Appendix B
HiLine District Air Resource Management Plan:

Adaptive Management Strategy
for
Oil and Gas Resources

Malta Air Monitoring Station Photo by Amanda Anderson

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Acronyms

APD	Application for Permits to Drill
AQRV	Air quality related value
AQTW	Air Quality Technical Workgroup
ARMP	Air Resource Management Plan
ARTSD	Air Resource Technical Support Document
BACT	Best Available Control Technology
BLM	Bureau of Land Management
CAMx	Comprehensive Air Quality Model with Extensions
CFR	Code of Federal Regulations
CMAQ	EPA Models-3/Community Multiscale Air Quality
CO	Carbon monoxide
EPA	U.S. Environmental Protection Agency
FLIR	Forward looking infrared
FLPMA	Federal Land Policy and Management Act
FS	U.S. Forest Service
FWS	U.S. Fish and Wildlife Service
hp	Horsepower
MAAQS	Montana Ambient Air Quality Standards
MAQP	Montana Air Quality Permits
$\mu g/m^3$	Micrograms per cubic meter
MDEQ	Montana Department of Environmental Quality
MOU	Memorandum of Understanding
NAA	Nonattainment Area
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NO	Nitric oxide
NO_2	Nitrogen dioxide
NO_x	Nitrogen oxides
NPS	National Park Service
NSR	New Source Review
O_3	Ozone
Pb	Lead
PGM	Photochemical grid modeling
PM_{10}	Particulate matter with a diameter less than or equal to 10 microns
$PM_{2.5}$	Particulate matter with a diameter less than or equal to 2.5 microns
POD	Plan of Development
ppb	Parts per billion
ppm	Parts per million
PSD	Prevention of Significant Deterioration
REC	Reduced emissions completion
ROD	Record of Decision
RMP	Resource Management Plan
SLAMS	State or Local Air Monitoring Station
SO_2	Sulfur dioxide
tpy	Tons Per Year
USDI	U.S. Department of the Interior
VOC	Volatile organic compound
WRAP	Western Regional Air Partnership
WRF	Weather and Research Forecasting

1.0 Introduction

1.1 Purpose of the Air Resource Management Plan

The Bureau of Land Management (BLM) HiLine District (HiLine) Air Resource Management Plan (ARMP) for oil and gas activities describes the air quality adaptive management strategy that would be used to assess future air quality and Air Quality Related Values (AQRVs) and identify mitigation measures to address unacceptable impacts that could potentially be associated with future oil and gas development. The adaptive management strategy focuses on oil and gas activity because aggregated emissions from multiple small sources at well sites can potentially cause significant air quality and AQRV impacts under certain circumstances.

The BLM works collaboratively with the Montana Department of Environmental Quality (MDEQ) to promote air quality monitoring near oil and gas activity areas and will work closely with the Montana MDEQ on any future emission mitigation considered under this ARMP. The oil and gas adaptive management strategy was prepared in collaboration or with the review of the U.S. Environmental Protection Agency (EPA) and three federal land management agencies under the *Understanding Among the U.S. Department of Agriculture, U.S. Department of the Interior, and U.S. Environmental Protection Agency, Regarding Air Quality Analyses and Mitigation for Federal Oil and Gas Decisions Through the National Environmental Policy Act [NEPA] Process* (USDI 2011). This Memorandum of Agreement (MOU) is described in more detail in Section 1.4 of this appendix. Although not a signatory to the MOU, the MDEQ participates in the Air Quality Technical Workgroup (AQTW) that was established to implement the MOU process for the Proposed Resource Management Plan (PRMP) and Environmental Impact Statement (EIS).

As described in Chapter 3 of the Proposed RMP/Final EIS, the MDEQ and EPA implement the Clean Air Act within non-tribal portions of the planning area, while EPA implements the Act in tribal areas. State and federal emission control regulations and air quality permitting programs apply to many oil and gas sources. However, some of the smallest oil and gas emission sources are not required to obtain air quality permits. Facilities that have the potential to emit less than 25 tons per year of a regulated air pollutant are generally not required to obtain state or federal air quality permits or register their facilities with MDEQ. At these smallest facilities, certain activities and equipment are subject to state and federal emission control regulations. The ARMP provides a means for the BLM to satisfy its statutory responsibility under NEPA and FLPMA to protect air quality and other natural resources. Under the ARMP, the BLM will take appropriate management action if monitoring data for local areas with BLM-authorized oil and gas activity indicate that additional emission reductions may be needed to maintain good air quality. Due to the fragmentation of surface and mineral estate within the planning area, the BLM and MDEQ would seek a consistent emission control approach throughout an area of concern.

The ARMP includes both near-term actions and long-term actions. In the near-term, the ARMP sets forth initial actions to maintain good air quality until regional modeling can be performed to further assess potential impacts to air quality and AQRVs. In the long-term, the ARMP provides ongoing management strategies to assess and adapt to new air quality and AQRV ambient monitoring and modeling data during the life of this Resource Management Plan (RMP).

The ARMP includes a multifaceted approach involving the following activities:

- Oil and gas activity assessment
- Ambient air quality monitoring support
- Air quality and AQRV assessment
- Future air quality and AQRV modeling
- Mitigation

Pollutant emissions addressed by the ARMP include the criteria air pollutants listed below.

- Carbon monoxide (CO)
- Nitrogen dioxide (NO_2)
- Ozone (O_3)
- Particulate matter with a diameter less than or equal to 10 microns (PM_{10})

- Particulate matter with a diameter less than or equal to 2.5 microns ($PM_{2.5}$)
- Sulfur dioxide (SO_2)

Three criteria air pollutants, CO, lead, and SO_2, are not monitored within the HiLine because high concentrations of these pollutants are unlikely. Elevated concentrations of CO are associated with vehicle traffic in very large urban areas, while high concentrations of lead and SO_2 are typically found near industrial facilities that emit large quantities of these pollutants or in areas with sour gas production. These situations do not occur in the planning area, as described in Chapter 3. CO and SO_2 emissions would be modeled to demonstrate compliance with the NAAQS. Due to the lack of lead emissions from oil and gas activities, lead emissions would not be modeled as part of the air quality analysis.

