, and the fact that all other ambient air quality standards would be attained, specification of monitoring or mitigation measures is not proposed at this time. However, the BLM would implement an adaptive management strategy to ensure that the proposed project remains in compliance with the NAAQS and would not contribute to ozone exceedances. This strategy***, as well as specific***

measures for mitigation of air quality impacts, is described in more detail in Section 4.1.2.6 under the Proposed Action.

4.1.4.7 Residual Impacts

This section is included in the Draft EIS and is not being amended in this supplement.

4.1.5 Relationship Between Local Short-term Uses of the Human Environment and Maintenance and Enhancement of Long-term Productivity

This section is included in the Draft EIS and is not being amended in this supplement.

4.1.6 Irreversible/Irretrievable Commitment of Resources

This section is included in the Draft EIS and is not being amended in this supplement.

4.2 Cultural Resources and Native American Traditional Values

This section is included in the Draft EIS and is not being amended in this supplement.

4.3 Geology

This section is included in the Draft EIS and is not being amended in this supplement.

4.4 Land Use

This section is included in the Draft EIS and is not being amended in this supplement.

4.5 Paleontology

This section is included in the Draft EIS and is not being amended in this supplement.

4.6 Range Resources

This section is included in the Draft EIS and is not being amended in this supplement.

4.7 Recreation

This section is included in the Draft EIS and is not being amended in this supplement.

4.8 Socioeconomics and Environmental Justice

This section is included in the Draft EIS and is not being amended in this supplement.

4.8.1 No Action Alternative

This section is included in the Draft EIS and is not being amended in this supplement.

4.8.1.1 Impacts on Socioeconomics and Environmental Justice

This section is included in the Draft EIS and is not being amended in this supplement.

Employment, Income, and Population

This section is included in the Draft EIS and is not being amended in this supplement.

Grazing

This section is included in the Draft EIS and is not being amended in this supplement.

Recreational Use and Tourism

This section is included in the Draft EIS and is not being amended in this supplement.

Community Facilities and Services

This section is included in the Draft EIS and is not being amended in this supplement.

Public Expenditures and Revenues

This section is included in the Draft EIS and is not being amended in this supplement.

Community Social Conditions

This section is included in the Draft EIS and is not being amended in this supplement.

Environmental Justice

Continuing production and some additional development activity is foreseen within the GNBPA under the No Action Alternative. The GNBPA encompasses a vast, largely unpopulated and undeveloped area in south-central Uintah County, characterized by substantial existing oil and gas development. The latter includes many producing wells, gathering lines, resource roads, and field compression and water disposal facilities. A few residents live on scattered farms and ranches in the general vicinity of the GNBPA, on the Ouray National Wildlife Refuge, and a small cluster of residences are located in Ouray, site of the former Reservation agency. Randlett CDP, with a population of 224 in 2000, is the nearest community of any substantial size to the GNBPA, located approximately 10 linear miles to the northwest. The Fort Duchesne and Whiterocks CDPs, the two other identified communities warranting consideration under the environmental justice criteria, are even more distant from the GNBPA.

The spatial separation between these communities and the GNBPA, combined with other factors, supports a determination of no environmental justice effects under the No Action Alternative. The other factors include no adverse environmental impacts of concern extending outside the GNBPA and avoidance of these communities by the primary highway access routes from the oil and gas industry's major service centers and staging areas in Vernal and Naples.

Results of near-field air quality modeling indicate temporary, short-term exceedances of the 1-hour NO_2 standard could occur under a scenario of multiple drilling rigs operating within a single section in

the extreme northwest corner of the GNBPA. However, the concentrations of pollutants would dissipate within 200 meters of the source to below the NAAQS within the GNBPA boundary. These near-field effects are described in Section 3.1.2. Therefore, the likelihood of adverse environmental effects of concern for environmental justice extending beyond the GNBPA is not anticipated. The BLM notes that ozone exceedances have been observed at monitoring stations in the Uinta Basin near Ouray and Redwash. These impacts are regional in scale and would not disproportionately impact communities with low-income or minority populations.

