United States Department of the Interior
Bureau of Land Management

Environmental Assessment
DOI-BLM-MT-C030-2013-229-EA
August 25, 2015

Project Title: Sundry Notice Flaring Requests

Location: North Dakota Field Office
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BLM

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1.0 PURPOSE AND NEED

1.1 Introduction

Oil production on Federal and Indian mineral estates has dramatically expanded in western North Dakota in the past several years with horizontal drilling and hydraulic fracturing of the Bakken and Three Forks Formations. The "Bakken" play primarily produces oil, and a by-product of oil production in the Bakken is natural gas. Gas produced during oil production is called associated gas. During oil and gas production, it may be necessary to burn or release natural gas for a number of operational reasons, including lowering the pressure to ensure safety. Burning natural gas is known as flaring, while releasing natural gas directly into the atmosphere is called venting. Each has different environmental impacts.

In addition to the operational reasons for flaring and venting, in areas where the primary purpose of drilling is to produce oil, producers flare or vent associated natural gas because no local market exists for the gas and transporting it to a market may not be economically feasible. Natural gas prices are a major determinant of whether associated gas is flared and vented or sold. Associated natural gas would be sold if prices were high enough over a long enough period to justify building the infrastructure to transport the gas to a market.

Under the general requirements for onshore oil and gas operations (43 CFR 3162.1), an operator shall comply with applicable laws and regulations. These include, but are not limited to, conducting all operations in a manner that results in maximum ultimate economic recovery of oil and gas with minimum waste.

Notice to Lessees & Operators of Onshore Federal & Indian Oil and Gas Leases (NTL-4A) Royalty or Compensation for Oil and Gas Lost, provides the BLM authority to allow venting or flaring of oil-well gas under certain conditions. An operator must request approval to vent or flare produced natural gas by submitting 1) an evaluation report supported by engineering, geologic, and economic data which demonstrates to the satisfaction of the Supervisor that conservation of gas, if required, would lead to premature abandonment of recoverable oil reserves; or 2) an action plan that will eliminate flaring of gas within one year from the date of application. The Operator submits a Form 3160-5, Sundry Notices (SN) and Reports on Wells that details the notice of intent to flare gas. The BLM is currently developing a national rule that will update and replace NTL-4A within the next two years. The rule will focus on waste prevention and royalty collection (the authorities inherent with the BLM).

Most flaring in western North Dakota occurs either because the well is not connected to natural gas gathering lines, or because the well is connected to infrastructure with inadequate capacity to handle the volumes of gas being generated. Various factors such as surface ownership and permitting review time make pipeline permitting challenging.

The BLM North Dakota Field Office (NDFO) is highly engaged in facilitating pipeline infrastructure, some of which would help to address flaring of oil-well gas. However, the NDFO has seen an increase in the number of SN applications requesting to flare oil-well gas from Federal and Indian wells throughout western North Dakota. The requests to flare vary and require review to ensure compliance with NTL-4A. This, in addition to limited staff and increased number of Applications for Permit to Drill (APDs), has resulted in approximately 2,211 SN applications requesting flaring approval for Federal and Indian oil wells throughout western North Dakota.

As of June 1, 2014, the North Dakota Industrial Commission (NDIC) adopted a new policy, Order 24665, for reducing gas flaring. This requirement is for all wells which will be drilled in the Bakken, Three Forks, and Three Forks/Bakken or Sanish Pools. The policy requires that a Gas Capture Plan (GCP) must accompany all APDs submitted to NDIC. The GCP has various requirements that must be met by prior to approval of APD. These plans aim to ensure that all options for capturing gas are fully evaluated before a well is drilled. The state of North Dakota began implementing its policy in 2014 by requiring operators to meet flaring reduction targets according to a prescribed timeline. For operators that do not meet the targets, the state policy provides for the restriction of oil production until the targets are met.

In addition to the new NDIC policy, a "Flaring Task Force" was formed under the North Dakota Petroleum Council (NDPC) composed of industry representatives intending to pool knowledge and experience to better optimize the resource at the wellhead and improve existing infrastructure to capture and transport gas for processing. The group plans to focus on educating the public while working with stakeholder groups, governments, the Three Affiliated Tribes (Fort Berthold Reservation), researchers, and landowners.

This Environmental Assessment (EA) has been prepared to disclose and analyze the environmental consequences of SN requests pending review to flare oil-well gas from BLM administered oil wells in western North Dakota. Reasonably foreseeable requests for BLM administered oil wells in the same geographic areas will also be analyzed in the EA. If necessary, additional coordination would be conducted with the proper agency for SNs requiring mitigation.

1.2 Need for the Proposed Action

The need for the action is established by the BLM's responsibility under NTL-4A to evaluate Federal and Indian SNs requesting to flare oil-well gas. The BLM has approximately 2,211 SNs pending review some of which have flared in the past and some are flaring at the present time. Both groups warrant evaluation to determine if each request is an avoidable loss of gas or unavoidable loss of gas in accordance to NTL-4A. This would allow BLM to identify mitigation measures where applicable, allow private individuals or companies to continue developing oil and gas resources in accordance to Federal regulations, and at the same time meet the requirement identified in the Energy Policy Act, Sec. 362(2), Federal Oil and Gas Leasing Reform Act of 1987, and the Mineral Leasing Act of 1920, Sec. 17. These companies have received approved APDs from the BLM, and are authorized to sell the oil and gas in public markets.

The BLM anticipates additional flaring requests in the future as a result of development. This broader suite of anticipated flaring requests would be temporally and spatially related to the past and ongoing flaring activities, and would require a series of associated subsequent decisions.

1.3 Purpose for the Proposed Action

The purpose of the action is to:

- Provide a response to the 268 pending requests currently flaring and determine under what conditions pending and future flaring would occur; and
- Provide a response to the 1,943 previously flared actions for wells that are connected to pipeline, and determine when collection of royalties is due.

1.4 The Decision to be Made

The BLM will determine under what conditions (design features/mitigation measures) current and future flaring may or may not occur, and if so, apply the necessary Conditions of Approval (COAs) at the time of approval. The BLM will also make a decision on when collection of royalties is due for requests that have flared oil-well gas and are connected to pipelines.

The BLM is evaluating and analyzing the current and future SN requests because the activity is an integral part of BLM's oil and gas program under authority of Federal Land Policy and Management Act (FLPMA) of 1976.

1.5 Conformance with Land Use Plan(s)

This EA is tiered to the information and analysis and conforms to the decisions contained in the North Dakota RMP Desktop Document, April 1988, Chapter 4 page 11, and its associated Environmental Impact Statement (EIS), the governing land use plan for the NDFO.

Analysis of the SN requests to flare oil-well gas is documented in this EA, and was conducted by BLM staff in the Eastern Montana/Dakotas District and Montana State Office who relied on professional knowledge of the areas involved, review of current databases, file information, and operator input to ensure that appropriate considerations were made.

Approving the SNs would not be in conflict with any local, county, or state laws or plans.

1.6 Public Scoping and Identification of Issues

Public scoping for this project was conducted by posting the proposed action on the NDFO website - National Environmental Policy Act (NEPA) notification log. Therefore, scoping was initiated August 30, 2013, the date the EA was assigned a number and posted to the NEPA notification log. Refer to Chapter 5 of this EA for a more complete summary of comments received and consultation/coordination.

Site-specific resource concerns were identified by the BLM through the preliminary review process conducted during the internal scoping period. The BLM focuses its analysis on "issues that are truly significant to the action in question, rather than amassing needless detail" (40 CFR

1500.1(b)). Issues have a relationship with the proposed action; are within the scope of analysis; and are amenable to scientific analysis.

The interdisciplinary team reviewed the proposed action and determined three issues that would have an effect on particular resources. The resources carried forward through analysis in this EA are with air resources, greenhouse gas emission and climate change, visual setting of cultural or historical properties, Native American Religious Concerns, and socioeconomic conditions.

- Issue – Flaring emissions

  The BLM recognizes air resources as a valuable natural and public resource that needs to be protected through prudent management and appropriate mitigation. Where a BLM-authorized activity has the potential to affect the air resource, this activity must be managed appropriately, consistent with BLM planning objectives and in compliance with the Clean Air Act.

  According to EPA Emission Inventory Improvement documents (EPA 1999), oil field emissions encompass three primary areas: combustion, fugitive, and vented. Flaring falls under the combustion area, and those emissions include SO_2, ozone precursors called volatile organic compounds (VOCs), greenhouse gases (GHGs), and hazardous air pollutants (HAPs).

- Issue – Justification of royalty revenue

  The BLM Authorized Officer has to review SN requests to flare oil-well gas in accordance with NTL-4A. Determining a request as unavoidable loss of gas would render the flared gas royalty free – thus no royalties would be due from the operators. Determining a request as avoidable loss of gas would render the flared gas royalty bearing – thus royalties would be due from the operators.

- Issue – Effects on the visual setting of historical properties

  Flaring has the potential to alter the characteristics of a significant cultural or historic property by introducing visual, atmospheric or audible elements that diminish the integrity of the property's setting or feeling. Though the effect on all historic properties were considered, an Interdisciplinary Team developed a viewshed of the Killdeer Mountain Battlefield State Historic Site, Elkhorn Ranch within Theodore Roosevelt National Park, the Lynch Knife River Flint Quarry, the Chateau de Mores State Historical Site, the Fort Buford State Historic Site, the Fort Union Trading Post National Historic Site, the Fort Dilts State Historic Site, and the Lewis & Clark National Historic Trail to understand the potential effects from flaring.

1.7 Issues Not Analyzed

The BLM considered other issues, listed below, but decided not to analyze those in further detail. The aspects of the existing environment that the BLM determined to not be present or not

potentially impacted by this project include: Areas of Critical Environmental Concern (ACEC), Cultural Resources, Farmlands (Prime & Unique), Floodplains, Invasive, Non-native weed species, Threatened, Endangered, or Candidate Plant Species, Threatened, Endangered, or Candidate Animal Species, Wastes (Hazardous or Solid), Water Quality (Drinking/Ground), Wild and Scenic Rivers, Livestock Grazing, Woodland/Forestry, Vegetation including Special Status Plant Species, Fish and Wildlife including Special Status Species, Soils, Recreation, Geology, Paleontology, Lands/Access, Fuels/Fire Management, Wilderness Characteristics. Thus, the EA contains no further discussion of these issues.

2.0 DESCRIPTION OF ALTERNATIVES

2.1 Alternative A (No Action):

The No Action Alternative would be to review and respond to all 2,211 pending SN requests to flare gas from Federal and Indian oil wells as submitted by the operator on a case-by-case basis in accordance with NTL-4A. This would mean the collection of royalties would also occur on a case-by-case basis without consideration of communitization agreements (CA), unit agreement, or field development, and economic conditions of a larger area. Each SN request would have an individual NEPA document to analyze impacts from the individual request. Impacts would be limited to the small geographic area of the individual request. Surface management would remain the same and ongoing oil and gas development would continue on surrounding Federal, Indian, private, and State leases. Future flaring SN requests would also be analyzed on a case-by-case basis.

2.2 Alternative B (Proposed Action-BLM Preferred):

The Proposed Action would be for BLM to review and respond to all 2,211 pending SN requests (Appendix A) to flare gas from Federal and Indian oil wells in the western portion of North Dakota (Map 1) as described below.

- For the 1,943 pending SN requests that flared oil-well gas, BLM would determine collection of royalties in accordance with NTL-4A Section III, and at a minimum apply the COAs listed in Appendix B to each SN request. If a well flared oil-well gas for up to six days or less, the gas flared would not be royalty bearing. If the well flared oil-well gas for seven days or greater, the gas flared during the first six days would not be royalty bearing and the gas flared from day seven and beyond would be royalty bearing.

- For the 268 pending SN requests with ongoing flaring and future flaring requests, the BLM would:

    - Determine if flaring requests are avoidable loss or unavoidable loss in accordance with NTL-4A. If possible, the reviews would be grouped by CA, unit, or field to consider the area's oil and gas development including economics. The BLM's review and determination would be based on an evaluation report supported by engineering, geologic, and economic data which demonstrates to the satisfaction of the authorized officer that the expenditures necessary to market or beneficially use such gas are or are not economically justified, and conservation and marketing of the gas is or is not required.
    - If the flaring requests are within the viewshed of a cultural or historic property, and the determination is avoidable, the BLM would at a minimum apply the COAs listed in Appendix B, and require capture of the gas through one of the following methods, but not limited to:
        - Construct a gathering pipeline which will ultimately be connected to a trunk pipeline;

        - Liquefy the gas on location and store on location until it can be transported via truck to a pipeline injection location;
        - Construct natural gas storage tanks on location;
        - Reinject the natural gas into the ground for possible future use; and
        - Reinject the natural gas into the ground for secondary enhanced oil recovery by maintaining reservoir pressure.
    - If BLM's determination is to require capture and marketing of the gas, which would require surface disturbing activities, a subsequent SN request would need to be submitted by the operator in accordance with 43 CFR §3164.1 Onshore Order No. 1 VIII for review and approval by BLM. A separate NEPA environmental analysis would be completed for the subsequent SN to properly analyze the proposed action with surface disturbing activities.
    - If the flaring requests are within the viewshed of a cultural or historic property, and the determination is unavoidable, the BLM would at a minimum apply the COAs listed in Appendix B, and require the following design features/mitigation measures, but not limited to:
        - Use of internal combustion units;
        - Beneficial use on lease;
        - Camouflaging of flare using vegetation or architectural structures;
        - Reducing flare stack height; and
        - Restriction of active flaring at night
    - Coordination with the appropriate surface management agency would be conducted for current and future flaring requests within the viewshed of a cultural or historic property requiring mitigation.

2.3 Alternative Considered But Dismissed from Further Analysis

Approving all SN requests to flare oil-well gas from Federal and Indian wells as submitted by the operator without necessary mitigation measures would not be in accordance with BLM policy and regulations. This alternative would not allow BLM to properly evaluate the request in accordance to NTL-4A, apply necessary mitigation measures, and determine if the request is avoidable loss or unavoidable loss, resulting in a loss of royalties paid and unjustified loss of resources.

3.0 AFFECTED ENVIRONMENT

3.1 Introduction

This chapter describes the existing environment (i.e., the physical, biological, social, and economic values and resources) within the Williston Basin in western North Dakota (Map 1). For this environmental analysis, the Williston Basin in western North Dakota is considered the area of analysis that could be affected by implementation of the alternatives described in Chapter 2. Each resource description will be analyzed further in Chapter 4.

Only those aspects of the existing environment that are potentially impacted by this project are described in detail. The following aspects of the existing environment were determined to not be present or not potentially impacted by this project are listed in Section 1.7 above.

3.2 General Description of the Affected Environment

The western portion of North Dakota is comprised of gently rolling hills, buttes, badlands, wetlands, riparian areas, and river breaks. These lands are primarily privately owned and are mainly utilized for agricultural uses. Lands that are not restricted by topography or soil constraints, and generally have been cultivated for crop production. Lands that have limitations from crop production are generally rangelands or pasture lands.

The BLM manages approximately 57,400 surface acres of public land in North Dakota and has oil and gas management responsibilities for 1,082,000 acres of Federal subsurface and approximately 546,000 acres of Indian Trust subsurface, mostly on the Fort Berthold reservation. Federal and Indian minerals represent approximately 7 percent of total Bakken/Three Forks mineral estate. The BLM and BIA split management responsibility on Indian lands, with the BIA managing leasing and surface use, and the BLM managing oversight of oil and gas drilling and production activities. Similarly, the BLM and USDA Forest Service split management responsibilities on Forest Service lands, approximately 1,025,000 acres, with the Forest Service managing leasing and surface use, and the BLM managing oversight of oil and gas drilling and production activities.

3.3 Air Resources

Air resources include air quality, air quality related values (AQRVs), and greenhouse gas (GHG) emissions affecting climate change.