The ARMP also addresses modeling and mitigation for the following AQRV assessments:

- Deposition of sulfur and nitrogen
- Lake acid neutralizing capacity
- Visibility

The adaptive management strategy for oil and gas resources provides the flexibility to respond to changing conditions that could not be predicted during RMP development. The strategy also allows for the use of new technology and methods that may minimize or reduce impacts.

1.2 Revision of the Air Resource Management Plan

This ARMP may be modified as necessary to comply with law, regulation, and policy and to address new information and changing circumstances. Changes to the goals or objectives set forth in the HiLine RMP/EIS would require maintenance or amendment of the RMP while changes to implementation, including modifying this ARMP, may be made without amending the RMP.

1.3 Current Air Quality

Based on the closest available monitoring data for rural oil and gas activity areas in northern Montana, air quality within the HiLine is believed to be good, as described in Chapter 3. All areas within the HiLine are designated as areas that attain the National Ambient Air Quality Standards (NAAQS). State-based standards, known as the Montana Ambient Air Quality Standards (MAAQS), are also believed to be met in the HiLine based on monitors sited outside the planning area. Recently installed BLM-funded monitors in Malta are providing much-needed ambient concentration data for north-central Montana.

1.4 Background of the AQTW and the MOU Regarding Air Quality Analyses and Mitigation for Federal Oil and Gas Decisions through the NEPA Process

The AQTW includes representatives from the following agencies: the BLM, EPA, U.S. Forest Service (FS), U.S. Fish and Wildlife Service (FWS), and the National Park Service (NPS). Each of these agencies is a party to the *Memorandum of Understanding Among the U.S. Department of Agriculture, U.S. Department of the Interior, and U.S. Environmental Protection Agency, Regarding Air Quality Analyses and Mitigation for Federal Oil and Gas Decisions Through the National Environmental Policy Act Process* (USDI 2011) (herein referred to as the MOU). This agreement is designed to ". . . facilitate the completion of NEPA environmental analyses for Federal land use planning and oil and gas development decisions [USDI 2011]."

The BLM asked the MDEQ to join the AQTW. The MDEQ has primary authority to protect air quality within the state. Although the MDEQ is not a signatory to the national MOU, successful air quality management of BLM-authorized oil and gas activities depends on a close working relationship between the BLM and the MDEQ. The two agencies have worked together to improve air quality monitoring and will continue to cooperate by sharing data, planning modeling efforts, and working together to identify emission reduction measures needed to maintain good air quality in areas with oil and gas activity.

The MOU sets forth collaborative procedures that the AQTW agencies use to analyze potential air quality and AQRV impacts. The agencies also work together to identify potential mitigation measures that may be needed to reduce impacts to air quality and AQRVs. The lead agency (the BLM in this case), in collaboration with the other agencies, has the responsibility to identify reasonable mitigation and control measures to address adverse impacts to air quality. Mitigation measures may also address impacts to AQRVs at Class I areas and at sensitive Class II areas that have been identified by the BLM, FS, FWS, and NPS.

The AQTW provided input to this ARMP and will continue to work collaboratively on future modeling efforts associated with this RMP. Provisions of the MOU continue to apply to future oil and gas activities in the planning area. In some cases, air quality and AQRV modeling performed under this ARMP may be sufficient to address modeling needs for future oil and gas projects that would otherwise require additional modeling under the MOU. However, the ARMP in no way replaces provisions of the MOU. Determinations of existing modeling adequacy for future oil and gas activities that trigger the MOU would be made collaboratively by the AQTW using the procedures included in the MOU.

1.5 MDEQ Air Quality Management and BLM Mitigation Measures

Primary air quality management authority and responsibility for the planning area rest with the MDEQ (for non-tribal areas of the planning area) and the EPA for tribal areas. However, the BLM also plays a role in protecting air resources under the Federal Land Policy and Management Act (FLPMA) and NEPA. Due to the nature of NEPA analyses for land use planning, the BLM's air resource management role is forward-looking because air resource impacts are analyzed for future activities that may or may not occur.

1.5.1 MDEQ Air Quality Programs

The MDEQ has been delegated Federal Clean Air Act authority from EPA to regulate air quality and air emissions requirements within the non-tribal areas of Montana. The MDEQ also implements state ambient air quality standards for additional air pollutants and has established more stringent standards for some criteria air pollutants, as shown in Table B.2. As part of NAAQS implementation, the MDEQ operates air quality monitors throughout Montana.

The MDEQ has State Implementation Plan approved New Source Review (NSR) permitting programs, which include Prevention of Significant Deterioration (PSD), Nonattainment Area (NAA), and minor source programs. The MDEQ's PSD and NAA permitting programs impose controls on major stationary sources in order to control emissions of regulated pollutants. Emission controls are typically required through the application of Best Available Control Technology (BACT) or Lowest Achievable Emission Rate, depending on the applicable NSR permitting program. In addition, the MDEQ implements a minor source NSR permitting program (e.g., minor source Montana Air Quality Permits [MAQP] and registrations). The MDEQ's minor source NSR program requires sources with a potential to emit greater than 25 tons per year (tpy) of any regulated air pollutant to apply for a permit to construct pursuant to the MAQP requirements or register with the MDEQ pursuant to the registration requirements under the Administrative Rules of Montana (ARM). To ensure compliance with the NAAQS, MDEQ's minor NSR program contains regulatory requirements that track activity and require the application of BACT. Additionally, the ARM require reasonable precautions to limit fugitive particulate emissions from all activities in Montana (i.e., permitted, registered, and those facilities that do not require a permit/registration). MDEQ's NSR program not only provides the emission benefits necessary to attain Montana's air quality goals, but also includes many features that provide regulatory certainty while still allowing flexibility in the implementation of Montana's air quality programs.