Finally, the Ute Tribe would receive royalty revenues on current and future oil and gas production from Tribal minerals under the No Action Alternative that may be used to further the Tribe's economic development and diversification goals.

4.8.2 Proposed Action Alternative

This section is included in the Draft EIS and is not being amended in this supplement.

4.8.2.1 Impacts on Socioeconomics and Environmental Justice

This section is included in the Draft EIS and is not being amended in this supplement.

Employment, Income, and Population

This section is included in the Draft EIS and is not being amended in this supplement.

Grazing

This section is included in the Draft EIS and is not being amended in this supplement.

Recreational Use and Tourism

This section is included in the Draft EIS and is not being amended in this supplement.

Community Facilities and Services

This section is included in the Draft EIS and is not being amended in this supplement.

Public Expenditures and Revenues

This section is included in the Draft EIS and is not being amended in this supplement.

Community Social Conditions

This section is included in the Draft EIS and is not being amended in this supplement.

Environmental Justice

Although the Proposed Action would increase levels of future natural gas development and production activities within the GNBPA, the fact that it is an infill development would not alter the fundamental spatial, economic, and demographic relationships used to assess potential economic justice effects with respect to the three minority and low-income communities; the Whiterocks, Fort Duchesne, and Randlett CDPs. Although additional well pads would be developed in the GNBPA, the Proposed Action would not reduce the distances or alter the intervening land uses that effectively buffer those three communities from existing and future gas development. The volume of truck traffic accessing the GNBPA would increase under the Proposed Action and residents living along the travel corridors would experience increases in traffic and traffic-related effects. However, the bulk of the truck traffic would occur on existing public highway access routes that avoid the three identified communities. Similar to that discussed under the No Action Alternative, near-field modeling does not

predict air quality impacts from the Proposed Action beyond the GNBPA boundary; therefore, adverse impacts for environmental justice are not anticipated.

Potential growth-related social and economic impacts associated with the Proposed Action would be higher and continue over a longer duration than under the No Action Alternative. Such impacts would have both beneficial and adverse dimensions, most of which would be focused in the Vernal and Naples area. Disproportionately high and adverse effects would not be anticipated in the three potentially affected minority and low-income communities.

The Ute Tribe would realize higher royalties on oil and gas production from Tribal mineral interests under the Proposed Action Alternative than under the No Action Alternative.

The spatial separation between these minority and low-income communities and the GNBPA, and the absence of adverse environmental effects, supports a determination of no environmental justice effects for the Proposed Action. Even were such environmental effects identified, prevailing wind patterns, the reliance on existing highway routes, and distribution of the population along the routes would preclude a determination of disproportionately high effects to potentially affected minority and low-income populations.

4.8.2.2 Mitigation and Mitigation Effectiveness

This section is included in the Draft EIS and is not being amended in this supplement.

4.8.2.3 Residual Effects

This section is included in the Draft EIS and is not being amended in this supplement.

4.8.3 Resource Protection Alternative

4.8.3.1 Impacts on Socioeconomics and Environmental Justice

This section is included in the Draft EIS and is not being amended in this supplement.

<u>Environmental Justice</u>

Under the Resource Protection Alternative, the same total number of wells would be drilled as under the Proposed Action, but on fewer new well pads. The lower number of well pads would leave unaffected the fundamental spatial, economic, and demographic relationships used to assess potential economic justice effects with respect to the three minority and low-income communities (i.e., the Whiterocks, Fort Duchesne, and Randlett CDPs).

Potential growth-related social and economic impacts associated with the Resource Protection Alternative would be higher and continue over a longer duration than under the No Action Alternative. Such impacts would have both beneficial and adverse dimensions, most of which would be focused in the Vernal and Naples area. Disproportionately high and adverse effects would not be anticipated in the three potentially affected minority and low-income communities.

The Ute Tribe would realize higher royalties on oil and gas production from Tribal mineral interests under the Resource Protection Alternative than under the No Action Alternative.