The U.S. Environmental Protection Agency (USEPA) has the primary responsibility for setting minimum air quality standards, including seven criteria air pollutants subject to National Ambient Air Quality Standards (NAAQS). Pollutants regulated under NAAQS include carbon monoxide (CO), lead, nitrogen dioxide (NO_2), ozone, 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 ($PM_{2.5}$), and sulfur dioxide (SO_2). Two additional pollutants, nitrogen oxides (NO_x) and volatile organic compounds (VOCs), are regulated because they form ozone in the atmosphere. Air quality is determined by pollutant emissions and emission characteristics, atmospheric

chemistry, dispersion meteorology, and terrain. AQRVs include effects on soil and water, such as sulfur and nitrogen deposition and lake acidification, and aesthetic effects, such as visibility. In addition to USEPA federal regulations, air quality is also regulated by the North Dakota Department of Health, Division of Air Quality. This agency develops state-specific regulations and issues air quality permits to emission sources.

Climate is the composite of generally prevailing weather conditions of a particular region throughout the year, averaged over a series of years. Climate change includes both historic and predicted climate shifts that are beyond normal weather variations.

3.3.1 Air Quality

Air quality is monitored at State and Local Air Monitoring Systems (SLAMS) monitors within the following counties with oil and gas activity: Billings, Burke, Dunn, and McKenzie. The USEPA air quality index (AQI) is an index used for reporting daily air quality to the public. The index tells how clean or polluted an area's air is and whether associated health effects might be a concern. The USEPA calculates the AQI for five criteria air pollutants regulated by the Clean Air Act (CAA): ground-level ozone, PM, CO, SO_2, and NO_2. For each of these pollutants, USEPA has established NAAQS to protect public health. An AQI value of 100 generally corresponds to the primary ambient standard for the pollutant. The following terms help interpret the AQI information:

- **Good** – The AQI value is between 0 and 50. Air quality is considered satisfactory and air pollution poses little or no risk.
- **Moderate** – The AQI is between 51 and 100. Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people. For example, people who are unusually sensitive to ozone may experience respiratory symptoms.
- **Unhealthy for Sensitive Groups** – When AQI values are between 101 and 150, members of "sensitive groups" may experience health effects. These groups are likely to be affected at lower levels than the general public. For example, people with lung disease are at greater risk from exposure to ozone, while people with either lung disease or heart disease are at greater risk from exposure to particle pollution. The general public is not likely to be affected when the AQI is in this range.
- **Unhealthy** – The AQI is between 151 and 200. Everyone may begin to experience some adverse health effects, and members of the sensitive groups may experience more serious effects.
- **Very Unhealthy** – The AQI is between 201 and 300. This index level would trigger a health alert signifying that everyone may experience more serious health effects.

AQI data show that there is little risk to the general public from air quality in the analysis area (Table 3.3.1). Based on available aggregate data for state-operated monitors in Billings, Burke, Dunn, and McKenzie counties for years 2011–2013, at least 92 percent of the days were rated "good." The three-year median daily AQIs were 33, 34, 31, and 35 for the Billings, Burke, Dunn, and McKenzie county monitors. Table 3.3.1 does not include data from monitors located at industrial sites.

Table 3.3.1 USEPA Air Quality Index Reports

County[1]	# Days in Period	# Days Rated Good or No Data	Percent of Days Rated Good or No Data	# Days Rated Moderate	# Days Rated Unhealthy for Sensitive Groups	# Days Rated Unhealthy	# Days Rated Very Unhealthy
Billings	1,096	1,091	99%	5	0	0	0
Burke	1,094	1,006	92%	88	0	0	0
Dunn	1,023	968	95%	55	0	0	0
McKenzie	1,096	1,005	92%	90	0	0	1

Source: USEPA 2014. AirData website (http://www.epa.gov/airdata/ad_rep_aqi.html, accessed August 19, 2014).
[1] Monitor names and station identifiers are as follows:
The Billings County monitor is the Painted Canyon monitor at the Theodore Roosevelt National Park North Unit (38-007-002).
The Burke County monitor is located in the Lostwood Wilderness (38-013-004).
The Dunn County monitor is located in Dunn Center (38-025-003).
The McKenzie County monitor is located at the Theodore Roosevelt National Park North Unit (38-053-002).

The area managed by the NDFO is designated as an attainment area for all NAAQS. Maximum concentrations as a percentage of the NAAQS are summarized in Table 3.3.2 based on 2013 monitoring data. Gaseous pollutant concentrations are provided in terms of parts per million (ppm) or parts per billion (ppb), while particulate concentrations are provided in terms of micrograms per cubic meter ($\mu g/m^3$). Data are not provided for CO and lead, which are not monitored at these sites. Data from multiple SLAMS monitoring locations are provided, including monitors in the Lostwood Wilderness (Burke County) and Theodore Roosevelt National Park North Unit (McKenzie County). A non-SLAMS monitoring site is maintained by the National Park Service at the Theodore Roosevelt National Park South Unit in Billings County.

Figure 3.3.1 provides air quality trend data based on monitoring data provided by the North Dakota Department of Health for years 2006-2013. Although oil and gas activity has increased substantially during the last several years, ambient concentrations have remained relatively stable or have decreased slightly, with the exception of PM_{10}, which increased substantially in Dunn County from 2010 to 2011 and has remained at the higher level. Additional air quality regulations that reduce emissions from many types of sources and operator efforts to control emissions have maintained good air quality in the area.

In addition, a new regulation adopted in mid-2014 by the North Dakota Industrial Commission (NDIC) will further limit VOC, GHG, and NO_x emissions from flaring of casinghead gas associated with oil wells. NDIC Order 24665 requires operators to capture greater percentages of casinghead gas at North Dakota Bakken Formation wells in order to meet gas capture targets of 85% by January 1, 2016 and 90% by October 1, 2020. Gas capture targets may be met by routing gas to pipeline for sale, usage of gas at the well site, or through the beneficial use of casinghead gas (e.g. electrical power generation).

Table 3.3.2 2013 Monitored Concentrations Representative of the Study Area

Pollutant	Averaging Time	Applicable Standard (Format)	Ambient Concentrations[a] (Billings, Burke, Dunn, McKenzie, Williston[b] Counties)	Percentages of NAAQS (Billings, Burke, Dunn, McKenzie, Williston[b] Counties)
CO	1 hour	35 ppm (2nd highest)	NA, NA, NA, NA, NA	NA, NA, NA, NA, NA
	8 hour	9 ppm (2nd highest)	NA, NA, NA, NA, NA	NA, NA, NA, NA, NA
Lead	24 hour	150 (3-month avg.)	NA, NA, NA, NA, NA	NA, NA, NA, NA, NA
NO_2	1 hour	100 ppb (98th percentile)	NA, 17, 10, 10	NA, 17%, 10%, 10%
O_3	8 hour	0.075 ppm, (4th highest daily maximum)	0.059, 0.058, 0.056, 0.058. 0.059	79%, 77%, 75%, 77%, 79%
PM_{10}	24 hour	150 $\mu g/m^3$ (2nd highest)	NA, 37.0, 74.0, 19.0, 76.0	NA, 25%, 49%, 13%, 51%
$PM_{2.5}$	24 hour	35 $\mu g/m^3$ (98th percentile)	11, 15, 15, 11, 22	31%, 43%, 43%, 31%, 63%
	Annual	12 $\mu g/m^3$ (weighted mean)	4.4, 6.8, 5.5, 6.5, 9.6	37%, 57%, 46%, 54%, 80%
SO_2	1 hour	75 ppb (99th percentile)	NA, 28, 9, 9, NA	NA, 37%, 12%, 12%, NA

Source: NDDOH 2014.

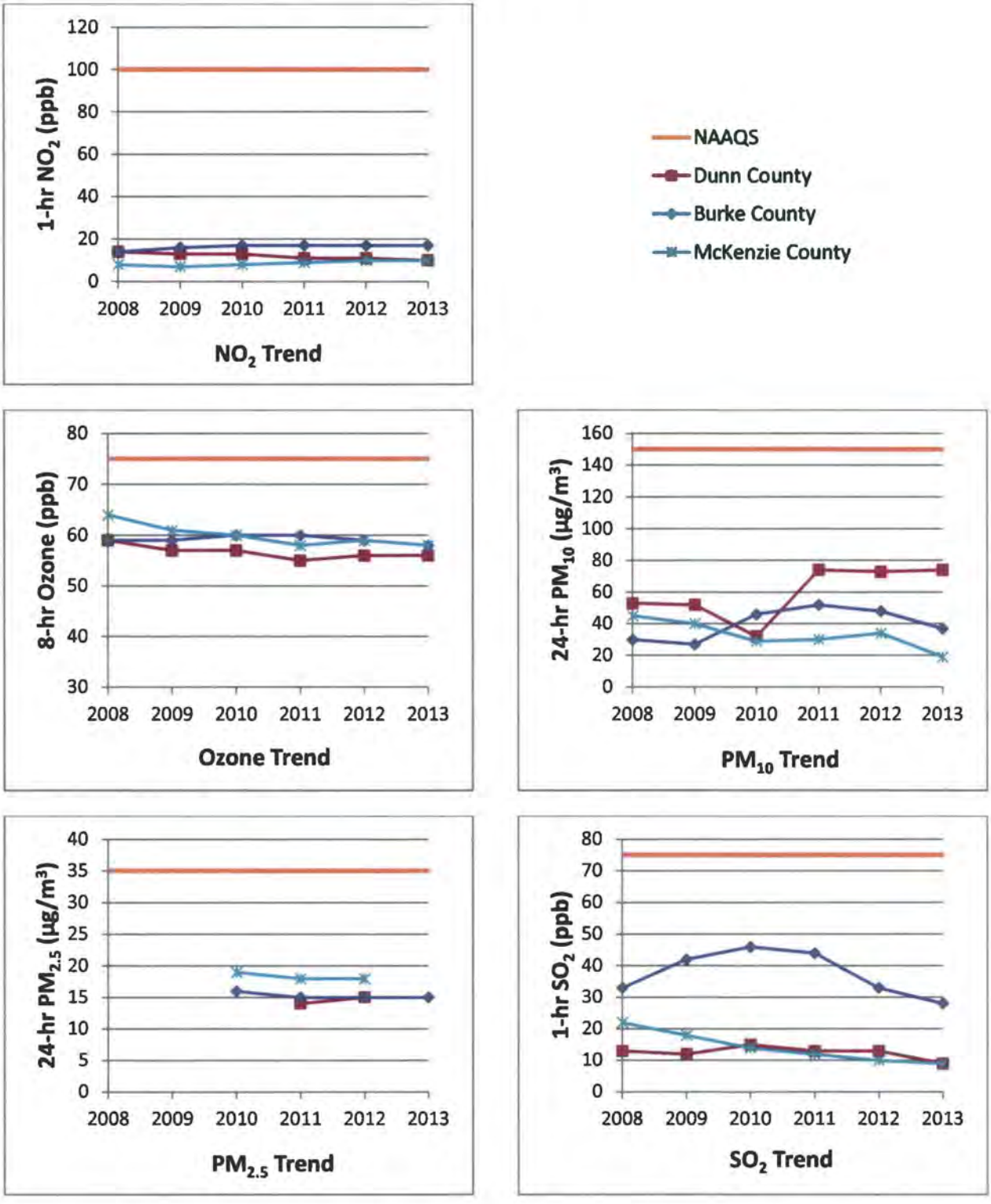
NA = not available.

[a] These values represent a 3-year average or a single year depending on the format of the NAAQS. Three-year averages of annual values are needed to determine NAAQS compliance for the NO_2, O_3, PM_{10}, 24-hour $PM_{2.5}$, and SO_2 standards.

[b] The monitor in Williston County began operating in 2013.

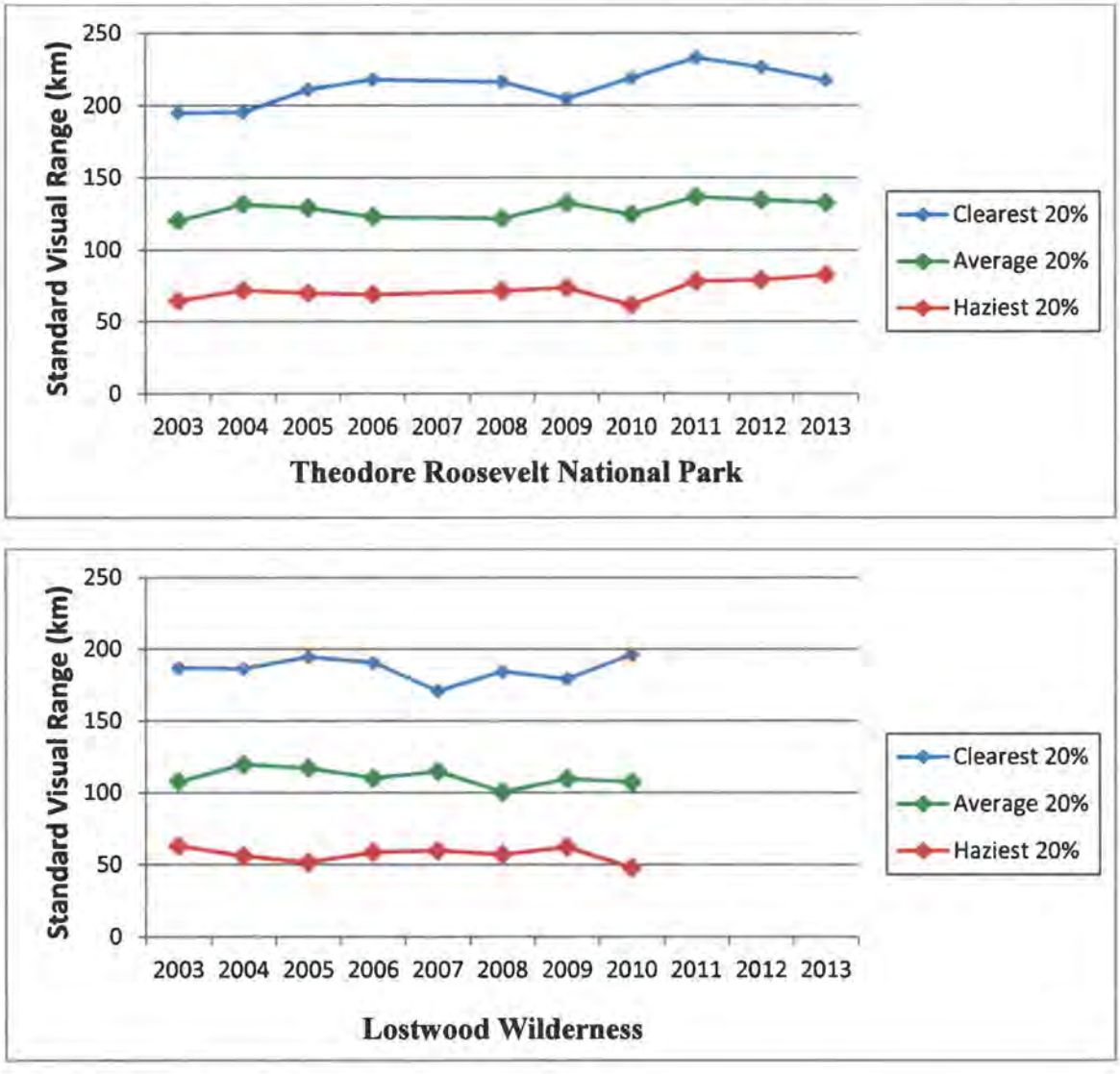
The order requires that after September 30, 2014, all existing and completed wells in the Bakken, Bakken/Three Forks, and/or Three Forks Pool be evaluated for compliance. A well is in compliance with the order if the gas capture percentage is consistent with the gas capture targets. If gas capture targets are not met, well production is limited to 100 or 200 barrels of oil per day depending on site-specific activities. Exemptions are allowed for: (1) wells that have received an exemption to North Dakota Century Code Section 38-08-06.4; (2) the first horizontal well completed in a Bakken, Bakken/Three Forks, and/or Three Forks Pool non-overlapping spacing unit; or (3) the first 90 days commencing on the first day oil is produced through well-head equipment into tanks from the ultimate producing interval after casing has been run

Figure 3.3.2 Air Quality Trends



Sources: Data derived from NDDOH 2006, 2007, 2008, 2009, 2010, 2012a, 2012b, 2013, 2014.