1.5.2 MDEQ Oil and Gas Emission Control Requirements

The MDEQ minor source permitting and registration program for oil and gas facilities includes a robust set of emission controls. MDEQ rules require oil or gas well facilities to control emissions from the time the well is completed until the source is registered or permitted. Facilities that choose to register must meet the emission control requirements contained in Administrative Rules of Montana (ARM) 17.8.17. If a source cannot meet these requirements it must apply for an MAQP. The MAQP requires a case-by-case BACT analysis. A case-by-case BACT analysis may include design, equipment, work practice, or operational standards in place of or in combination with an emission limitation. Examples of MDEQ emission control requirements for oil and gas facilities (defined as those with a potential to emit more than 25 tpy of any airborne pollutant) include the following measures to limit emissions.

- Each piece of oil or gas well facility equipment containing volatile organic compound (VOC) vapors (as defined in the permitting or registration regulations) with a potential to emit 15 tpy or more must be routed to a gas pipeline or to air pollution control equipment with 95 percent or greater control efficiency (registered facilities). This requirement applies to the following equipment.
    - Oil and gas wellhead production equipment including, but not limited to, wellhead assemblies, amine units, prime mover engines, phase separators, heater treatment units, dehydrator units, storage tanks, and connector tubing
    - Transport vehicle loading operations
- Hydrocarbon liquids must be loaded into transport vehicles using submerged fill technology.
- Stationary internal combustion engines greater than 85 brake horsepower must be equipped with nonselective catalytic reduction (for rich burn engines) or oxidation catalytic reduction (for lean burn engines) or equivalent emission reduction technologies.
- Piping components containing VOCs must be inspected for leaks each month. The first attempt to repair any leaking VOC equipment must occur within 5 days and the repair must be completed no later than 15 days after the leak is initially detected unless facility shutdown is required. Facilities are required to maintain monthly leak inspection and repair records.

Although MDEQ emission control requirements do not mention GHGs, the VOC emission control measures would also reduce methane emissions, while the engine emission controls would reduce nitrous oxide emissions.

The MDEQ oil and gas emission control requirements have successfully protected air quality throughout the planning area, as evidenced by ambient air quality monitoring data that indicate good air quality in oil and gas activity areas.

1.5.3 BLM Air Resource Management and MDEQ Coordination

The BLM's authority to address air resources derives primarily from FLPMA and NEPA. Under FLPMA, the BLM must "provide for compliance with applicable pollution control laws, including State and Federal air, water, noise, or other pollution standards or implementation plans" in the development and revision of land use plans (Section 202 (c)(8)). FLPMA also authorizes the BLM to manage public lands "in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values" (Section 102 (8)).

Under NEPA, the BLM ensures that information on the potential environmental and human impact of federal actions is available to public officials and citizens before decisions are made and before actions are taken. One of the purposes of the Act is to "promote efforts which will prevent or eliminate damage to the environment and biosphere," and to promote human health and welfare (Section 2). NEPA requires that BLM and other federal agencies prepare a detailed statement on the environmental impact of the proposed action for major federal actions expected to significantly affect the quality of the human environment (Section 102 (C)).

The BLM's authority under the Clean Air Act primarily derives from the requirement that BLM-authorized activities comply with the Clean Air Act. BLM-authorized activities may not violate the Clean Air Act or federal and state regulations and State Implementation Plans issued to implement the Act. When air quality or AQRV modeling performed during NEPA analysis predicts potential violations of the Clean Air Act or unacceptable AQRV impacts, the BLM evaluates the data and determines whether mitigation measures are needed. For example, the initial mitigation measure requiring drill rig engines to meet Tier 4 emission standards reduces NO_2 emissions and was demonstrated via modeling to prevent NAAQS violations from multiple large drill rig engines that may operate on one well pad. The mitigation measure includes an exception that allows use of drill rig engines meeting Tier 1, 2, or 3 emission standards if future modeling or near-field monitoring demonstrates compliance with the NAAQS.

When determining whether mitigation measures are needed, the BLM reviews current and proposed federal, state, and local regulations to determine whether mitigation will occur due to other agency actions. If the BLM determines that additional mitigation is needed while implementing this ARMP, the BLM will work closely with the MDEQ to coordinate future mitigation measures for BLM-authorized activities.

2.0 Oil and Gas Activity Assessment

Each year, the BLM would track the number and locations of new oil and gas wells drilled on federal mineral estate and the number of new and abandoned producing wells on federal mineral estate. These numbers would be compared to the planning area RFD and to the level of oil and gas development identified in the proposed plan.

In addition, the BLM would estimate oil and gas emissions from federal mineral estate every three years for oil and gas wells drilled and producing after the ROD is signed. Emission estimates would be based on well types, well numbers, and knowledge of typical equipment and operations. Emission estimation methods are expected to improve over time as better data become available. The emission estimates would also account for implemented mitigation measures and for new emission control regulations as they become effective. The BLM would collect additional data related to oil and gas equipment and operations to improve emission inventory quality. One area identified for improvement involves acquiring better data on oil and gas equipment used in the planning area. In order to improve fugitive dust emission estimates, the number, type, and length of vehicle trips in high-activity areas would also be assessed.

Each three-year oil and gas emission inventory would be compared to emission estimates for the RFD and the proposed plan. The results of this comparison would inform BLM decisions on NEPA adequacy.

3.0 Ambient Air Quality Monitoring Support

The Air Resources Management Bureau of the MDEQ has primary responsibility for siting and operating ambient air quality monitors within Montana and for reporting monitoring data to EPA and to the public. As described in its annual Air Quality Monitoring Network Plan (MDEQ 2013), the MDEQ identifies monitoring objectives for assessing ambient concentrations of criteria air pollutants and assessing compliance with the NAAQS and MAAQS. Historically, most MDEQ monitors were placed in cities to assess human health impacts in the more densely populated areas of Montana.