The spatial separation between these minority and low-income communities and the GNBPA, and the absence of significant adverse environmental effects, supports a determination of no environmental justice effects for the Resource Protection Alternative. Even were environmental effects identified, prevailing wind patterns, the reliance on existing highway routes, and distribution of the population along the routes would preclude a determination of disproportionately high effects to potentially

affected minority and low-income populations. Similar to that discussed under the No Action Alternative, near-field modeling does not predict impacts from the Resource Protection Alternative beyond the boundary of the GNBPA. Therefore, adverse air quality impacts for environmental justice are not anticipated.

4.8.3.2 Mitigation and Mitigation Effectiveness

This section is included in the Draft EIS and is not being amended in this supplement.

4.8.3.3 Residual Effects

This section is included in the Draft EIS and is not being amended in this supplement.

4.8.4 Optimal Recovery Alternative

4.8.4.1 Impacts on Socioeconomics and Environmental Justice

This section is included in the Draft EIS and is not being amended in this supplement.

Employment, Income, and Population

This section is included in the Draft EIS and is not being amended in this supplement.

Grazing

This section is included in the Draft EIS and is not being amended in this supplement.

Recreational Use and Tourism

This section is included in the Draft EIS and is not being amended in this supplement.

Community Facilities and Services

This section is included in the Draft EIS and is not being amended in this supplement.

Public Expenditures and Revenues

This section is included in the Draft EIS and is not being amended in this supplement.

Community Social Conditions

This section is included in the Draft EIS and is not being amended in this supplement.

Environmental Justice

Under the Optimal Recovery Alternative, substantially more wells would be drilled than under the Proposed Action, and these wells would be developed on many more new well pads over a longer duration. However, the higher number of wells and well pads would not alter the fundamental spatial, economic, and demographic relationships used to assess potential Environmental justice effects with respect to the three minority and low-income communities: Whiterocks, Fort Duchesne, and Randlett CDPs.

The spatial separation between these communities and the GNBPA, and the absence of significant adverse environmental effects, supports a determination of no environmental justice effects for the Optimal Recovery Alternative. Even were environmental effects identified, prevailing wind patterns, the reliance on existing highway routes, and distribution population along the routes would preclude a

determination of disproportionately high effects to potentially affected minority and low-income populations.

The Ute Tribe would realize substantially higher royalties on oil and gas production from Tribal mineral interests under the Optimal Recovery Alternative than under the No Action Alternative.

Potential growth-related social and economic impacts associated with the Optimal Recovery Alternative would be much higher and continue over a longer duration than under the No Action Alternative. Such impacts would have both beneficial and adverse dimensions. Although most impacts would be focused in and around the Vernal and Naples area, more growth-related development and land use changes would occur outside the existing urbanized area. However, such effects would not be anticipated to accrue disproportionately to the three potentially affected minority and low-income communities. Similar to that discussed under the No Action Alternative, near-field modeling does not predict impacts from the Optimal Recovery Alternative beyond the GNBPA boundary. Therefore, adverse air quality impacts for environmental justice are not anticipated.

4.8.4.2 Mitigation and Mitigation Effectiveness

This section is included in the Draft EIS and is not being amended in this supplement.

4.8.4.3 Residual Effects

This section is included in the Draft EIS and is not being amended in this supplement.

4.8.5 Relationship Between Local Short-term Uses of the Human Environment and Maintenance and Enhancement of Long-term Productivity

This section is included in the Draft EIS and is not being amended in this supplement.

4.8.6 Irreversible/Irretrievable Commitment of Resources

This section is included in the Draft EIS and is not being amended in this supplement.

4.9 Soils

This section is included in the Draft EIS and is not being amended in this supplement.

4.10 Transportation and Access

This section is included in the Draft EIS and is not being amended in this supplement.

4.11 Vegetation

This section is included in the Draft EIS and is not being amended in this supplement.

4.12 Visual Resources

This section is included in the Draft EIS and is not being amended in this supplement.

4.13 Water Resources

This section is included in the Draft EIS and is not being amended in this supplement.

4.14 Wilderness Characteristics

This section is included in the Draft EIS and is not being amended in this supplement.

4.15 Wildlife and Fisheries Resources

This section is included in the Draft EIS and is not being amended in this supplement.