Figure 3.3.3 Visibility Trends in Nearby Class I Areas



Source: Data derived from IMPROVE 2014.

Air resources also include visibility, which can be assessed in terms of the standard visual range (in kilometers or miles) that a person can distinguish a large dark object. Visibility degradation is primarily due to anthropogenic sulfate, nitrate, and particulate emissions and due to wildfires. Air pollutants affecting visibility can be transported hundreds of miles. Figure 3.3.3 illustrates visibility trends based on IMPROVE monitoring data from 2003-2013 at the two Class I areas in North Dakota: Lostwood Wilderness and Theodore Roosevelt National Park. Because visibility is highly variable throughout the year, it is characterized by three groupings: the clearest 20% days, average 20% days, and haziest 20% days. Monitoring data for the Lostwood Wilderness are not available for 2010-2013. A slight improving trend in visibility is apparent at Theodore Roosevelt National Park. At the Lostwood Wilderness, there was no apparent trend from 2003 to 2010.

Sulfur, nitrogen, and acid deposition rates in the study area are among the lowest in the nation, as measured at the Theodore Roosevelt National Park South Unit during 2012 (NADP 2013). Dry deposition was 2 kilograms per hectare (kg/ha) for sulfate and 3 kg/ha for nitrate. Nitrogen and sulfur wet deposition were 173 equivalents per hectare. Precipitation pH was 5.8, which is not considered to be acidic. Hydrogen ion wet deposition was extremely low at less than 0.01 kg/ha. Lake acidification is unlikely with these deposition values and has not been reported at lakes in the area.

3.3.2 Climate Change

Climate change is defined by the Intergovernmental Panel on Climate Change (IPCC) as "a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and persist for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings such as modulations of the solar cycles, volcanic eruptions and persistent anthropogenic changes in the composition of the atmosphere or in land use (IPCC 2013)." Climate change and climate science are discussed in detail in the *Climate Change Supplementary Information Report for Montana, North Dakota, and South Dakota* (BLM 2010). This document is incorporated by reference into this EA.

The IPCC states, "Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased (IPCC 2013)." The global average surface temperature has increased approximately 1.5°F from 1880 to 2012 (IPCC 2013). Warming has occurred on land surfaces, oceans and other water bodies, and in the troposphere (lowest layer of earth's atmosphere, up to 4-12 miles above the earth). Other indications of global climate change described by the IPCC (BLM 2010) include:

- Rates of surface warming increased in the mid-1970s and the global land surface has been warming at about double the rate of ocean surface warming since then;
- Eleven of the last 12 years rank among the 12 warmest years on record since 1850;
- Lower-tropospheric temperatures have slightly greater warming rates than the earth's surface from 1958-2005.

Earth has a natural greenhouse effect wherein naturally occurring gases such as water vapor, carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) absorb and retain heat. Without the natural greenhouse effect, earth would be approximately 60°F cooler (BLM 2010). Current ongoing global climate change is caused, in part, by the atmospheric buildup of GHGs, which may persist for decades or even centuries. Each GHG has a global warming potential that accounts for the intensity of each GHG's heat trapping effect and its longevity in the atmosphere (BLM 2010). Emissions of GHGs such as CO_2, methane, N_2O, and halocarbons since the start of the industrial revolution have substantially increased atmospheric concentrations of these compounds compared to background levels. At such elevated concentrations, these compounds absorb more energy from the earth's surface and re-emit a larger portion of the earth's heat back to the earth rather than allowing the heat to escape into space than would be the case under more natural conditions of background GHG concentrations.

A number of activities contribute to the phenomenon of climate change, including emissions of GHGs (especially CO_2 and methane) from fossil fuel development, large wildfires, activities using combustion engines, changes to the natural carbon cycle, and changes to radiative forces and reflectivity (albedo). It is important to note that GHGs will have sustained climatic impact over different temporal scales due to their differences in global warming potential (described above) and lifespans in the atmosphere. For example, CO_2 may last 50 to 200 years in the atmosphere while methane has an average atmospheric life time of 12 years (BLM 2010). Based on the global warming potentials put forth in EPA regulations (40 *Code of Regulations* Part 98), companies must report GHG emissions using global warming potentials of 1 for CO_2, 25 for methane, and 298 for N_2O. The BLM uses these global warming potentials to provide consistent comparisons with federal GHG emission inventories.

Climate change impacts will occur at global, national, regional, and local scales. The USEPA identifies western North Dakota as part of the Great Plains region. The following summary characterizes potential changes identified by the U.S. Climate Change Science Program (CCSP 2008) that are expected to occur at the regional scale (BLM 2010).

- The region is expected to experience warmer temperatures with less snowfall.
- Temperatures are expected to increase more in winter than in summer, more at night than in the day, and more in the mountains than at lower elevations.
- Earlier snowmelt means that peak stream flow will be earlier, weeks before the peak needs of ranchers, farmers, recreationalist, and others. In late summer, rivers, lakes, and reservoirs will be drier.
- More frequent, more severe, and possibly longer-lasting droughts are expected to occur.
- Crop and livestock production patterns will shift northward; less soil moisture due to increased evaporation may increase irrigation needs.
- Large-scale shifts have already occurred in the ranges of many species and the timing of the seasons and animal migrations. These shifts will continue. Climate changes include the arrival of spring an average of 10 days to 2 weeks earlier through much of the U.S. compared to 20 years ago. Multiple bird species now migrate north earlier in the year.
- Air quality will be degraded due to increased particulate matter in the air as drier, less vegetated soils experience wind erosion.
- Fires, insect epidemics, disease pathogens, and invasive weed species have increased and these trends are likely to continue. Changes in timing of precipitation and earlier runoff will increase fire risks.
- Grasslands and rangelands will expand into previously forested areas

Additional projected changes associated with climate change in North Dakota include (BLM 2010):

- Temperature increases in North Dakota are predicted to be between 3 to 5°F at mid-21st century. As the mean temperature rises, more heat waves are predicted to occur.
- Precipitation is expected to increase during winter and spring, decrease slightly in summer, and remain relatively unchanged in the fall.
- For the western portion of the state, annual median runoff is expected to decrease between 2 and 5 percent by mid-21st century.
- Crop yields may increase in North Dakota due to predicted temperature increases.

- North Dakota's Prairie Pothole wetlands are expected to decline in quality, due to their shallow depths and rapid evaporation rates. Shrinking wetlands may lead to decreased waterfowl populations.
- Wildland fire risk is predicted to continue to increase due to climate change effects on temperature, precipitation, and wind. One study predicted an increase of 393 percent in the median annual area burned by wildland fires in the western portion of North Dakota, based on a 1°C global average temperature increase.

While long-range regional changes will occur within the NDFO, it is impossible to predict precisely when these changes will occur.

3.4 Visual Resources

The Federal Land Policy and Management Act requires that the BLM consider the scenic values of public land as a resource that merits management and preservation, as determined through the land use planning process. VRM classifications are only applied to BLM surface ownership.

The North Dakota Field Office did not assign VRM classifications in the current Resource Management Plan. However, the following general objective and management actions were approved in the RMP:

RMP Objective: "To maintain visual qualities wherever possible."

RMP Management Actions:

- Consider impacts to the visible landscape during all phases of land use planning.
- Ensure that the high visual qualities of National Park Service Units are considered in cooperation with the NPS when a specific mineral lease or developmental action is proposed that potentially affects existing visual qualities.

3.5 Cultural Resources

The BLM is responsible for identifying, protecting, managing, and enhancing cultural resources located on public lands, or that may be affected by a BLM undertaking on BLM-administered or non-federal lands, in accordance with the National Historic Preservation Act (NHPA) of 1966, as amended. Cultural resources are defined as prehistoric or historic district, site, building, structure, or object significant in American history, architecture, archeology, engineering, and culture (36 CFR 60.1). Cultural resources also refer to artifacts, records, remains, and properties of traditional religious and cultural importance to an Indian tribe (36 CFR 800.16(l)(1)).

Cultural resources are evaluated with reference to their eligibility for listing on the National Register of Historic Places (NRHP). Each resource is considered on a case-by-case basis. Common prehistoric resource types in North Dakota include stone circles, stone cairns, rock art, lithic artifacts, pottery remains, earthlodge villages, rock alignments, bone concentrations, eagle-trapping pits, and lithic procurement areas. Common historic site types in North Dakota are

material remains of human life or activities over 50 years in age including homesteads, farmsteads, dumps, schools, roads, railroad grades, trails, trading posts, and military forts.

There are a number of areas designated as National Historic Landmarks or State Historic Sites within the Williston Basin of western North Dakota. They include the:

- Killdeer Mountain Battlefield State Historic Site,
- Elkhorn Ranch site within Theodore Roosevelt National Park,
- Lynch Knife River Flint Quarry site,
- Chateau de Mores State Historical Site,
- Fort Buford State Historic Site,
- Fort Union Trading Post National Historic Site,
- Fort Dilts State Historic Site, and
- Lewis & Clark National Historic Trail.

3.6 Native American Religious Concerns

The BLM's management of Native American Religious concerns is guided through Manual 8120: *Tribal Consultation under Cultural Resources Authorities* and Handbook 8120-1: *Guidelines for Conducting Tribal Consultation*. Generally, areas of concern to Native Americans are referred to as "Traditional Cultural Properties" (TCPs) which are defined as cultural properties eligible for the National Register of Historic Places because of its association with cultural practices or beliefs that (a) are rooted in that community's history and (b) are important in maintaining the continuing cultural identity of the community.

There are several locations within the Williston Basin in western North Dakota that are a concern to Native Americans. Cultural resources associated with Native American ceremonies, religious practices, and important events in history have the highest probability of being of religious or of cultural concern to Native Americans. Common sites of concern are burials, rock art, monumental rock features, eagle catching pits, sweat lodges, offering and prayer loci, battle sites, and stone rings (Deaver 1995:3.11 – 3.25).

The Mandan, Hidatsa, and Arikara Nation attach religious and cultural significance to the Missouri River (Murray et al 2011; Sundstom 1997:7), Black Butte (Deaver 1995), and the Blue Buttes (Deaver 1995:4.66). In addition, Grassy Butte, Bullion Butte, the Sentinel Buttes, and the Little Missouri River were the setting for Hidatsa, Mandan, and Arikara myths (Sundstom 1997:6-8). It is likely that the Killdeer Mountain Battlefield and Cannonball River are of concern to many of the Sioux tribes (Sundstom 1997:8).

Bowers (1965:12) identifies specific buttes associated with the Hidatasa Earthnaming Bundle. The ceremonies tied to the Earthnaming Bundle were linked to specific spirts (e.g., Buffalo), and were residents of named buttes and the adjacent prairies in North Dakota. For example, spirts were associated with the Killdeer Mountains, Rosebud Butte and at least a dozen more buttes (i.e.., White Butte, Singing Butte, Ghost Singing Butte, Crow Butte, Fox Singing Butte, Little Heart Buttel, Heart Singing Butte, Square Butte, Buffalo Home Butte, Lone Butte, Opposite Butte and Dog Den Butte).

3.7 Fluid Minerals

Oil and gas exploration and development in North Dakota has been concentrated in the Williston Basin western portion of North Dakota. The Williston Basin covers approximately 200,000 square miles of western North Dakota, northwestern South Dakota, eastern Montana, southern Saskatchewan, and extreme southwestern Manitoba. As of June 2015, there are approximately 12,383 active oil/gas wells in western North Dakota (Table 3.7.1).

Table 3.7.1. Total number of wells in the area of analysis.

Well Status	Federal Wells	Private and State Wells	Indian Wells	Total
Active Oil/Gas Wells	1,795	10,126	462	**12,383**
Permitted/Drilling/Constructed	184	954	131	**1,269**
Temporarily Abandoned/ Abandoned/Plugged/Inactive	2,209	11,417	200	**13,826**
TOTAL	**4,188**	**22,497**	**793**	**27,478**

Source: NDIC GIS database, accessed June 10, 2015.

Current technology allows wells to be drilled horizontally from the same well pad, resulting in a multi-well pad which may be comprised by wells from multiple lease owners (e.g. Federal, Indian, Private, State). Multi-well pads are commonly used for producing Bakken or Three Forks Formation wells in the Williston Basin. They are typically larger in size to accommodate for drilling and production operations of multiple wells. Production facilities are typically located on the same well pad, or on a nearby production pad, and can be shared by all the wells in the same communitization agreement (CA) or lease. Because the same well pad, pipeline corridor, access road, and production facilities are being used for multiple wells, it reduces the surface disturbance per well.

The sharing of production facilities may result in commingling of oil and gas production from all the wells regardless of ownership, which facilitates production in the area when the wells produce under a common CA. However, if there are multiple CAs with respect to a well pad, then commingling can occur between the like CA wells, but commingling cannot occur between unlike CA wells without prior BLM approval.

Communitization agreements are used for development of Bakken or Three Forks Formation wells in the Williston Basin. A CA combines two or more leases that otherwise could not be independently developed in conformity with established well-spacing patterns. The leases can be comprised of multiple mineral lease owners (e.g. Federal, Indian, Private, State) within the spacing unit, and all would share in the costs and benefits of the well drilled in the spacing unit. Like multi-well pads, CAs reduce the amount of surface disturbance and eliminate unnecessary wells, roads, pipelines, and lease equipment. As of June, 2015 there were 1,026 Federal CAs and 443 Indian CAs in the North Dakota Field Office.

Wells in the Williston Basin will produce most of their gas in the first few years of production, and then they will steadily decline and produce lower volumes of gas for the remaining life of

the well. There are multiple reasons for an operator to request flaring of associated oil-well gas. Some of those include:

- the operator has a one-year gas capture plan in accordance to NTL-4A;
- the operator is unable to obtain a Right-of-Way from the surface owner(s) (private, government agency, or Indian) to install a natural gas gathering line;
- the well is connected to infrastructure with inadequate capacity to handle the volumes of gas being generated;
- the gas generated does not meet standards for gas processing, the well produces a low gas volume for which a gas processing contract cannot be obtained; or
- the well is in a remote location with no current or future infrastructure plans.

The BLM's reviews and determinations would be based on an evaluation report supported by engineering, geologic, and economic data which demonstrates to the satisfaction of the Authorized Officer that the expenditures necessary to market or beneficially use such gas are economically justified in accordance to NTL-4A.

Most flaring in North Dakota occurs because the well is connected to infrastructure with inadequate capacity to handle the volumes of gas being generated. This results in oil wells flaring associated gas sporadically throughout the year. The length of time an operator flares due to inadequate capacity varies and is typically of short duration.

As of June 1, 2014, the NDIC adopted a new policy, Order 24665, to reduce gas flaring. This requirement is for all wells which produce from the Bakken, Three Forks, and Three Forks/Bakken or Sanish Pools. The policy requires that all APDs submitted to NDIC must be accompanied by a Gas Capture Plan (GCP). The GCP has various requirements that must be met prior to approval of an APD. These plans aim to ensure that all options for capturing gas are fully evaluated before a well is drilled. The State policy also requires that operators meet flaring reduction targets according to a prescribed timeline. For operators that do not meet the targets, the state policy provides for the restriction of oil production until the targets are met. The Order requires that by first quarter of 2016, gas capture rate should be at 85 percent allowing 15 percent to be flared; and by fourth quarter 2020, gas capture rate should be at least 90 percent allowing 10 percent to be flared. In the May 2015 NDIC Director's Cut report, gas capture rates were at 85 percent capture, meeting the percent required in the policy.