The BLM is working cooperatively with the MDEQ to place ambient air quality monitors in less densely populated areas where oil and gas activities are occurring or may occur in the future. The purpose of these monitors is two-fold: 1) to assess compliance with ambient air quality standards, and 2) to provide background ambient air quality concentrations for use in modeling efforts. Using a cooperative agreement, the BLM provided funding to help purchase, install, and operate monitoring equipment near Malta at the location shown in Table B.1.

The recently installed monitoring station near Malta measures ambient concentrations of NO_2, ozone, PM_{10}, and $PM_{2.5}$, as well as meteorological parameters such as temperature, wind speed, and wind direction. The BLM plans to continue to support monitoring at this location by providing operational funding and BLM staffing support to the MDEQ.

Table B.1. HiLine Monitoring Station

Station Name	*Monitored Pollutants*	*Installation Date*	*Station Number*	*County*	*Latitude*	*Longitude*
Malta	NO, NO_2, NO_x, O_3, PM_{10}, $PM_{2.5}$	July 2012	30-071-0010	Phillips	48.3175	-107.8625

4.0 Air Quality and AQRV Assessment

The BLM would assess air quality and AQRVs on an annual basis using quality-assured data from the EPA, MDEQ, FS, FWS, NPS, and other sources. In addition, a preliminary assessment of ozone concentrations would be performed on a weekly basis using data provided by the MDEQ.

4.1 Annual NAAQS and MAAQS Assessment

Based on the monitor listed in Section 3.0, the BLM would assess air quality monitoring data annually and would share the results of the assessment with the MDEQ and AQTW. The purposes of the annual assessment are to compare monitored data to NAAQS and MAAQS and to identify seasonal and long-term trends in air pollutant concentrations. The BLM would complete the annual assessment by May 31 of each year in order to ensure that quality-assured data are available for review.

NAAQS and MAAQS are provided in Table B.2 for pollutants monitored at the Malta monitoring station.

Table B.2. Ambient Air Quality Standards for Pollutants Monitored at the Malta Station

		Federal NAAQS [1]			*MAAQS* [2]
Pollutant	***Averaging Period***	***Concentration***	***Standard Type***	***Form of NAAQS Primary Standard***	***Concentration***
NO_2	1-hour	100 ppb	Primary	3-year average of the 98th percentile concentrations	0.30 ppm
	Annual	53 ppb	Primary, Secondary	Annual mean	0.05 ppm [6]
Ozone	1-hour	---	---	---	0.12 ppm [7]
	8-hour	0.075 ppm	Primary, Secondary	3-year average of the fourth-highest daily maximum 8-hour average	---
$PM_{2.5}$	24-hour	35 µg/m^3	Primary, Secondary [3]	3-year average of the 98th percentile concentrations	---
	Annual	12 µg/m^3	Primary	3-year average of the annual mean	---
	Annual	15.0 µg/m^3	Secondary	3-year average of the annual mean	---
PM_{10}	24-hour	150 µg/m^3	Primary, Secondary	NTBE more than one per year on average over 3 years	---
	Annual	Revoked [5]	---	---	50 µg/m^3 [5]

µg/m^3 micrograms per cubic meter
MAAQS Montana Ambient Air Quality Standards
NAAQS National Ambient Air Quality Standards
NO_2 nitrogen dioxide
NTBE not to be exceeded
$PM_{2.5}$ particulate matter less than or equal to 2.5 microns
PM_{10} particulate matter less than or equal to 10 microns
ppb parts per billion
ppm parts per million

[1] NAAQS are codified in Title 40 of the Code of Federal Regulations (CFR), Part 50.
[2] Montana AAQS are codified in Title 17, Chapter 8, Subchapter 2 of the Ambient Air Quality in the Administrative Rules of Montana and are shown in this column.
[3] EPA proposed a new secondary standard for $PM_{2.5}$ visibility of 28 or 30 deciviews (equivalent to 24 or 19 kilometers [15 or 12 miles] standard visual range).
[4] The annual PM_{10} NAAQS was revoked October 17, 2006.
[5] Based on annual second maximum.
[6] Not to be exceeded in the averaging period specified.
[7] State violation when exceeded more than once during any 12 consecutive months.

Montana standards are shown only if they are more stringent than the NAAQS. As of November 1, 2013, CO, lead, and SO_2 were not monitored within the HiLine. With regard to pollutants regulated exclusively under the MAAQS, hydrogen sulfide and settleable PM are not monitored within the planning area. Hydrogen sulfide is not monitored because ambient concentrations are believed to be very low due to low hydrogen sulfide levels in gas produced in the area. Settleable PM is not monitored in the area because the MDEQ prioritizes monitoring of pollutants subject to NAAQS and settleable PM is a MAAQS.

The BLM would use design values to compare ambient monitoring data to the NAAQS. Design values reflect the form of the NAAQS; they define the statistical metric used to compare monitoring data to federal and state standards. Depending on the pollutant and averaging time being assessed, the NAAQS is typically stated in terms of the maximum or second maximum concentration, average concentration, or a percentile of the standard. The form of a standard also states whether the design value is determined based on one or more years of monitoring data. EPA-calculated design values serve a critically important regulatory purpose; they determine whether areas are designated attainment or nonattainment. As such, EPA's design value determinations may take more than one year to finalize.

In order to review air quality trends more quickly, the BLM would determine "mitigation design values" by May 31 of each year for the previous calendar year(s). The mitigation design value would be a metric calculated by the MDEQ or BLM that uses procedures similar to EPA's regulatory design value calculation methodology, with the advantage that the MDEQ/BLM-calculated mitigation design values can be determined more quickly. The timing allows the MDEQ adequate time to quality assure monitoring data. However, the MDEQ may not yet have EPA concurrence on data that has been flagged by the MDEQ due to exceptional events such as wildfires. Consequently, the MDEQ/BLM-calculated mitigation design values would exclude monitoring data associated with MDEQ-identified exceptional events. Each BLM annual assessment would look back the requisite number of years for each pollutant and include data from the time period prior to ROD issuance for the first several annual BLM assessments. Additional information concerning design value calculations is provided in Section 6.2.3 The BLM will work closely with the MDEQ to ensure that only data certified by the MDEQ and procedures consistent with MDEQ procedures are used in design value calculations.