3.8 Socio-Economic Conditions

Oil and gas development, which includes the extraction of oil and gas, drilling of wells, and support activities, has significantly increased in North Dakota over the last decade as exploration in the Bakken Formation has intensified. Leasing, exploration, development and production of federal minerals stimulates tremendous economic activity within the state, influencing employment, income, and public revenues.

The analysis area for economic conditions includes the following counties: Billings, Bowman, Burke, Divide, Dunn, Golden Valley, McKenzie, McLean, Mountrail, Stark, and Williams counties. The 2014 population for the analysis area was 107,907 residents with Billings County having the fewest residents (901) and Williams County the most (32,130) (Table 3.8.1) Unemployment rates are relatively low, ranging from 1.2 percent to 4.2 percent (Table 3.8.1).

Both Billings and McLean counties have unemployment rates (3.0 and 4.2 percent respectively) higher than the average for North Dakota (2.8 percent). In 2014 there was an average of 97,379 jobs in the analysis area with a majority of them in Stark and Williams counties (Labor Market Information Center 2015). A majority of jobs in Dunn, McKenzie, Mountrail, and Williams counties were in the mining, oil and gas extraction; construction; and transportation and warehousing industries (Table 3.8.1). Oil and gas development is often associated with increased jobs in construction and transportation due to building energy infrastructure and truck hauling of materials such as water and waste.

Annual wages associated with jobs in these three industries tend to relatively high-for example annual wages for mining, oil and gas extraction industry ranged from $106,932 in Williams County to $97,244 in Mountrail County (Labor Market Information Center 2015). This highlights energy development as a major contributor to many of the local economies in the analysis area in terms of jobs and income.

Forty-nine percent of the federal revenues collected in association to oil and gas development (e.g. bonus bids, rent, and royalties) is redistributed back to the state of production. The state then redistributes these monies with half going towards North Dakota public education/school and the other half being returned to the county of production. This revenue helps fund traditional county functions such as enforcing laws, administering justice, collecting and disbursing tax funds, providing for orderly elections, maintaining roads and highways, providing fire protection, and keeping records. Other county functions that may be funded include operating clinics/hospitals, county libraries, county airports, local landfills, and county health systems.

Based on sales year data, the amount of revenues associated with federal oil and gas activities in the analysis area counties redistributed back to North Dakota in 2014 was approximately $104,419,578 (ONRR 2015). Revenues associated with gas lost to flaring or venting occurred in Burke and Dunn counties with a total of $405 being received by the federal government in 2014 (ONRR 2015). As discussed in Section 1.2 and 1.3 above, the BLM has the authority to allow venting or flaring of an oil-well gas under certain conditions pursuant to NTL-4A. Through the review process of the SN applications, the BLM will determine whether each request is an avoidable loss of gas or unavoidable loss of gas as well as the determination of any royalties to be paid.

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, states "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations…" (Executive Order 12989).

Minority populations as defined by Council on Environmental Quality (CEQ) guidance under the National Environmental Policy Act (CEQ 1997) include individuals in the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic. A minority population is identified where "(a) the minority population of the

Table 3.8.1 Analysis Area Social and Economic Conditions.

	North Dakota	Billings County	Bowman County	Burke County	Divide County	Dunn County	Golden Valley County	McKenzie County	McLean County	Mountrail County	Stark County	Williams County
Total Population (2014)[1]	739,482	901	3,247	2,245	2,432	4,399	1,825	10,996	9,578	9,782	30,372	32,130
Unemployment Rate, Annual Average (2014)[2]	2.8%	3.0%	1.8%	2.8%	1.5%	1.3%	2.2%	1.5%	4.2%	1.3%	1.6%	1.2%
Percent of Total Jobs by Industry (2014 average annual)[3]												
Agriculture, Forestry, Fishing and Hunting	1.0%	****	3.1%	0.0%	0.0%	0.3%	3.9%	0.4%	1.4%	0.1%	0.2%	****
Mining, Quarrying, and Oil and Gas Extraction	6.7%	9.2%	7.6%	8.2%	13.3%	32.8%	****	18.2%	****	20.4%	20.9%	35.5%
Utilities	0.8%	****	****	****	****	0.2%	****	0.6%	****	****	0.4%	0.6%
Construction	7.8%	1.7%	11.0%	9.0%	3.7%	16.2%	2.3%	22.0%	6.8%	15.8%	9.4%	11.6%
Manufacturing	5.8%	0.0%	1.7%	0.0%	****	****	****	0.1%	****	****	5.5%	1.2%
Wholesale Trade	6.1%	****	13.1%	7.2%	****	2.3%	14.4%	4.7%	8.5%	4.8%	7.0%	7.8%
Retail Trade	11.4%	4.0%	11.1%	6.0%	8.4%	4.7%	9.0%	5.9%	7.7%	8.2%	9.9%	6.4%
Transportation and Warehousing	5.0%	9.5%	3.4%	21.0%	16.0%	13.2%	8.1%	17.9%	2.6%	20.6%	8.8%	9.1%
Information	1.5%	0.0%	1.2%	****	****	****	****	****	****	****	1.1%	0.5%

Finance and Insurance	4.0%	na	4.5%	3.5%	2.9%	0.7%	4.8%	1.1%	3.7%	1.2%	1.8%	1.0%
Real Estate and Rental and Leasing	1.3%	****	****	0.5%	1.3%	1.4%	na	1.6%	0.7%	0.3%	2.0%	3.7%
Professional and Technical Services	3.8%	0.7%	2.1%	1.3%	1.9%	3.7%	3.9%	2.9%	0.7%	3.1%	2.9%	3.0%
Management of Companies and Enterprises	1.2%	na	****	****	na	na	na	****	****	****	0.2%	****
Administrative and Waste Services	3.2%	1.3%	****	****	2.8%	1.1%	0.0%	1.0%	0.8%	1.0%	2.3%	2.6%
Educational Services	0.5%	0.0%	0.0%	0.0%	****	na	****	0.1%	****	0.0%	0.3%	0.2%
	North Dakota	Billings County	Bowman County	Burke County	Divide County	Dunn County	Golden Valley County	McKenzie County	McLean County	Mountrail County	Stark County	Williams County
Health Care and Social Assistance	12.5%	0.0%	15.7%	2.1%	****	****	17.0%	2.8%	11.5%	3.1%	7.4%	3.5%
Arts, Entertainment, and Recreation	1.0%	****	0.8%	0.8%	****	0.4%	****	0.6%	1.1%	****	0.8%	0.2%
Accommodation and Food Services	8.1%	11.3%	7.2%	4.6%	8.6%	5.2%	3.5%	5.8%	6.1%	4.1%	7.4%	6.0%
Other Services (except Public Administration)	2.8%	1.2%	2.1%	1.8%	1.2%	2.5%	4.4%	2.2%	1.7%	1.2%	2.8%	1.5%

Government (federal, state, local)	15.4%	29.2%	14.5%	29.0%	17.0%	9.2%	25.6%	12.0%	23.4%	11.8%	8.9%	5.1%
Percent Population (All Ages) Below Poverty Level[4] (2013)												
	11.6%	8.2%	8.0%	9.5%	9.0%	9.6%	11.7%	9.9%	10.6%	11.5%	8.7%	7.8%
Race Alone[1] (2014)												
White	89.1%	95.0%	95.8%	96.5%	96.6%	85.9%	96.7%	81.7%	90.6%	68.7%	93.9%	90.0%
Black or African American	2.1%	0.6%	0.3%	0.6%	0.7%	0.6%	0.8%	1.2%	0.3%	0.9%	1.7%	2.4%
American Indian and Alaska Native	5.4%	0.4%	2.5%	1.0%	0.7%	9.7%	1.2%	14.1%	7.2%	27.2%	1.3%	3.9%
Asian	1.3%	3.7%	0.2%	0.6%	0.7%	1.5%	0.2%	0.7%	0.1%	0.3%	1.4%	0.8%
Native Hawaiian and Other Pacific Islander	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%	0.1%
Two or More Races[1] (2014)	2.0%	0.3%	1.1%	1.3%	1.2%	2.3%	0.9%	2.3%	1.8%	2.9%	1.6%	2.9%
Hispanic[1] (2014)	3.2%	1.8%	4.7%	2.1%	3.9%	3.8%	2.7%	6.8%	2.1%	6.2%	4.9%	5.2%
Total Minority[5] (2014)	13.4%	6.3%	7.3%	5.5%	7.0%	17.0%	5.8%	23.5%	10.5%	35.2%	10.5%	14.5%

Source: [1]U.S. Census Bureau 2015. [2]Bureau of Labor Statistics 2015. [3]Labor Market Information Center 2015. [4]U.S. Census Bureau 2014. [5] Total minority is calculated as: (Total Population - Non-Hispanic White Alone population)/Total Population. The term "total minority population" refers to the part of the total population which is not classified by the race/ethnicity category Non-Hispanic White Alone by the U.S. Census Bureau. This definition is most inclusive of populations that may be considered as a minority population under EO 12898.

affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater…" (CEQ 1997). Additionally, "[a] minority population also exists if there is more than one minority group present and the minority percentage, as calculated by aggregating all minority persons, meets one of the above-stated thresholds" (CEQ 1997). Low-income populations are determined by the U.S. Census Bureau based upon poverty thresholds developed every year.

U.S. Census data are used to determine whether the populations residing in the analysis area constitute an "environmental justice population" through meeting either of the following criteria:

- At least one-half of the population is of minority or low-income status; or
- The percentage of population that is of minority or low-income status is at least 10 percentage points higher than for the entire State of North Dakota.

Table 3.8.1 indicates the State of North Dakota has 11.6 percent of the population living below the poverty level in 2013 and a total minority population of 13.4 percent in 2014. None of the counties met the criteria above for low-income environmental justice populations. McKenzie and Mountrail counties have total minority populations that meet the criteria for constituting environmental justice populations. In 2014, Mountrail County met the criteria with a total minority percent of 35.2 and an American Indian/Alaska Native percent of 27.2 whereas the State of North Dakota has 13.4 percent of total minority and 5.4 percent of the population as American Indian/Alaska Native (Table 3.8.1). McKenzie County had a total minority percent of 23.5 percent which was largely driven by the American Indian/Alaska Native race and Hispanic or Latino ethnicity (14.1 and 6.8 percents respectively). Total minority will not equal the aggregation of the minority races alone, two or more races, and Hispanic ethnicity, since any race can be of Hispanic ethnicity.

Public scoping was initiated on August 30, 2013 by posting the proposed action on the NDFO website - NEPA notification log. The BLM consults with the State Historic Preservation Office (SHPO) and Native American Tribes under Section 106 of the National Historic Preservation Act (NHPA). On June 24, 2015, the NDFO sent formal consultation and determination letters to the State Historic Preservation Officer (SHPO) of North Dakota. On July 8, 2015, the SHPO concurred with the NDFO's finding of "No Historic Properties Affected" (ND SHPO Ref: 15-0835). On June 29, 2015, the NDFO invited seventeen federally recognized Indian tribes to consult about the NDFO's oil and gas program and the flaring of natural gas. The NDFO sent letters with maps to 17 Tribal Historical Preservation Officers (THPOs) or the respective cultural contacts for the Flandreau Santee Sioux Tribe, Fort Belknap Indian Community, Crow Tribe, Oglala Sioux Tribe, Mandan, Hidatsa, and Arikara Nation, Sisseton-Wahpeton Oyate Tribes, Rosebud Sioux Tribe, Lower Sioux Indian Community, Lower Brule Sioux Tribe, Yankton Sioux Tribe, Spirt Lake Tribe, Turtle Mountain Band of Chippewa, Cheyenne River Sioux Tribe, Northern Cheyenne Tribe, Standing Rock Sioux Tribe, Fort Peck Assiniboine and Sioux Tribes, and the Crow Creek Sioux Tribe inviting them to submit issues and concerns BLM should consider in the environmental analysis. To date, only the Fort Belknap Indian Community has requested to be consulted with on future NDFO APDs.

4.0 ENVIRONMENTAL IMPACTS

4.1 Assumptions and Methodology

The analytical assumptions and methodology listed below were developed by BLM resource specialists and petroleum engineers who relied on professional judgment of the resource and knowledge of flaring activity within the Williston Basin in western North Dakota. The BLM used production and GIS data from the BLM and NDIC databases to identify well locations, status, and production information.

BLM took into consideration NDIC Order 24665 to develop assumptions for this EA. This Order requires that by the first quarter of 2016, gas capture rate should be at 85 percent allowing 15 percent to be flared; and by the fourth quarter 2020, gas capture rate should be at least 90 percent allowing 10 percent to be flared. See Appendix C for further details on the methodology and application of assumptions to determine gas production rates and quantities for this EA.

The BLM assumes that all operators will comply with applicable laws, regulations and BLM requirements. Under the general requirements for onshore oil and gas operations (43 CFR 3162.1), an operator shall comply with applicable laws and regulations. These include, but are not limited to, conducting all operations in a manner that results in maximum ultimate economic recovery of oil and gas with minimum waste. The NTL-4A provides the BLM authority to allow flaring of oil well gas under certain conditions. The BLM completes a review of the SN request to flare oil-well gas and determines if the request is an avoidable loss of gas or unavoidable loss of gas. This would require denying a SN request to flare gas and requiring capture and marketing of the gas; or approving a SN request with necessary mitigation measures. The BLM has the authority to re-evaluate all flaring approvals and update their determination in accordance with NTL-4A.

If the SN request to flare gas is denied and the operator concurs in gas capture and marketing the gas, a subsequent SN would need to be submitted for review and approval of the capture method and marketing of the gas. If the SN request to flare gas is denied and the operator does not concur in gas capture and marketing, this would result in incidents of noncompliance, monetary assessments, unorderly development, and possibly shutting-in the well. For this analysis, it is assumed that all operators would comply with BLM's requirement to capture and market the gas. It is also assumed that denying a request to flare will not result in a reduction of the number of wells projected in section 4.2 Reasonably Foreseeable Development.

The BLM assumes that no surface disturbance would occur as a result of denying or approving the SN request to flare oil-well gas. If BLM's determination is to require capture and marketing of the gas, which would require surface disturbing activities, a subsequent SN would be submitted in accordance with 43 CFR §3164.1 Onshore Order No. 1 VIII for review and approval by BLM. A separate NEPA environmental analysis would be completed for the subsequent SN to properly analyze the proposed action. When necessary, the BLM would coordinate with the appropriate SMA during the NEPA reviews.

The BLM assumes that all wells that have sold natural gas associated with oil production are connected to a natural gas gathering pipeline to transport gas to processing plant.

Based on the type of flaring SN request, one well may have multiple SN requests submitted for BLM review. The impacts to each resource may be associated to the number of SN requests submitted or the number of wells within the analysis area. Therefore, each resource will identify when the number of SN requests is being used as part of the impact analysis and when the number of wells is being used as part of the impact analysis.

For this EA, the 268 SN requests, associated with 192 wells not connected to pipeline, the BLM assumes 5 percent (10 wells) of the pending SN requests would be required to capture and market the associated oil-well gas; therefore, no gas would be flared. The BLM assumes 80 percent (154 wells) would flare for short-term (i.e. 1-year gas capture plan) which would result in gas capture upon installation of infrastructure. The BLM assumes 15 percent (29 wells) would flare for long-term (i.e. no ROW access, poor quality, low quantity, etc.); therefore, the flaring of gas would be considered unavoidable loss and not royalty bearing.

For this EA, the BLM assumes the average metric cubic foot (MCF) of gas flared by an oil well per day (PD) in ND is approximately 121 MCFPD.

This chapter describes the environmental effects (direct, indirect, and cumulative) that would result from the alternatives. Environmental consequences are discussed below by alternative to the extent possible at this time for the resources described in Chapter 3. As per NEPA regulations at 40 CFR 1502.14(f), 40 CFR 1502.16(h), and 40 CFR 1508.20, mitigation measures to reduce, avoid, or minimize potential impacts of the proposed action are identified by resource below.

4.2 Reasonably Foreseeable Development

The Reasonably Foreseeable Development (RFD) scenario for this EA is based on information and assumptions contained in the RFD developed in 2009, revised in 2011 for the NDFO Resource Management Plan (RMP), and revised again in 2014 for the NDFO RMP to consider the increased rate of development in the Williston Basin portion of North Dakota (Map 1). The 2014 RFD revision contains projections of oil and gas wells for the western portion of the NDFO area. This information was used in the analysis of this EA.

The 2014 RFD revision took into consideration the assumptions and methodology from the previous reports completed. It also incorporated current changes in development that resulted in an increase projection of oil and gas development for the next 20 years. For this EA, only the first 5 years of projected development was used to complete this analysis. In the next 5 years, the 2014 RFD revision projects a baseline total of 6,353 wells to be producing wells in the western portion of North Dakota. Of those, 826 are Federal, 381 are Forest Service, 381 are Indian, and 4,765 are Fee/State administered wells.

Based on 2014 RFD, for the next five years, the BLM assumes a total of 6,648 wells are projected to produce gas and flare an average 121 MCFPD per well. The gas capture percentages requirements from NDIC Order 24665 were applied to the projected number of

wells for the next five years to identify projected capture and projected flared short-term and long-term by year. See Appendix C for specific percentages and projections per year.

4.3 Alternative A (No Action Alternative)

4.3.1 Direct Effects Common to All Resources

Under Alternative A, the 2,211 pending SN requests and future SN requests would be reviewed and responded to on a case-by-case basis in accordance with NTL-4A. Each SN request would have an individual NEPA document analyzing impacts from an individual request.

The direct and indirect impacts would be the same as those described in Section 4.4 Alternative B; however, completing individual NEPA review would limit the scale and scope of analysis and increase review time for all requests. Increased review time frames would lead to inefficiency and result in a backlog of pending SN requests. Not processing requests to flare in a timely manner would also limit BLM's opportunity to mitigate impacts at the time they are occurring.

Collection of royalties would be completed also on a case-by-case basis. This would result in inconsistent reviews and would not take into consideration field development and economic development of a larger area.

Surface management would remain the same and ongoing oil and gas development would continue on surrounding Federal, private, and State leases. Future flaring SN requests submitted by operators and identification of mitigation measures would be completed on a case-by-case basis.

4.3.2.2 Cumulative Effects Common to All Resources:

The cumulative effects would be the same as those described in Section 4.4.6. Cumulative Impacts Alternative B; however, reviews for current and future flaring requests, the identification of mitigation measures, and royalty determinations would be completed on a case-by-case basis. This would result in inefficiencies and a continual backlog of pending SN requests.

4.4 Alternative B (Proposed Action BLM Preferred Alternative)

4.4.1 Air Resources

4.4.1.1 Air Quality

Associated gas flaring is a combustion process that oxidizes organic compounds found in natural gas, creating primarily CO_2, water vapor, and combustion by-products that can include hazardous air pollutants (HAPs). Flaring does not oxidize all organic compounds because it is an imperfect process in which some of the gas entering the flare may bypass the flame or pass through low-temperature areas that do not achieve complete combustion. Flares must meet North Dakota Department of Health and EPA requirements. EPA's flare New Source Performance Standards (NSPS) in 40 CFR §60.18 include equipment design and operational standards with a destruction efficiency of 98 percent. The NSPS also require no visible emissions, except for up to 5 minutes every 2 hours.

Appendix D contains criteria air pollutant and HAP emission calculations for flared gas on a pound per million standard cubic foot (lb/MMSCF) basis and annual basis in terms of short tons per year. The calculations use associated gas composition and assume that 2 percent of the gas passes through the flare without combustion and 98 percent is completely combusted. Annual emissions for the year with the greatest quantity of flared gas are shown in Table 4.4.1. The emissions are compared to statewide North Dakota criteria pollutant emissions, provided as a percentage of EPA's year 2011 National Emissions Inventory (NEI).

Table 4.4.1. Criteria and Hazardous Air Pollutant Annual Emissions

Pollutant	Annual Emissions (short tons/year)		Maximum Flaring Percent (Year 2019)
	Maximum Annual Flaring Emissions (2019)	North Dakota (2011 NEI)	
PM_{10}	429	365,857	<1%
$PM_{2.5}$	429	90,086	<1%
NOx	6,032	163,788	4%
SO_2	6,516	1,074,343	1%
CO	4,743	488,511	1%
VOC	23,513	281,219	8%
HAPs	1,042	N/A	N/A

NEI = National Emissions Inventory
Short tons = 2,000 lb
Source: EPA 2015.

As shown in Table 4.4.1, criteria air pollutant emissions from flaring would constitute a small percentage of statewide emissions. These emissions represent an increase in emissions in the specific locations where flaring would be allowed under this alternative. However, the emissions may or may not represent an increase in the region, given the flaring reductions required by the NDIC.

Flaring emissions would occur over a wide geographic area covering many counties with relatively flat terrain and with good pollutant dispersion characteristics. Given the good air quality in the planning area, flaring emissions are not expected to affect air quality.

Flaring is not expected to cause visible plumes, except for short periods of time. Some impacts to visibility due to emissions of fine particulate, NO_x, and SO_2 could potentially occur because these pollutants can contribute to regional haze. Because the net increase in these pollutants cannot be estimated due to regional reductions in flaring, impacts to regional haze are difficult to predict.

4.4.1.2 Greenhouse Gas Emissions at the NDFO and Project Scales

The primary GHGs emitted by flaring are CO_2, CH_4, and N_2O. Associated gas that bypasses the flare consists of approximately 70 percent by volume CH_4 (WRAP 2014). The total climate change effect of aggregated GHGs is estimated in terms of carbon dioxide equivalent (CO_2e), which is calculated by multiplying the quantity of each GHG by its global warming potential (GWP) and summing the results. In order to make meaningful comparisons to EPA emission inventories, regulatory GWPs from 40 CFR Part 98, Table A-1 are used in the calculations. These GWPs reflect the 100-year impact of GHG emissions and are equal to 1 for CO_2, 25 for CH_4, and 298 for N_2O. For every molecule of CH_4 that is flared, one molecule of CO_2 is produced and for every metric ton of CH_4 flared, approximately 2.9 metric tons of CO_2 are formed. Put in terms of CO_2e, each metric ton of CH_4 flared is equivalent to 25 metric tons of CO_2e entering the flare and results in 2.9 metric tons of CO_2e exiting the flare. Flaring converts a high GWP gas to a lower GWP gas.

Other GWPs based on different time frames can be used by the reader by selecting desired GWP values and multiplying them by the emissions of each individual GHG.

Appendix D provides an estimate of GHG emissions on a pound per million standard cubic foot (lb/MMSCF) basis and an annual basis in terms of short tons per year and metric tons per year. Table 4.4.2 summarizes GHG emissions in terms of individual GHG emissions and as CO_2e.

Table 4.4.2 Greenhouse Gas Annual Emissions

	Maximum Annual Flaring Emissions (Year 2019)	
GHG	**(short tons/year)**	**(metric tons/year)**
CO_2	6,775,959	6,147,014
CH_4	21,105	19,146
N_2O	124	113
CO_2e	**7,340,605**	**6,659,250**

Short tons = 2,000 lb
Metric tons = 2,205 lb

Flaring GHG emissions can be put into context by comparing them to state and national GHG emission inventories. An EPA inventory of GHG emissions emitted by large sources in North Dakota estimates emissions at 37,003,286 metric tons per year (EPA 2015a). This number does not include emissions from residential heating, vehicular travel, and other sources with small emissions on a per household or per vehicle basis. Alternative B flaring emissions would be 18 percent of this large-source North Dakota emission inventory. A more comprehensive national inventory including nearly all types of GHG emissions estimates national CO_2e emissions of 6.673 billion metric tons per year for 2013 (EPA 2015b). Alternative B flaring emissions would be 0.10 percent of this national inventory.

4.4.1.3 Climate Change

Flaring releases increased GHG emissions into the atmosphere because no energy benefit, such as electricity production or resident heating, is obtained from the flaring process. Additional natural gas must be produced and combusted in order to provide these energy benefits. Under Alternative B, atmospheric GHG concentrations would be slightly greater than they would be otherwise. However, given the small percentage of GHG emissions compared to state and national emission inventories, the global change would be extremely small.

The extent of climate effects due to the increase in GHG emissions is also difficult to predict because the change in emissions is so small. Climate change models cannot differentiate global, regional, state, and local climate impacts for changes at this scale. Furthermore, impacts to human health and ecosystems cannot be accurately predicted due to these small emission changes.

4.4.1.4 Mitigation

When compared to venting associated gas, flaring is a form of mitigation because it destroys most VOCs and HAPs in the gas by converting them to CO_2 and other compounds. As described earlier, flaring also mitigates GHG emissions by converting a high GWP gas (CH_4) to a low GWP gas (CO_2).

Alternative B mitigates air pollutant and climate change impacts by requiring that most of the gas is captured or put to beneficial use, as described in Section 4.4.

4.4.2 Visual Resources

4.4.2.1 Direct and Indirect Effects

There are no SN requests to flare on BLM administered lands; therefore, approval of the 2,211 SN requests to flare on existing facilities would have no impacts to visual resources on BLM administered lands.

Potential impacts from future flaring requests would include the introduction of visual contrast and degradation of scenic quality by the artificial lighting of the landscape that may otherwise be unlit. It is expected that the majority of flaring requests would be short term (less than 5 years) and result in negligible impacts due to existing infrastructure on the existing well pad (e.g. tanks, pump jacks, heater-treaters, etc.), application of NDIC Order 24665, and the decrease in gas production over the life of the well.

4.4.2.2 Mitigation

Application and implementation of the project design features/mitigation measures addressed in the proposed action would provide the necessary measures to protect visual resources when a SN request to flare is proposed on BLM administered lands. Additional site specific mitigation measures for future requests to flare on BLM administered lands, would be determined on a case by case basis to maintain the visual qualities or scenic value of the area.

For future APDs, the BLM would apply appropriate BLM BMPs for visual resources, which would serve to mitigate flaring activities on the well pad. Mitigation measures applied to the APD would include, but not be limited to, proper site selection, reduction of visibility, and

selecting color(s)/color schemes that blend with the background. Repetition of form, line, color and texture when designing projects would reduce contrasts between landscape and development.

4.4.3 Cultural Resources

4.4.3.1 Direct and Indirect Effects

The 2,211 requests to flare are located on existing facilities, which would not introduce new elements to the landscape. The requests to flare located on existing facilities that have ongoing flaring or have flared oil well gas, do not have the potential to affect cultural or historic resources.

From the 2,211 SN requests, there are no requests to flare gas within the viewsheds of the Chateau de Mores State Historical Site, the Fort Dilts State Historic Site, and the Lynch Knife River Flint Quarry site.

From the 2,211 SN requests, there are no requests with ongoing flaring on existing facilities within the viewsheds of the Killdeer Mountain Battlefield State Historic Site, the Fort Buford State Historic Site, the Fort Union Trading Post National Historic Site, and the Lewis & Clark National Historic Trail.

From the 2,211 SN requests, there are 102 SN requests for wells that are connected to pipelines and have flared oil well gas within the viewshed of the latter five areas. The 102 SN requests have flared oil well gas and are being reviewed by BLM to determine compensation of royalties on the flared gas. The numbers of SN requests are as follows:

- 75 requests in the Lewis & Clark National Historic Trail;
- 6 requests in the Fort Union Trading Post National Historic Site;
- 2 requests in the Killdeer Mountain Battlefield State Historic Site;
- 2 requests in the Theodore Roosevelt Greater Elkhorn Ranchlands; and
- 17 requests in the Fort Buford State Historic Site.

From the 2,211 SN requests, there is one request to flare on the Morgan Draw Federal 1 well facility which is not connected to a pipeline and has ongoing flaring within the viewshed of Theodore Roosevelt Greater Elkhorn Ranchlands. The well is located on U.S. Forest Service Land and is not connected to a pipeline to transport and market the gas to a processing facility. Production for the last four years shows this well has produced 1,860 mcf, beneficially put to use 1,483 mcf to operate the existing facility; therefore, flared a total of 377 mcf of gas. Flaring for this well is infrequent and occurs with extremely low volumes (average 8 mcf per month) throughout the year. With the current rate of flaring on an existing well pad with infrastructure, this specific well would not introduce new elements to the landscape. Therefore, this well would not have the potential to affect cultural, scientific, or historic resources.

Potential impacts from future flaring requests or future APDs have the potential to introduce visual, atmospheric or audible elements that would diminish the integrity of a property's setting and feeling.

4.4.3.2 Mitigation

Application and implementation of the project design features/mitigation measures addressed in the proposed action would provide the necessary measures to avoid, minimize, or mitigate impacts to cultural or historic properties when a SN request to flare is submitted by an operator. Site specific mitigation measures, including design features proposed by the operator would be developed during review of the application to avoid, minimize, or mitigate potential impacts to historic properties.

Application of standard lease terms, stipulations, and cultural lease notices on the APD would provide mechanisms to protect historic properties that may be affected by flaring. The NDFO would conduct necessary viewshed analysis, outlined in Appendix E, to identify potential impacts to a historic property's setting or feeling and where viewshed is integral to the sites integrity and therefore its eligibility to the NRHP. Site specific mitigation measures would include but not limited to the project design features/mitigation measures addressed in the proposed action to avoid, minimize or mitigate impacts to a historic property's setting or feeling in accordance with Section 106.

4.4.4 Native American Religious Concerns

4.4.4.1 Direct and Indirect Effects

The 2,211 requests to flare located on existing facilities would not impact Native American religious concerns. Flaring on an existing location would not interfere with the performance of traditional ceremonies and rituals pursuant to the American Indian Religious Freedom Act (AIRFA) or EO 13007 and would not prevent tribes from visiting sacred sites or prevent possession of sacred objects.

Potential impacts from future flaring requests or future APDs submitted for BLM review have the potential to introduce visual, atmospheric or audible elements that could potentially impact Native American Religious Concerns and interfere with performance of traditional ceremonies and rituals.

4.4.4.2 Mitigation

Mitigation would be the same as section 4.4.3.2 above. The NDFO would continue to invite interested parties to consult about historic properties' that are of religious and cultural significance to Native Americans.

4.4.5 Socio-Economic Conditions

4.4.5.1 Direct and Indirect Effects

There are 1,943 SN requests associated with 1,474 wells connected to pipelines that flared associated oil-well gas from Federal and Indian oil wells. For all 1,943 SN requests the BLM would determine collection of royalties in accordance with NTL-4A and apply administrative COAs. Future flaring requests will be reviewed in accordance with NTL-4A and the collection of royalties determined.

Flaring or venting of oil-well gas (associated gas) will be allowed when the operator has submitted an evaluation with the appropriate supporting data. The evaluation and data need to

show that rejection of the request for flaring will result in an early abandonment and ultimate greater loss of equivalent total energy (i.e., Btu) than could be recovered for beneficial use from the lease if flaring or venting were allowed, or the investment required to conserve the gas is not economically feasible. Accordingly, an economic analysis must be made for each application for flaring or venting. Although the format of the evaluation may vary depending upon the circumstances of each case, the following will generally be required for each application: 1) Estimate the life of the lease and the annual net operating income from oil recovery operations. Economic parameters should include but not limited to the following: Cost to drill, complete and equip the well; monthly operating costs specific to the oil operation; anticipated production – production decline curve; value of the product or anticipated product value; taxes to be paid on the production; royalties to be paid on the production; discount rate. 2) Estimate the capital investment and annual net operating income from the gas recovery operations. Economic parameters should include but not limited to the following: Cost to of the gas facilities necessary to deliver the gas to nearest market or to nearest midstream gas pipeline; monthly operating costs specific to the gas operation; anticipated production – oil and gas production decline curves; value of the product or anticipated product value; taxes to be paid on the production; royalties to be paid on the production; discount rate. 3) Using mid-year lump-sum deferment factors calculate the present value of operating net income for both oil and gas operations. 4) Based on the present value of the net income from: (1) the oil operations, (2) gas operations, and (3) combined oil and gas operations, calculate the payout periods for each.