4.2 Preliminary Ozone Assessment

Because the new Malta monitor began operation in mid-2012, a full calendar year of data is not yet available. The most representative historical ozone concentration data for oil and gas areas in the HiLine comes from the Sidney monitoring station, for which data are provided in Table B.3 The maximum (1st highest) monitored ozone 8-hour concentration is shown in the following table. These numbers are greater than the values provided in Chapters 3 and 4, which are based on the 3-year average of the 4th highest daily maximum 8-hour average for direct comparison to the NAAQS. In its annual network monitoring plan, the MDEQ stated: "The information collected from these sites to-date indicates that O_3 is not currently a pollutant of concern in Montana" [MDEQ 2012]. However, in other states, ozone has become a pollutant of concern in rural areas with oil and gas activity. In order to protect air quality, the BLM developed an adaptive management strategy that would quickly identify any high-ozone events that may occur in the future and gather data that may help explain these events.

Table B.3. Maximum Monitored Ozone Concentrations Near the HiLine

Year	*8-hr Ozone Concentrations (ppb)*
2009	62
2010	65
2011	57

The BLM would perform weekly preliminary ozone concentration reviews to determine if high ozone events occur at the Malta monitor. If a high-ozone event occurs, the BLM would document meteorological and other conditions that may have contributed to the event. Because high-ozone events in other rural parts of the nation are not well understood and contributing factors can be site-specific, the BLM would gather data to develop baseline information relevant to any high-ozone events that may occur within the HiLine. Relevant baseline information includes capturing meteorological data for each event, determining the amount of snow on the ground (if applicable), and identifying any other data that may help describe circumstances associated with the event. For the purposes of this effort, a high-ozone event would be defined as a day for which the maximum 8-hour average ozone concentration is at or above 0.065 ppm.

In order to quickly ascertain relevant circumstances, the preliminary ozone assessments would use non-quality-assured data provided by the MDEQ. As part of the annual NAAQS assessment, quality-assured ozone data would be reviewed to determine if the preliminary ozone monitoring data were valid or if monitored high ozone concentrations were due to monitor malfunctions.

If high-ozone events occur within the HiLine, a summary of events and a discussion of relevant meteorological data and circumstances would be developed as part of the annual NAAQS assessment. These summaries and the underlying data may provide important information that can be used to predict potential occurrences of high-ozone events and to identify mitigation measures and/or proactive measures that could prevent future events.

4.3 Annual AQRV Assessment

Federal land managers track the status, condition, and trends of AQRVs for Class I and sensitive Class II areas under their jurisdictions. Consequently, the BLM would request visibility, sulfur and nitrogen deposition, and lake acid neutralizing capacity data from the FS, FWS, and NPS and would include agency-submitted data in the BLM's annual review of AQRV trends. The annual review would also include AQRV data from any Class I or sensitive Class II areas under BLM jurisdiction.

Based on these reviews, the BLM would maintain an awareness of AQRV trends. However, it should be noted that the reviews would not necessarily link AQRV trends to oil and gas development. AQRV impacts are often associated with pollutants that can be transported long distances from many different types of sources. For example, visibility degradation in eastern Montana primarily results from large stationary sources such as electric generating units and cement kilns, as addressed in the Montana Regional Haze Federal Implementation Plan (EPA 2012).

Photochemical grid modeling (PGM) would be completed after the ROD is signed and would provide additional information concerning the potential impact of oil and gas emissions and cumulative emissions on AQRVs.

5.0 Future Modeling

The BLM committed to perform PGM in order to assess regional air quality and AQRV impacts. Due to insufficient monitoring and regional emissions data available during development of the RMP, PGM will not be completed prior to issuance of the RMP/EIS and the ROD. In order to complete PGM expeditiously, the BLM began data acquisition and initiated steps needed to proceed with PGM. When PGM is completed and the results assessed, the BLM may identify additional emission mitigation measures for oil and gas activity.

5.1 Photochemical Grid Modeling

Comprehensive regional air quality and AQRV regional modeling of emission sources within the HiLine and surrounding areas requires PGM. This type of modeling can predict ozone and regional haze impacts, for which major pollutants and precursors can be transported many hundreds of miles.

5.1.1 Data Acquisition

PGM requires three main types of concurrent data: meteorological data, ambient monitoring data, and comprehensive emission data. The BLM's analysis determined that the latter two types of data need to be augmented and updated prior to performing PGM.

5.1.1.1 Additional Monitoring

Ambient monitoring data throughout the PGM domain is needed in order to validate model performance, which is assessed by modeling a previous year and comparing the model's predicted concentrations to actual monitored concentrations. A new monitor in Malta will provide data to assess model performance in north-central Montana.

5.1.1.2 Updating Emission Inventories

Comprehensive emission inventories are also critically important in predicting cumulative air quality and AQRV impacts. Current oil and gas regional emission inventories for Montana and the Dakotas are known to lack important emission sources, particularly sources of volatile organic compounds (VOCs), which contribute to ozone formation. The

existing oil and gas inventories for the Williston and Central Montana Basins represent the year 2002 and were developed as part of the Western Regional Air Partnership (WRAP) Phase II inventory. Since then, 2006 Phase III emission inventories have been developed for oil and gas basins within Colorado, Utah, Wyoming, and New Mexico, but have not yet been completed for Montana, North Dakota, and South Dakota. The Phase III inventories have more comprehensive emission inventories of VOC sources at oil and gas facilities.

The BLM Montana and Dakotas State Office is providing financial assistance to the WRAP so that Phase III oil and gas emission inventories can be completed in 2013 for the Williston Basin and the Central Montana Basin. These inventories would represent calendar year 2011 emissions. In addition to covering the planning area, the inventories would include comprehensive recent emission estimates for oil and gas activity in North Dakota and South Dakota.

5.1.2 PGM Schedule

In order to use a full 12 months of ambient monitoring data from the new Malta monitor (and a similar monitor near Lewistown), the baseline year for PGM is expected to be 2013 or may be a 12-month period beginning in late 2012 and ending in 2013. PGM planning began in 2012 and development of the PGM modeling protocol was completed in 2013. Modeling activities will begin in 2014 and should be completed in mid-2015. Review and assessment of PGM results would be completed in Fall 2015. Table B.4 provides the data acquisition and PGM schedule.

Table B.4. Data Acquisition and PGM Schedule

Task / Subtask	*Completion Date*
Pre-Modeling Emission Inventory and Protocol Development	
Develop Weather Research Forecasting and PGM Protocol	4/15/2013
"WRAP" Williston and Central Montana Basin Inventory	4/15/2014
Base Year Modeling and Evaluation*	
Weather Research Forecasting Modeling	5/8/2014
Draft WRF Model Evaluation	6/5/2014
WRF Evaluation Review	7/10/2014
Photochemical Grid Modeling of Base Year	8/28/2014
AQTW and MDEQ Emission Modeling Review	10/2/2014 (base year) 1/7/2015 (future year)
Draft Base Year PGM Evaluation	11/25/2014
AQTW and MDEQ PGM Evaluation Review	12/1/2014
Finalize WRF and PGM Evaluations	12/15/2014
Emission Modeling Reports	1/21/2015
Future Year Modeling and Evaluation*	
Draft ARTSD	4/19/2015
AQTW ARTSD Review	6/19/2015
Finalize ARTSD	7/1/2015

AQTW = Air Quality Technical Workgroup
ARTSD = Air Resource Technical Support Document
MDEQ = Montana Department of Environmental Quality
PGM = Photochemical grid modeling
RFP = Request for Proposal
WRF = Weather Research and Forecasting Model
WRAP = Western Regional Air Partnership
* Duration and dates are subject to revision; they are estimated to provide the general timing of future modeling activities.

The Weather Research and Forecasting (WRF) model would be used to model meteorological conditions and the photochemical grid model to be used would be either the EPA Models-3/Community Multiscale Air Quality (CMAQ) modeling system or the Comprehensive Air Quality Model with Extensions (CAMx). In addition, multiple models would be used to develop and process emission inventories for input into the photochemical grid model. When modeling is completed, a PGM Air Resource Technical Support Document (ARTSD) would be developed.

Initial PGM would include future year modeling for a year between 2017 and 2020 using emissions representing full development of BLM oil and gas resources under the selected Alternative. The specific year would be determined by the BLM based on the ability to predict future cumulative regional oil and gas emissions in the Williston and Central Montana Basins.

5.1.3 MDEQ and AQTW Review and Input to PGM

Throughout the PGM data collection and modeling process, the BLM would work collaboratively with the MDEQ and the AQTW that was formed to provide input on this ARMP, and with other agencies or Tribes that request to be involved in the PGM effort. These collaborators would provide technical review and comment on the draft modeling protocol, on WRF and PGM performance evaluations, and on the draft PGM ARTSD. Substantial time has been included in the schedule shown in Table B.4 to allow adequate review and comment periods during the PGM process.

5.1.4 Availability of PGM Results

Future PGM results would be presented in the final ARTSD and in a summary of the results. The ARTSD and summary document would be posted on the Glasgow, Malta, and Havre BLM websites. In addition, the WRF and PGM protocol document would be provided via the websites when the photochemical modeling ARTSD is made available. Outreach information regarding the availability of the results would be made through the AQTW and agencies involved in the PGM process, as well as other interested parties.

5.2 Limited CALPUFF Modeling for AQRVs

Through their participation under the AQ MOU, the FWS and the NPS specifically requested that limited CALPUFF modeling be prepared between the Draft and the Final RMP. This limited modeling effort was performed and assessed direct AQRV impacts from potential future BLM-authorized oil and gas sources in the northern portion of the planning area near the FWS UL Bend Wilderness and Medicine Lake Wilderness.

The CALPUFF modeling was used as a screening tool to assess direct oil and gas impacts to AQRVs at FWS Class I and sensitive Class areas. In addition, potential plume blight impacts were assessed using the VISCREEN model. Results of these efforts are provided in Chapter 4.

Regional far-field impact analysis for this RMP would be based on results from future PGM described above in Section 5.1. Photochemical grid models are recommended for AQRV analysis of large domains in the Appendix to the MOU (USDI 2011).

5.3 Post-PGM Modeling

To the extent that future emission increases are within the levels modeled with PGM or other modeling and are proximate to modeled emission locations, far-field air quality and AQRV impact analysis may incorporate by reference PGM and other modeling results. The BLM and the AQTW would determine whether previous modeling is sufficient to satisfy MOU requirements. This air quality management approach is consistent with the MOU (USDI 2011) and allows for efficient air quality and AQRV impact analysis.

If additional modeling is performed after PGM is complete, an assessment of air quality and AQRV impacts would be made and, if necessary, additional mitigation measures may be identified.

6.0 Mitigation

Air quality and AQRV impact mitigation would involve two types of mitigation: 1) initial mitigation measures that become effective when the ROD is signed, and 2) enhanced mitigation measures that may be identified based on future ambient monitoring data or modeling results.

6.1 Initial Mitigation Measures

The following air quality mitigation measures would be applied upon issuance of the ROD through leasing documents and project-specific NEPA documents. To the extent practical, emission reductions associated with these mitigation measures have been included in the HiLine emission inventory.