In regards to the American Indian/Alaska Natives environmental justice populations, the 2,211 requests to flare located on existing facilities would not impact Native American religious concerns. Flaring on an existing location would not interfere with the performance of traditional ceremonies and rituals pursuant to the American Indian Religious Freedom Act (AIRFA) or EO 13007 and would not prevent tribes from visiting sacred sites or prevent possession of sacred objects.

4.4.5.2 Mitigation

Mitigation for the American Indian/Alaska Natives environmental justice populations would be the same as section 4.4.4.2 and 4.4.3.2. The NDFO would continue to invite interested parties to consult about historic properties' that are of religious and cultural significance to Native Americans.

4.4.6 Cumulative Impacts- Alternative B

Cumulative impacts are those impacts resulting from the incremental impact of an action when added to other past, present, and reasonably foreseeable actions regardless of what agency or person undertakes such other actions (40 CFR 1508.7). This section describes cumulative impacts associated with this project on resources.

4.4.6.1 Past, Present and Reasonably Foreseeable Future Actions

Past, present, or reasonably foreseeable future actions that affect the same components of the environment as the Proposed Action, are: drilling and producing of new and existing wells on state, private, Indian, and Federal minerals, installation of new infrastructure and roads, and utility rights-of-way. Additional flaring of gas from state, private, Federal and Indian oil-wells is expected but in lower volumes for short duration due to the requirements in NDIC Order 24665. The Order requires that by the first quarter of 2016, gas capture rate should be at 85 percent

allowing 15 percent to be flared; and by the fourth quarter 2020, gas capture rate should be at least 90 percent allowing 10 percent to be flared.

4.4.6.2 Cumulative Impacts by Resource

Cumulative effects for all resources in the NDFO are described in the final RMP/EIS (pgs. 22 to 28). Anticipated flaring activity associated with the SNs being analyzed in this EA is described in this cumulative effects analysis for air resources, socio-economic conditions, cultural resources, and visual resources.

Anticipated development activities associated with the SN requests considered in this EA is within the range of assumptions used and effects described in this cumulative effects analysis for resources other than air resources, economic, cultural resources, and visual resources.

4.4.6.3 Greenhouse Gas Emissions and Cumulative Impacts on Climate Change

GHG emission cumulative impacts are extremely difficult to predict due to the many sources of GHG emissions at the local, state, national, and global scales. Within the planning area, cumulative GHG emissions from oil and gas operations are expected to decline as greater percentages of associated gas are captured due to recent NDIC regulations. Oil and gas companies are also reducing GHG emissions due to GHG emission reporting programs and public pressure.

Regional, state, and national GHG emissions are expected to decline due to recently promulgated EPA regulations that reduce vehicle emissions and proposed regulations, such as the Clean Power Plan, that will significantly reduce GHG emissions from power plants.

Substantial global GHG emissions reductions are becoming more likely as more nations are recognizing climate change impacts to their resources and economics and as they are imposing regulations to reduce these emissions.

Given these changes on such large scales, it is difficult to determine if global cumulative GHG emissions will increase or decrease.

4.4.6.4 Cumulative Impacts of Climate Change

Cumulative climate change impacts on human health, ecosystems, and economies will depend on GHG emissions, atmospheric GHG concentrations, and the ability to mitigate climate change impacts by developing more resilient systems. Due to the longevity of GHGs in the atmosphere, climate change impacts will continue to increase for many years, regardless of whether global GHG emissions increase, decrease, or remain stable over the next 5-6 years.

4.4.6.5 Cumulative Impacts to Visual Resources

While impacts to visual resources are assumed to be short term in nature for each individual request, the location of the impacts would shift across the landscape over time with additional development and contribute to cumulative visual effects in the project area.

4.4.6.6 Cumulative Impacts to Cultural Resources

Cultural resources have been affected by past and current land uses such as agricultural development, transportation development, and mineral development which continue to impact

resource values today throughout western North Dakota. Although the proposed action does not involve surface disturbing activities, if future development occurs in high volumes without design features or mitigation measures outside of site boundaries or within their viewshed, flaring activities on existing well pads would contribute to impacts on a site's setting and feeling. However, the implementation of NDIC Order 24665 in North Dakota would curtail production if capture rates are not met by operators. Over time, this would result in a change of pace in oil and gas development and minimize or eliminate the need to flare on existing oil well locations. This, in conjunction with site specific requirements on an APD or SN request to flare, would provide the protection needed to eliminate, minimize or mitigate impacts to a site's setting and feeling.

4.4.6.7 Cumulative Impacts to Native American Religious Concerns

Cultural resources associated with Native American ceremonies, religious practices, and important events in history have the highest probability of being of religious or of cultural concern to Native Americans. These cultural resources have been affected by past and current land uses such as agricultural development, transportation development, and mineral development throughout the western portion of North Dakota. Site specific mitigation measures for future APDs or SN requests to flare would be identified during tribal consultation for each project, in conjunction with the implementation of NDIC Order 24665 would serve to eliminate, minimize, or mitigate impacts to cultural resources associated with Native American Religious Concerns.

4.4.6.8 Cumulative Impacts to Socio-Economic Conditions

The implementation of NDIC Order 24665 in North Dakota would curtail production if capture rates are not met by operators. Over time, this would result in a change of pace in oil and gas development and minimize or eliminate the need to flare on existing oil well locations. These changes can impact the royalties received from the development of federal minerals or from vented or flared oil well gas.

The analysis area for cumulative impacts includes numerous additional counties with current wells. Three of these additional counties-Benson, Rolette and Sioux counties, meet the criteria for low-income environmental justice populations and for American Indian/Alaska Native environmental justice populations. Flaring on an existing location would not interfere with the performance of traditional ceremonies and rituals pursuant to the American Indian Religious Freedom Act (AIRFA) or EO 13007 and would not prevent tribes from visiting sacred sites or prevent possession of sacred objects. The NDFO would continue to invite interested parties to consult about historic properties' that are of religious and cultural significance to Native Americans.

5.0 CONSULTATION AND COORDINATION

5.1 Persons, Agencies, and Organizations Consulted

Public scoping for this project was conducted by posting the proposed action on the NDFO website - NEPA notification log. Therefore, scoping was initiated August 30, 2013, the date the EA was assigned a number and posted to the NEPA notification log.

To address the pending SN requests, the BLM coordinated with various entities to gather information, and develop review protocols to address these requests in accordance with NTL-4A. This included a NDPC quarterly workshop with NDPC members, Mandan, Hidatsa and Arikara Three Affiliated Tribes Chairman Fox, operators, midstream pipeline companies, and state oil and gas entities to discuss development, infrastructure, and issues in the ND Williston Basin, in addition, to the past, present, and future flaring activities and gas capture methods/options. Operators were also individually consulted to clarify the details of their SN requests to flare oil-well gas from Federal and Indian wells.

The BLM consults with the State Historic Preservation Office (SHPO) and Native American Tribes under Section 106 of the National Historic Preservation Act (NHPA). On June 24, 2015, the NDFO sent formal consultation and determination letters to the State Historic Preservation Officer (SHPO) of North Dakota. On July 8, 2015, the SHPO concurred with the NDFO's finding of "No Historic Properties Affected" (ND SHPO Ref: 15-0835).

On June 29, 2015, the NDFO invited seventeen federally recognized Indian tribes to consult about the NDFO's oil and gas program and the flaring of natural gas. The NDFO sent letters with maps to 17 Tribal Historical Preservation Officers (THPOs) or the respective cultural contacts for the Flandreau Santee Sioux Tribe, Fort Belknap Indian Community, Crow Tribe, Oglala Sioux Tribe, Mandan, Hidatsa, and Arikara Nation, Sisseton-Wahpeton Oyate Tribes, Rosebud Sioux Tribe, Lower Sioux Indian Community, Lower Brule Sioux Tribe, Yankton Sioux Tribe, Spirt Lake Tribe, Turtle Mountain Band of Chippewa, Cheyenne River Sioux Tribe, Northern Cheyenne Tribe, Standing Rock Sioux Tribe, Fort Peck Assiniboine and Sioux Tribes, and the Crow Creek Sioux Tribe inviting them to submit issues and concerns BLM should consider in the environmental analysis. To date, only the Fort Belknap Indian Community has requested to be consulted with on future NDFO APDs.

5.2 Summary of Public Participation

Public scoping for this project was conducted by posting the proposed action on the NDFO website - NEPA notification log. Therefore, scoping was initiated August 30, 2013, the date the EA was assigned a number and posted to the NEPA notification log. No comments were received from the public.

Table 5.1. List of Preparers

Name	Title	Responsible for the Following Section(s)
Susan Bassett	Air Resource Specialist	Air Resources, Climate Change
Jessica Montag	Economist	Socio-Economic Conditions
Irma Nansel	Planning and Envir. Coor.	Project Lead
Margaret Ward	NEPA Coordinator	NEPA
Dale Manchester	Petroleum Engineer	Fluid Minerals, RFD
Barney Whiteman	Petroleum Engineer	Fluid Minerals, RFD
Paul Kelley	Natural Resource Specialist	Visual Resources
Sean Berry	Archaeologist	Cultural Resources, Native American Religious Concerns

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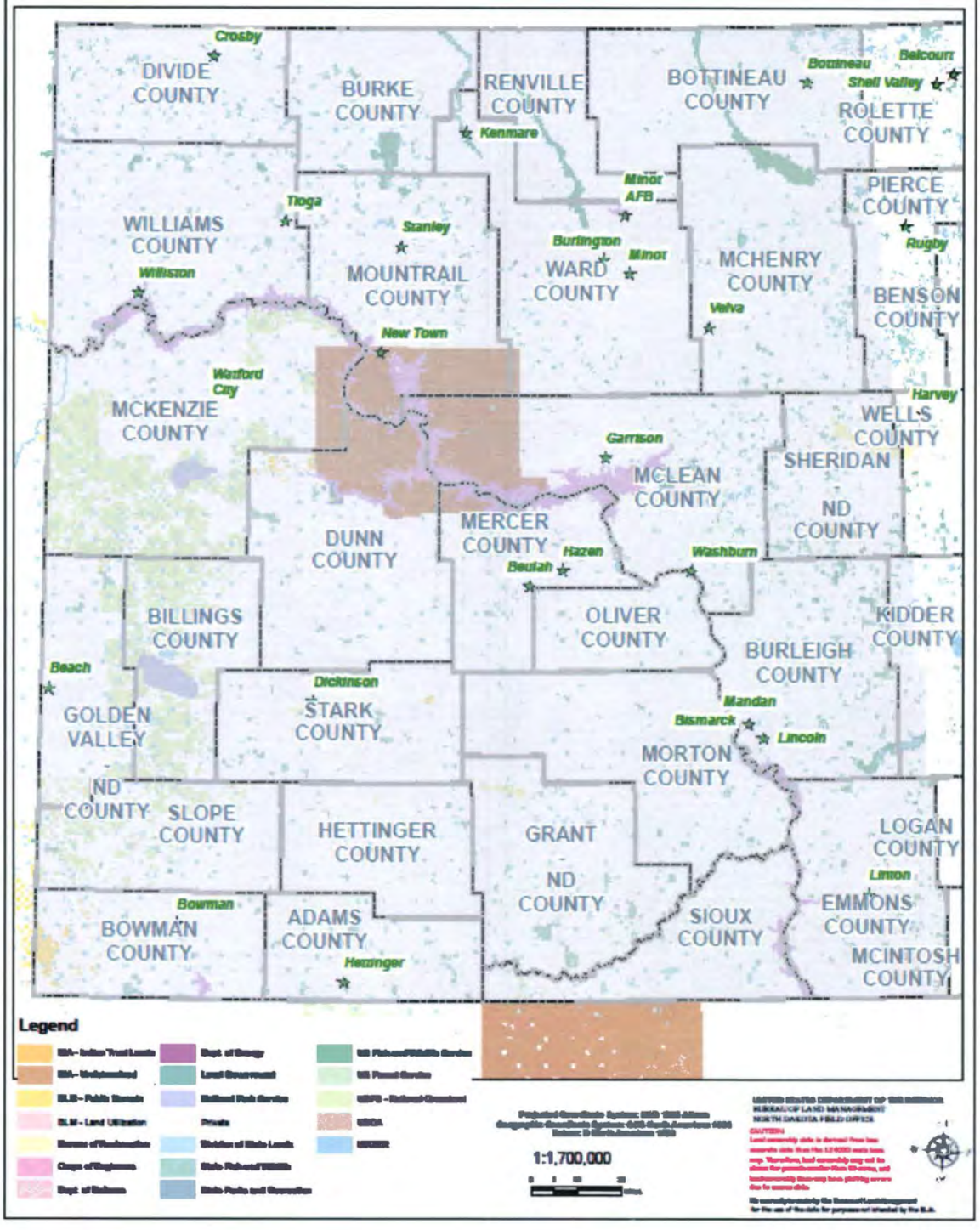
http://www.wrapair2.org/ND-SD-MT.aspx

Map 1. Area of Proposed Action
Williston Basin western North Dakota

User Name: Ismail
Date: 7/16/2015



Appendix A. Pending Sundry Notices in the NDFO.