1. Design and construct roads and well pads to reduce the amount of fugitive dust generated by traffic or other activities. During construction activities, apply water, apply dust-suppression chemicals, apply gravel, or use other control methods to achieve 50 percent fugitive dust control efficiency, except when ground is wet or frozen.

2. Use water or other BLM-approved dust suppression during drilling, completion, and well workover operations for dust abatement on access roads, as needed, to achieve a 50 percent fugitive dust control efficiency, except when ground is wet or frozen.

3. Use water or other BLM-approved dust suppression in high traffic areas during production operations for dust abatement, as needed, to achieve 50 percent fugitive dust control efficiency, except when ground is wet or frozen. Operators will work with local government agencies to improve dust suppression on roads.

4. For oil and gas Project Plans of Development (PODs), oil and gas operators will establish speed limits for project-required unpaved roads in and adjacent to the project area; oil and gas operator employees will comply with these speed limits.

5. For oil and gas Project PODs, oil and gas operators will be encouraged to reduce surface disturbance, vehicle traffic, and fugitive dust emissions by consolidating facilities (e.g., using multi-well pads, storage vessels) when feasible.

6. Diesel drill rig and completion engines greater than 200 hp will meet Tier 4 emission standards for non-road diesel engines. Alternatively, oil and gas operators may use engines that exceed Tier 4 emission standards if modeling or monitoring at the project level or at a programmatic level demonstrates compliance with the NAAQS and protection of AQRVs.

7. For hydraulically fractured gas wells that do not qualify as “low pressure wells,” “wildcat,” or “delineation” wells, oil and gas operators will comply with reduced emissions completion (REC) requirements specified in Subpart OOOO, Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution (40 CFR §60.5375) within six months of ROD issuance.

8. Non-road diesel engines will be required to use ultra-low sulfur diesel fuel (15 ppmw) as required by 40 CFR §80.610(e)(3)(iii).

6.2 Monitoring-Based Mitigation

Enhanced mitigation would be evaluated and implemented if ambient monitoring data at monitor(s) located in oil and gas activity areas within the planning area indicate that pollutant concentrations are approaching or threatening the NAQQS or MAAQS. As of August 1, 2012, one ambient air quality monitor near Malta was located in oil and gas activity areas within the HiLine. If, in future years, additional MDEQ monitoring stations are placed in oil and gas activity areas for the purpose of assessing air quality impacts from oil and gas activity, ambient monitoring data from these stations would be included in ambient air quality assessments used to determine whether enhanced mitigation is needed.

Prior to completion of initial PGM, monitoring-based thresholds would be based on evaluation of exceedances of the NAAQS, as described in Section 6.2.1. After completion of initial PGM, monitoring-based thresholds would be based on BLM-calculated design values, as described in Section 6.2.3.

6.2.1 Monitoring-Based Thresholds Before PGM Completion

Based on requests from EPA during the MOU review process, the BLM would review NAAQS exceedances and determine if enhanced mitigation would be warranted during the interim period between ROD issuance and PGM completion. The BLM would require enhanced mitigation for BLM-authorized oil and gas activities if there is a monitored exceedance of the NAAQS at the Malta monitor, unless the BLM determines that enhanced mitigation is not warranted after completing specified steps as outlined below.

1. The BLM would notify the EPA and the MDEQ within 30 days after Malta monitoring data showing an exceedance has been posted on EPA's Air Quality System (AQS). An exceedance is defined as any monitored concentration (other than one occurring during an exceptional event) that is greater than the NAAQS, without consideration of the statistical form of the NAAQS or multi-year averaging. The notification would state that (1) the BLM requests concurrence from the MDEQ and EPA that an exceedance occurred, and (2) the BLM would, upon concurrence by both agencies, review the exceedance according to this procedure.

2. After consulting with the MDEQ, the BLM would determine whether an exceptional event[1] may have caused the exceedance.

    - If the MDEQ informs the BLM that an exceptional event likely caused the exceedance, the BLM would provide a letter to that effect to the EPA. No further action would be necessary.

    - If an exceptional event did not cause the exceedance or if MDEQ would not submit an exceptional event waiver to EPA, the BLM would perform Step 3.

3. The BLM would conduct a screening level analysis[2] to determine the likely source and location of the exceedance and whether mitigation is needed.[3]

    - If the screening analysis indicates that the exceedance was not caused by BLM-authorized oil and gas source(s) within the planning area or indicates that the BLM-authorized oil and gas source(s) within the planning did not contribute to the exceedance, the BLM would convey this finding in writing to the MDEQ and EPA for review and comment. No further action would be necessary.

    - If the screening analysis indicates that the exceedance was caused or contributed to by BLM-authorized oil and gas sources inside the planning area, the BLM would perform Step 4.

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[1] The BLM would not formally decide that an exceptional event occurred as this decision would be made by MDEQ. Until a final determination of an exceptional event is presented to EPA by MDEQ, and the EPA has concurred, the BLM would assume that an exceptional event occurred based on a stated intention by the MDEQ to submit an exceptional event waiver.

[2] Publically available web based applications suggested by EPA to identify sources of air pollution and potential impacts include the following sites: trajectory analysis tools like HySplit (http://ready.arl.noaa.gov/), air quality data at the EPA's AQS site (http://airnow.gov), state regulatory agency sites and airnowtech.org, an interactive snow site (http://www.nohrsc.nws.gov/interactive/html/map.html), daily ozone modeling (http://airquality.weather.gov/), daily ozone and $PM_{2.5}$ modeling site (http://www.getbluesky.org/), and daily satellite imagery site (http://ge.ssec.wisc.edu/modis-today/).

[3] If data necessary to conduct a screening level analysis are not available, the BLM would consult with the MDEQ and the EPA regarding source attribution and the need for mitigation.

4. The BLM would consult with the MDEQ and EPA to determine whether there is a need for: 1) a refined attribution analysis (e.g., attribution test using CAMx ozone source attribution technology or anthropogenic precursor's culpability assessment) or 2) mitigation on BLM-authorized oil and gas emission sources within the planning area. If the refined analysis:

    - is warranted, the BLM would perform the refined analysis within 6 months of completing Step 3 in consultation with MDEQ and EPA.
    - indicates that the exceedance was not caused or contributed to by BLM-authorized oil and gas sources inside the planning area, the BLM would provide that recommendation to the MDEQ and EPA for review and comment. No further action would be necessary.
    - indicates that the exceedance was caused by BLM-authorized oil and gas sources within the planning area, the BLM would evaluate enhanced mitigation measures, as described in Section 6.2.2.

6.2.2 Determination of Enhanced Mitigation Measures Before PGM Completion

If a NAAQS exceedance occurs prior to completion of PGM and the refined analysis in Step 4 above determined that the exceedance was caused by BLM-authorized oil and gas sources within the planning area, one or more enhanced mitigation measures would be evaluated and selected by the BLM, in cooperation with the MDEQ and the EPA. The geographic extent of the mitigation measure(s) would be determined based on the analysis performed under Section 6.2.1 and would be limited to the area determined to be at risk for future exceedances. Preference would be given to mitigation methods that the MDEQ intends to impose as new regulations or air quality permitting provisions. Selected mitigation measures would be implemented within one year after the BLM decision to apply additional mitigation.

Potential enhanced mitigation measures include one or more of the measures listed below based on current information concerning potential emission reduction technologies. Additional measures or equivalent methods or emission restrictions may be identified in the future.

- Drilling and/or blowdown activity restrictions based on meteorological conditions
- Construction activity restrictions based on meteorological conditions
- Centralization of gathering facilities
- Electric drill rigs
- Field electrification for compressors and/or pumpjack engines
- Plunger lift systems with smart automation
- Oil tank load out vapor recovery
- VOC controls on tanks with a potential to emit less than 5 tpy
- Selective catalytic reduction on non-drill rig stationary engines
- Reduced emission completions beyond those required by EPA regulations, if determined to be technically and economically feasible
- Well pad density limitations
- Reducing the total number of drill rigs operating simultaneously
- 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
- Employing a monthly forward looking infrared (FLIR) leak detection program to reduce VOCs
- Tank load out vapor recovery
- Enhanced VOC emission controls with 95% control efficiency on additional production equipment having a potential to emit of greater than 5 tpy
- Enhanced direct inspection and maintenance program

6.2.3 Monitoring-Based Thresholds After PGM Completion

By May 31 of each year following completion of PGM, the BLM would calculate design values for each pollutant monitored at a federal reference monitor federal equivalent method monitor within the planning area and identified as a representative monitor in Section 3.0. The design value would be calculated based on calendar year monitoring data

available at the time. Monitoring data from the appropriate prior period would be used. For example, based on PGM completion in summer 2015, the first annual design value calculation would be performed by May 31, 2016 and would include monitoring data for calendar years 2013, 2014, and 2015 for three-year design values and on monitoring data for calendar year 2015 for single-year design values.

Calculation methods would, to the extent possible, follow EPA procedures provided in the following appendices within Title 40 of the Code of Federal Regulations (CFR), Part 50 in effect as of December 1, 2012. These procedures may be updated by future EPA regulations and this section of the ARMP would be revised to reflect changing regulations.

- NO_2 (Appendix S)
- O_3 (Appendix P)
- PM_{10} (Appendix K)
- $PM_{2.5}$ (Appendix N)
- SO_2 (Appendix T)

Design values would be calculated on a site-specific basis (i.e., no spatial averaging of multiple monitors). The BLM design value calculations would exclude data associated with exceptional events identified by MDEQ.

6.2.4 Determination of Enhanced Mitigation Measures After PGM Completion

If the air quality assessment described in Section 6.2.3 indicates that a BLM-calculated design value is greater than 85 percent of a NAAQS, one or more enhanced mitigation measures addressing that pollutant or pollutant precursor would be evaluated and selected by the BLM, in cooperation with the MDEQ and EPA. The geographic extent of the mitigation measure(s) would be determined in conjunction with the MDEQ. Potential enhanced mitigation measures to be considered include the measures listed above in Section 6.2.2, as well as additional measures that may be identified in the future. Selected mitigation measures would be implemented within 1 year after the BLM decision to apply additional mitigation.

6.3 Modeling-Based Mitigation

6.3.1 Modeling-Based Thresholds

Future modeling would assess air quality and AQRV impacts from future BLM-authorized oil and gas activity and would include regional PGM and project-specific modeling. Modeling-based thresholds for evaluating enhanced mitigation would include potential future impacts on NAAQS or MAAQS or impacts above specific levels of concern for AQRVs in Class I or sensitive Class II areas (as identified on a case-by-case basis by MDEQ or a federal land management or tribal agency).

6.3.2 Determination of Modeling-Based Enhanced Mitigation Measures

If BLM-authorized oil and gas activity is predicted to cause or contribute to impacts above the thresholds described above, the BLM would facilitate an interagency process to ensure that a comprehensive strategy is developed to manage air quality impacts from future oil and gas development within the region. The local, state, federal, and Tribal agencies involved in the regulation of air quality and the authorization of oil and gas development would evaluate modeling results from future modeling studies and identify potential air quality concerns and necessary reductions in air emissions. If the modeling predicts significant impacts, these agencies would use their respective authorities to implement enhanced emission control strategies, operating limitations, equipment standards, and/or pacing of development as necessary to ensure continued compliance with applicable ambient air quality standards, including the enhanced mitigation measures listed in Section 6.2.2, other future mitigation measures identified through BLM's adaptive management strategy, or reasonable mitigation measures suggested by the MDEQ or AQTW. If necessary, implementation of mitigation measures would occur within one year of obtaining final modeling results for mitigation measures that conform to currently implemented land use planning decisions and constraints.

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