	WELL-ID	COUNTY			WELL-ID	COUNTY
1	0904ERH NERU	BILLINGS		1125	34-9TFH CLEMENS	BILLINGS
2	2901H NERU	BILLINGS		1126	34-12TFH SMITH	BILLINGS
3	14-22H MOSSER	BILLINGS		1127	12-12TFH SCHNEI	BILLINGS
4	34-11TFH PRONGH	BILLINGS		1128	21-2-1H EVONIUK	BILLINGS
5	44-11PH PRONGHO	BILLINGS		1129	21-36TFH TEDDY	BILLINGS
6	14-11PH PRONGHO	BILLINGS		1130	21-14TFH PRONGH	BILLINGS
7	44-20TFH DRY CR	BILLINGS		1131	21-14 CL PH PRO	BILLINGS
8	31-10TFH DEMORE	BILLINGS		1132	21-16TFH PRONGH	BILLINGS
9	24-24TFH DRS FE	BILLINGS		1133	41-16PH PRONGHO	BILLINGS
10	11-25PH DRS FED	BILLINGS		1134	21-26TFH TALKIN	BILLINGS
11	21-28TFH REDMON	BILLINGS		1135	41-26PH TALKING	BILLINGS
12	31-28PH REDMOND	BILLINGS		1136	14-12PH DULETSK	BILLINGS
13	11-28PH REDMOND	BILLINGS		1137	34-11PH DULETSK	BILLINGS
14	11-7TFH ELLISON	BILLINGS		1138	44-11PH DULETSK	BILLINGS
15	21-13TFH PRONGH	BILLINGS		1139	44-11PH DULETSK	BILLINGS
16	11-8TFH KORDON	BILLINGS		1140	44-32TFH TEDDY	BILLINGS
17	11-8TFH KORDON	BILLINGS		1141	21-24TFH TEDDY	BILLINGS
18	14-11PH DULETSK	BILLINGS		1142	34-10PH PRONGHO	BILLINGS
19	11-20TFH TEDDY	BILLINGS		1143	44-10PH PRONGHO	BILLINGS
20	34-35-1H BASARA	BILLINGS		1144	14-10PH PRONGHO	BILLINGS
21	41-15PH PRONGHO	BILLINGS		1145	34-9PH PRONGHOR	BILLINGS
22	21-15PH PRONGHO	BILLINGS		1146	44-9PH PRONGHOR	BILLINGS
23	11-15PH PRONGHO	BILLINGS		1147	11-27PH TALKING	BILLINGS
24	31-5PH BABECK	BILLINGS		1148	41-14H BUCKHORN	BILLINGS
25	41-5PH BABECK	BILLINGS		1149	10-1 FEDERAL	BILLINGS
26	11-5PH BABECK F	BILLINGS		1150	31-16H BUCKHORN	BILLINGS
27	11-17TFH ANDERS	BILLINGS		1151	15-1102H VANVIL	BURKE
28	11-17TFH ANDERS	BILLINGS		1152	1-15H TORGESON	DIVIDE
29	2 MORGAN DR FED	BILLINGS		1153	1-1H GULBRANSON	DIVIDE
30	1-22 VOODOO	BILLINGS		1154	1-30H ROSENVOLD	DIVIDE
31	1807 BSMU	BILLINGS		1155	3-30H-3 ROSENVO	DIVIDE
32	3108 BSMU	BILLINGS		1156	8-5-161-98H-1PB	DIVIDE
33	3006 BSMU	BILLINGS		1157	160-98H 1XP KAR	DIVIDE
34	1806 BSMU	BILLINGS		1158	4-3-34-3H3 MOCC	DUNN
35	3204 BSMU	BILLINGS		1159	4-3-34-4H MOCCA	DUNN
36	1707 BSMU	BILLINGS		1160	4-3-34-4H MOCCA	DUNN
37	1910 BSMU	BILLINGS		1161	03-16H HORSE CA	DUNN
38	21-1TFH WANNER	BILLINGS		1162	102-16H HORSE C	DUNN
39	1 MORGAN DRAW F	BILLINGS		1163	16-9H ALISIA FO	DUNN

40	7 ELKHORN FED A	BILLINGS		1164	16-9H ALISIA FO	DUNN
41	3 MORGAN DRAW B	BILLINGS		1165	1-22H WILD TURK	DUNN
42	2 BUCKHORN FED	BILLINGS		1166	43X-5 JORGENSON	DUNN
43	23-5H BUCKHORN	BILLINGS		1167	43X-5 DEEP CREE	DUNN
44	36-1 STATE	BILLINGS		1168	16-3-11H MOCCAS	DUNN
45	31-3PH MCDONALD	BILLINGS		1169	14-20H ROHDE US	DUNN
46	31-3PH MCDONALD	BILLINGS		1170	14-20H ROHDE US	DUNN
47	41-27PH TALKING	BILLINGS		1171	22A-27-2H FORT	DUNN
48	21-27PH TALKING	BILLINGS		1172	16-3H MOCCASIN	DUNN
49	3-11F US	BILLINGS		1173	16-3H MOCCASIN	DUNN
50	2-14XH FRANKS C	BILLINGS		1174	14-16H BIRDSBIL	DUNN
51	4-22 GOLDEN MOS	BILLINGS		1175	14-16H BIRDSBIL	DUNN
52	2-12 US	BILLINGS		1176	4-15H PATRICIA	DUNN
53	1-10 T.R.FEDERA	BILLINGS		1177	4-15H PATRICIA	DUNN
54	41-22H TRMU	BILLINGS		1178	24X-6 LOIS FED	DUNN
55	14-14H TRMU	BILLINGS		1179	34X-35D BOOMER	DUNN
56	12-12H TRMU	BILLINGS		1180	34X-35H BOOMER	DUNN
57	21-14H TR MADIS	BILLINGS		1181	14-7H JOSEPH SC	DUNN
58	44X-15H TRMU	BILLINGS		1182	14-7H JOSEPH SC	DUNN
59	13X-22H TRMU	BILLINGS		1183	13-34-28-1H MOC	DUNN
60	34X-23H TRMU	BILLINGS		1184	13-34-28-1H MOC	DUNN
61	22X-16H TRMU	BILLINGS		1185	13-34-28-2H MOC	DUNN
62	24X-12H TRMU	BILLINGS		1186	13-34-28-2H MOC	DUNN
63	1-23H FRANKS CR	BILLINGS		1187	1A-12-1H FORT B	DUNN
64	2-26 MOSSER	BILLINGS		1188	1A-12-2H FORT B	DUNN
65	1-27 HAMILL	BILLINGS		1189	24X-13B BRANDVI	DUNN
66	3-27 HAMILL	BILLINGS		1190	24X-13F BRANDVI	DUNN
67	2-25 MOSSER	BILLINGS		1191	14-21-16-2HS TW	DUNN
68	30-26H MOSSER	BILLINGS		1192	14-21-16-2HS TW	DUNN
69	41X-27H TRMU	BILLINGS		1193	1-06-01H-149-92	DUNN
70	41-22H TRMU	BILLINGS		1194	2-06-01H-149-92	DUNN
71	24X-12H TRMU	BILLINGS		1195	21-6H CASEY KUK	DUNN
72	1-23H FRANKS CR	BILLINGS		1196	41-6H 2 IVAN HE	DUNN
73	2-14XH FRANKS C	BILLINGS		1197	21-6H CASEY KUK	DUNN
74	31-34 MIKKELSON	BILLINGS		1198	41-6H 2 IVAN HE	DUNN
75	11-10 CITIES SE	BILLINGS		1199	3A-10-1H FORT B	DUNN
76	34-31H FEDERAL	BILLINGS		1200	3A-10-2H FORT B	DUNN
77	44-28H KUKOWSKI	BILLINGS		1201	32-29H WELLS	DUNN
78	41-18D FEDERAL	BILLINGS		1202	32-29H WELLS	DUNN
79	41-18D FEDERAL	BILLINGS		1203	24X-36 CARUS FE	DUNN
80	44-18TFH ASH CO	BILLINGS		1204	14-21-4H TWO SH	DUNN

81	44-18TFH ASH CO	BILLINGS		1205	14-21-4H TWO SH	DUNN
82	11-19-1PH KJELS	BILLINGS		1206	2-24-12-1H3 TWO	DUNN
83	11-19-1PH KJELS	BILLINGS		1207	2-24-12-1H3 TWO	DUNN
84	11-14PH PRONGHO	BILLINGS		1208	2-24-12-2H TWO	DUNN
85	41-30H FEDERAL	BILLINGS		1209	2-24-12-2H TWO	DUNN
86	42-18H FEDERAL	BILLINGS		1210	3-24-12-3H3 TWO	DUNN
87	21-5 SH BEULAH	BOWMAN		1211	3-24-12-3H3 TWO	DUNN
88	34-34SH MARSHA	BOWMAN		1212	3-24-12-4H TWO	DUNN
89	43-8SH WINCHEST	BOWMAN		1213	3-24-12-4H TWO	DUNN
90	44-32SH DAVIS	BOWMAN		1214	20-24H BIRON	DUNN
91	1-11 NJOS	BOWMAN		1215	20-24H BIRON	DUNN
92	12-17 NH HOLECE	BOWMAN		1216	20-34H BAKER	DUNN
93	21-8 SH DROMEDA	BOWMAN		1217	20-34H BAKER	DUNN
94	21-5 SH BEULAH	BOWMAN		1218	34X-25A FBIR BA	DUNN
95	32-16H FEDERAL	BURKE		1219	34X-25E FBIR BA	DUNN
96	32-16H FEDERAL	BURKE		1220	34X-25F FBIR BA	DUNN
97	21-3427H KANDIY	BURKE		1221	30-31H MANDAREE	DUNN
98	WELL-ID	COUNTY		1222	30-31HA MANDARE	DUNN
99	WELL-ID	COUNTY		1223	30-31HC ALFRED	DUNN
100	2-1H GULBRANSON	DIVIDE		1224	30-31HD ALFRED	DUNN
101	14HC ETHAN HALL	DUNN		1225	30-31HW MANDARE	DUNN
102	14HC ETHAN HALL	DUNN		1226	30-31HY ALFRED	DUNN
103	4-11H WOMAN CRE	DUNN		1227	30-31HZ ALFRED	DUNN
104	4-11H WOMAN CRE	DUNN		1228	31X-19 FBIR STE	DUNN
105	4-11H WOMAN CRE	DUNN		1229	31X-19D FBIR ST	DUNN
106	16-44H BURR	DUNN		1230	31X-19G FBIR ST	DUNN
107	3-18H NATHAN HA	DUNN		1231	31X-19H FBIR ST	DUNN
108	3-18H NATHAN HA	DUNN		1232	9-1H WING	DUNN
109	4-31H LOOK OUT	DUNN		1233	8-1H CRYING TRE	DUNN
110	14-2H TAT	DUNN		1234	11-15H BOY CHIE	DUNN
111	14-2H TAT	DUNN		1235	11-15TFH BOY CH	DUNN
112	05AH NEEDLE (MW	DUNN		1236	21-15H CHASE US	DUNN
113	1-05H SOWARD	DUNN		1237	21-15TFH TWO CR	DUNN
114	28HC NORTH JOHN	DUNN		1238	31-15H AZURE US	DUNN
115	28HC NORTH JOHN	DUNN		1239	31-15TFH SWIFT	DUNN
116	28HC NORTH JOHN	DUNN		1240	21-14H GOOD BEA	DUNN
117	16-3-11H MOCCAS	DUNN		1241	31-14H GOOD BEA	DUNN
118	14-17H CLARA	DUNN		1242	11-4H BEARS GHO	DUNN
119	14-17H CLARA	DUNN		1243	11-4TFH BEARS G	DUNN
120	43X-4 KAYE	DUNN		1244	21-4H RICHANDA	DUNN
121	43X-4 JORGENSON	DUNN		1245	29-31H BAKER	DUNN

122	43X-4B KAYE FED	DUNN		1246	29-31H BAKER	DUNN
123	43X-4E KAYE FED	DUNN		1247	29-31H BAKER	DUNN
124	14-33-6H TWO SH	DUNN		1248	36-35H BEAKS	DUNN
125	14-33-6H TWO SH	DUNN		1249	36-35H BEAKS	DUNN
126	15-1H TAT	DUNN		1250	24X-26B FBIR LA	DUNN
127	15-1H TAT	DUNN		1251	27A-34-1H FORT	DUNN
128	13-34-3H MOCCAS	DUNN		1252	27A-34-2H FORT	DUNN
129	13-34-3H MOCCAS	DUNN		1253	27A-34-3H FORT	DUNN
130	11X-20 FENTON F	DUNN		1254	22D-15-1H FORT	DUNN
131	21X-19B GEORGE	DUNN		1255	2-1H TAT	DUNN
132	25A-36-1H FORT	DUNN		1256	2-1H TAT	DUNN
133	36C-25-4H FORT	DUNN		1257	2-8-17-14H3 SKU	DUNN
134	36D-25-2H FORT	DUNN		1258	2-8-17-14H3 SKU	DUNN
135	4-9H HIGH HAWK	DUNN		1259	2-8-17-15H SKUN	DUNN
136	4-9H HIGH HAWK	DUNN		1260	2-8-17-15H SKUN	DUNN
137	9C-04-3H FORT B	DUNN		1261	4-8-17-13H SKUN	DUNN
138	9C-04-4H FORT B	DUNN		1262	4-8-17-13H SKUN	DUNN
139	9C-04-5H FORT B	DUNN		1263	4-8-17-13H3 SKU	DUNN
140	9D-04-1H FORT B	DUNN		1264	4-8-17-13H3 SKU	DUNN
141	9D-04-2H FORT B	DUNN		1265	4-8-17-14H SKUN	DUNN
142	16-15-16H TALL	DUNN		1266	4-8-17-14H3 SKU	DUNN
143	1-06-31H-150-92	DUNN		1267	4-8-17-14H3 SKU	DUNN
144	34X-7 CLARENCE	DUNN		1268	14-8H FOX	DUNN
145	34X-7C CLARENCE	DUNN		1269	1-36HC BUFFALO	DUNN
146	34X-7B CLARENCE	DUNN		1270	1-36HC BUFFALO	DUNN
147	34X-7H CLARENCE	DUNN		1271	1-36HD CORRAL	DUNN
148	34X-7D CLARENCE	DUNN		1272	1-36HD CORRAL	DUNN
149	24X-6 CAROL FED	DUNN		1273	31X-19 FBIR BIR	DUNN
150	11X-20 JANE FE	DUNN		1274	31X-19D FBIR BI	DUNN
151	34X-35 BOOMER	DUNN		1275	31X-19G FBIR BI	DUNN
152	34X-35G BOOMER	DUNN		1276	31X-19H FBIR BI	DUNN
153	1-32-29H-143-96	DUNN		1277	15-34H BLACK HA	DUNN
154	2-32-29H-143-96	DUNN		1278	15-34H BLACK HA	DUNN
155	1-12H SKUNK CRE	DUNN		1279	33-34H HELENA R	DUNN
156	1-12H SKUNK CRE	DUNN		1280	33-34H HELENA R	DUNN
157	34-27H WICKER	DUNN		1281	1-06-07H-147-92	DUNN
158	34-27H WICKER	DUNN		1282	3-06-07H-147-92	DUNN
159	44-19TFH CCU ME	DUNN		1283	5-06-07H-147-92	DUNN
160	44-19MBH CCU ME	DUNN		1284	7-06-07H-147-92	DUNN
161	11-30TFH CCU PR	DUNN		1285	16-2-3-13H3 SKU	DUNN
162	14-19TFH CCU ME	DUNN		1286	16-2-3-13H3 SKU	DUNN

163	14-19MBH CCU ME	DUNN		1287	9-2-3-12HS SKUN	DUNN
164	24-19TFH CCU ME	DUNN		1288	9-2-3-12HS SKUN	DUNN
165	24-19MBH CCU ME	DUNN		1289	9-2-3-5H SKUNK	DUNN
166	21-30MBH CCU PR	DUNN		1290	9-2-3-5H SKUNK	DUNN
167	31-30TFH CCU PR	DUNN		1291	1-31-30H-150-91	DUNN
168	31-30MBH CCU PR	DUNN		1292	1-31-36H-150-92	DUNN
169	34-19TFH CCU ME	DUNN		1293	2-31-25H-150-92	DUNN
170	34-20MBH CCU WI	DUNN		1294	3-31-25H-150-92	DUNN
171	14-20MBH CCU WI	DUNN		1295	3-31-30H-150-91	DUNN
172	14-20TFH CCU WI	DUNN		1296	3-31-36H-150-92	DUNN
173	11-28TFH CCU CO	DUNN		1297	4-31-25H-150-92	DUNN
174	41-26TFH CCU BU	DUNN		1298	5-31-25H-150-92	DUNN
175	44-20MBH CCU WI	DUNN		1299	7-31-25H-150-92	DUNN
176	14-21TFH CCU FO	DUNN		1300	2-32-33H-148-92	DUNN
177	41-26MBH CCU BU	DUNN		1301	4-32-33H-148-92	DUNN
178	34-33H CCU CORR	DUNN		1302	3-9H BENSON	DUNN
179	41-26H CCU BURN	DUNN		1303	3-9H BENSON	DUNN
180	14-32H CCU POWE	DUNN		1304	3-9HA BENSON	DUNN
181	14-34H CCU BISO	DUNN		1305	3-9HA BENSON	DUNN
182	14-20H CCU WILL	DUNN		1306	2-06-07H-147-92	DUNN
183	41-27H CCU AUDU	DUNN		1307	4-06-07H-147-92	DUNN
184	44-31H CCU CARO	DUNN		1308	6-06-07H-147-92	DUNN
185	11-16H CCU FOUR	DUNN		1309	8-06-07H-147-92	DUNN
186	24-36H CCU COLU	DUNN		1310	1-11-02H 1 HALL	DUNN
187	11-25H CCU NORT	DUNN		1311	1-11-02H 1 HALL	DUNN
188	21-2TFH CCU OLY	DUNN		1312	41X-16 BIG GULC	DUNN
189	44-34MBH CCU BI	DUNN		1313	34X-14 FBIR DAR	DUNN
190	44-34TFH CCU BI	DUNN		1314	34X-14D FBIR DA	DUNN
191	11-2MBH CCU OLY	DUNN		1315	34X-14H FBIR DA	DUNN
192	11-2TFH CCU OLY	DUNN		1316	3-06-01H-149-92	DUNN
193	6-31-1TH BICE	DUNN		1317	4-06-01H-149-92	DUNN
194	0631H-3 LK-BICE	DUNN		1318	12X-19 ELAINE F	DUNN
195	1102H-2 MCMURPH	DUNN		1319	31X-12C FBIR WA	DUNN
196	5-7-8-1H TWO SH	DUNN		1320	31X-12D FBIR WA	DUNN
197	5-7-8-1H TWO SH	DUNN		1321	31X-12G FBIR WA	DUNN
198	2-24-25-15H SKU	DUNN		1322	31X-12H FBIR WA	DUNN
199	2-24-25-15H SKU	DUNN		1323	23A-1H HAWAII 1	DUNN
200	2-24-25-16H SKU	DUNN		1324	23A-4H TF MAUI	DUNN
201	2-24-25-16H SKU	DUNN		1325	23B-2H TF HILO	DUNN
202	3-24-25-13H SKU	DUNN		1326	23B-3H KONA 148	DUNN
203	3-24-25-13H SKU	DUNN		1327	15HC WOUNDED FA	DUNN

204	3-24-25-14H3 SK	DUNN		1328	15HC WOUNDED FA	DUNN
205	3-24-25-14H3 SK	DUNN		1329	1-12H BLACK HAW	DUNN
206	34X-25 FBIR WAL	DUNN		1330	1-12H BLACK HAW	DUNN
207	34X-25 FBIR WAL	DUNN		1331	1-12H BLACK HAW	DUNN
208	21-4TFH BEARS G	DUNN		1332	1-12HA BLACK HA	DUNN
209	31-4H BEARS GHO	DUNN		1333	1-12HA BLACK HA	DUNN
210	31-4H BEARS GHO	DUNN		1334	1-12HA BLACK HA	DUNN
211	31-4TFH BEARS G	DUNN		1335	1-12HB BLACK HA	DUNN
212	31-4TFH BEARS G	DUNN		1336	1-12HB BLACK HA	DUNN
213	12-10-11-9H SKU	DUNN		1337	1-12HB BLACK HA	DUNN
214	12-10-11-9H SKU	DUNN		1338	1-12HD BLACK HA	DUNN
215	12-10-11-9H3 SK	DUNN		1339	1-12HD BLACK HA	DUNN
216	12-10-11-9H3 SK	DUNN		1340	1-12HW BLACK HA	DUNN
217	24X-27A FBIR GU	DUNN		1341	1-12HW BLACK HA	DUNN
218	24X-27A FBIR GU	DUNN		1342	1-12HW BLACK HA	DUNN
219	24X-27B FBIR GU	DUNN		1343	1-12HY BLACK HA	DUNN
220	24X-27B FBIR GU	DUNN		1344	1-12HY BLACK HA	DUNN
221	24X-27ER FBIR G	DUNN		1345	1-12HZ BLACK HA	DUNN
222	24X-27F FBIR GU	DUNN		1346	1-12HZ BLACK HA	DUNN
223	3-1H OLSON (DWO	DUNN		1347	12X-19 ALWIN FE	DUNN
224	34-1H HAY DRAW	DUNN		1348	33-12H ELK CREE	DUNN
225	14-8H FOX	DUNN		1349	34-12H BUFFALO	DUNN
226	15-32H PACKINEA	DUNN		1350	14-12TFH DEEP C	DUNN
227	15-32H PACKINEA	DUNN		1351	21-13TFH DEEP C	DUNN
228	1-19-18H 1 HALL	DUNN		1352	31X-19 ERNEST F	DUNN
229	1-19-18H 1 HALL	DUNN		1353	21X-10 FBIR YEL	DUNN
230	11X-10 FBIR SMI	DUNN		1354	21X-10 FBIR IRO	DUNN
231	11X-10A FBIR SM	DUNN		1355	29A-32-3H FORT	DUNN
232	11X-10E FBIR SM	DUNN		1356	29A-32-4H FORT	DUNN
233	11X-10F FBIR SM	DUNN		1357	29A-32-5H FORT	DUNN
234	1-32-29H-150-91	DUNN		1358	29B-32-1H FORT	DUNN
235	3-32-29H-150-91	DUNN		1359	29B-32-2H FORT	DUNN
236	31X-9A FBIR YOU	DUNN		1360	12-7-8-8H SKUNK	DUNN
237	31X-9B FBIR YOU	DUNN		1361	12-7-8-8H SKUNK	DUNN
238	31X-9E FBIR YOU	DUNN		1362	12-7-8-9H SKUNK	DUNN
239	31X-9F FBIR YOU	DUNN		1363	12-7-8-9H SKUNK	DUNN
240	1-32-33H-148-92	DUNN		1364	12-7-8-9H3 SKUN	DUNN
241	3-32-33H-148-92	DUNN		1365	12-7-8-9H3 SKUN	DUNN
242	1-04-03H-149-91	DUNN		1366	24X-8B FBIR HUN	DUNN
243	3-04-03H-149-91	DUNN		1367	24X-8E FBIR HUN	DUNN
244	14-23HA MABEL L	DUNN		1368	29B-32H ARABIAN	DUNN

245	14-23HB MABEL L	DUNN		1369	9HD EDWARD GOOD	DUNN
246	14-23HX MABEL L	DUNN		1370	9HD EDWARD GOOD	DUNN
247	23-14HC SKUNK C	DUNN		1371	1-04-33H-150-92	DUNN
248	23-14HC SKUNK C	DUNN		1372	1-04-33H-150-92	DUNN
249	18C-07-1H DUET	DUNN		1373	2-04-33H-150-92	DUNN
250	18C-07-1H DUET	DUNN		1374	2-04-33H-150-92	DUNN
251	18C-07-2H TF HA	DUNN		1375	3-04-33H-150-92	DUNN
252	18C-07-2H TF HA	DUNN		1376	14C-13H TOBACCO	DUNN
253	18D-07-3H CHORD	DUNN		1377	1-06-05H-149-92	DUNN
254	18D-07-3H CHORD	DUNN		1378	1-06-32H-150-92	DUNN
255	18D-07-4H TF MU	DUNN		1379	2-06-05H-149-92	DUNN
256	18D-07-4H TF MU	DUNN		1380	2-06-32H-150-92	DUNN
257	18D-07-4H TF MU	DUNN		1381	3-06-32H-150-92	DUNN
258	06B-05-4H TF HU	DUNN		1382	4-06-31H-150-92	DUNN
259	2-31H LIKES EAG	DUNN		1383	4-06-32H-150-92	DUNN
260	05CH TF GRAY WO	DUNN		1384	5-06-05H-149-92	DUNN
261	5-24H BUFFALO R	DUNN		1385	1-03-02H-149-92	DUNN
262	13-18-17-16H3 S	DUNN		1386	1-03-34H-150-92	DUNN
263	13-18-17-16H3 S	DUNN		1387	1-03-35H-150-92	DUNN
264	13-18-17-9H SKU	DUNN		1388	2-03-02H-149-92	DUNN
265	13-18-17-9H SKU	DUNN		1389	2-03-35H-150-92	DUNN
266	16-26-27-12H MO	DUNN		1390	3-03-02H-149-92	DUNN
267	16-26-27-12H MO	DUNN		1391	3-03-34H-150-92	DUNN
268	16-26-27-13H3 M	DUNN		1392	3-03-35H-150-92	DUNN
269	16-26-27-13H3 M	DUNN		1393	4-03-02H-149-92	DUNN
270	31X-11C FBIR GO	DUNN		1394	4-03-35H-150-92	DUNN
271	16-2-3-13H SKUN	DUNN		1395	19-18HB ALFRED	DUNN
272	16-2-3-13H SKUN	DUNN		1396	19-18HC ALFRED	DUNN
273	14-31TFH GORHMA	DUNN		1397	19-18HD ALFRED	DUNN
274	24-31MBH GORHMA	DUNN		1398	19-18HW MAGGIE	DUNN
275	FAC HALLIDAY CT	DUNN		1399	19-18HW MAGGIE	DUNN
276	1-11-02H 1 HALL	DUNN		1400	19-18HW MAGGIE	DUNN
277	1-11-02H 1 HALL	DUNN		1401	19-18HY ALFRED	DUNN
278	1-11-02H 1 HALL	DUNN		1402	19-18HZ ALFRED	DUNN
279	1-11-02H 1 HALL	DUNN		1403	28A-33-1H FORT	DUNN
280	1-11-02H 1 HALL	DUNN		1404	28A-33-2H FORT	DUNN
281	1-11-02H 1 HALL	DUNN		1405	33D-28-4H FORT	DUNN
282	35HA PAUL PETER	DUNN		1406	33D-28-5H FORT	DUNN
283	35HA PAUL PETER	DUNN		1407	22-27HC SARAH Y	DUNN
284	35HC PAUL PETER	DUNN		1408	22-27HC SARAH Y	DUNN
285	35HC PAUL PETER	DUNN		1409	36-25HA GOOD BI	DUNN

286	35HD PAUL PETER	DUNN		1410	36-25HA GOOD BI	DUNN
287	35HD PAUL PETER	DUNN		1411	36-25HB GOOD BI	DUNN
288	13X-13B FBIR NE	DUNN		1412	36-25HB GOOD BI	DUNN
289	13X-13B FBIR NE	DUNN		1413	36-25HC GOOD BI	DUNN
290	24X-21B FBIR BL	DUNN		1414	36-25HC GOOD BI	DUNN
291	24X-21B FBIR BL	DUNN		1415	36-25HD GOOD BI	DUNN
292	2-05-04H-148-91	DUNN		1416	36-25HW GOOD BI	DUNN
293	4-05-04H-148-91	DUNN		1417	36-25HW GOOD BI	DUNN
294	2-32-29H-150-91	DUNN		1418	36-25HX GOOD BI	DUNN
295	4-32-29H-150-91	DUNN		1419	36-25HZ GOOD BI	DUNN
296	20C-21-4H FORT	DUNN		1420	149-93-33C-28H	DUNN
297	20C-21-5H FORT	DUNN		1421	33C-28H TF CALY	DUNN
298	20C-21-6H FORT	DUNN		1422	21A-22H CHOKECH	DUNN
299	21A-20-1H FORT	DUNN		1423	21C-22H TF BLUE	DUNN
300	21A-20-2H FORT	DUNN		1424	21C-22H WORMWOO	DUNN
301	21A-20-3H FORT	DUNN		1425	16-10-3-3H MOCC	DUNN
302	2-04-03H-149-91	DUNN		1426	16-10-3-3H MOCC	DUNN
303	4-04-03H-149-91	DUNN		1427	16-10-3-3H3 MOC	DUNN
304	11X-11 TUCKERMA	DUNN		1428	16-10-3-3H3 MOC	DUNN
305	11X-11B TUCKERM	DUNN		1429	142-94 (DWOA) F	DUNN
306	11X-11F TUCKERM	DUNN		1430	142-94 (DWOA) F	DUNN
307	11X-11A TUCKERM	DUNN		1431	142-94 (DWOA) F	DUNN
308	31X-2 FBIR HUNT	DUNN		1432	41X-16 DAKOTA F	DUNN
309	44X-32C FBIR HE	DUNN		1433	14-11-2-3H MOCC	DUNN
310	41X-1C FBIR GRI	DUNN		1434	14-11-2-3H MOCC	DUNN
311	21X-6B FBIR GEO	DUNN		1435	14-11-2-3H3 MOC	DUNN
312	34X-33C FBIR GR	DUNN		1436	14-11-2-3H3 MOC	DUNN
313	3-04-33H-150-92	DUNN		1437	15D-16H TF BULL	DUNN
314	4-04-33H-150-92	DUNN		1438	41-5H EAGLE USA	DUNN
315	4-04-33H-150-92	DUNN		1439	23-36H GARY BEL	DUNN
316	5-04-33H-150-92	DUNN		1440	23-36H GARY BEL	DUNN
317	5-04-33H-150-92	DUNN		1441	42-35H CHARGING	DUNN
318	7-04-33H-150-92	DUNN		1442	42-35H CHARGING	DUNN
319	7-04-33H-150-92	DUNN		1443	6-7HC FETTIG (M	DUNN
320	24X-8A FBIR BEA	DUNN		1444	6-7HC FETTIG (M	DUNN
321	24X-8B FBIR BEA	DUNN		1445	43-26H FREDERIC	DUNN
322	24X-8E FBIR BEA	DUNN		1446	1-10-11H-149-91	DUNN
323	14C-13H TF PUMP	DUNN		1447	1-10-15H-149-91	DUNN
324	2-35HC INDEPEND	DUNN		1448	2-10-11H-149-91	DUNN
325	2-35HC INDEPEND	DUNN		1449	3-10-11H-149-91	DUNN
326	2-35HD INDEPEND	DUNN		1450	3-10-15H-149-9	DUNN

327	2-35HI INDEPEND	DUNN		1451	4-10-11H-149-91	DUNN
328	2-35HY INDEPEND	DUNN		1452	42-5TFH BEAR DE	DUNN
329	2-35HZ INDEPEND	DUNN		1453	34-7H ROEHR USA	DUNN
330	20-17HA MARTIN	DUNN		1454	34-7H ROEHR USA	DUNN
331	20-17HB MARTIN	DUNN		1455	2-06-31H-150-92	DUNN
332	20-17HC MARTIN	DUNN		1456	3-06-31H-150-92	DUNN
333	20-17HD MARTIN	DUNN		1457	14X-36F TAT STA	DUNN
334	20-17HF MARTIN	DUNN		1458	14-10H SHERALEE	DUNN
335	20-17HW MARTIN	DUNN		1459	14-10H SHERALEE	DUNN
336	20-17HX MARTIN	DUNN		1460	1-19-18H-143-94	DUNN
337	20-17HZ MARTIN	DUNN		1461	1-30H HARRIS FE	DUNN
338	2-27H HAWKINSON	DUNN		1462	146-97-3328H-1	DUNN
339	2-34H WHITMAN	DUNN		1463	44-10H TYSVER F	DUNN
340	3-27H HAWKINSON	DUNN		1464	34-11H T KUPPER	DUNN
341	3-34H WHITMAN	DUNN		1465	14-11H T.KUPPER	DUNN
342	31-30HA CHARLES	DUNN		1466	34-11H T KUPPER	DUNN
343	31-30HA CHARLES	DUNN		1467	14-11H T.KUPPER	DUNN
344	31-30HB CHARLES	DUNN		1468	31X-33H MARTIN	DUNN
345	31-30HB CHARLES	DUNN		1469	21X-33E MARTIN	DUNN
346	31-30HX CHARLES	DUNN		1470	21X-33A MARTIN	DUNN
347	31-30HX CHARLES	DUNN		1471	21X-33F MARTIN	DUNN
348	2215H-1 MC-HEIN	DUNN		1472	21X-33B MARTIN	DUNN
349	6-04-33H-150-92	DUNN		1473	41-4H OSCAR STO	DUNN
350	6-04-33H-150-92	DUNN		1474	41-4H OSCAR STO	DUNN
351	8-04-33H-150-92	DUNN		1475	16-34-2H MOCCAS	DUNN
352	8-04-33H-150-92	DUNN		1476	16-34-2H MOCCAS	DUNN
353	30B-31H NET 149	DUNN		1477	34-7H DAVID BEC	DUNN
354	30B-31H NET 149	DUNN		1478	24-7H DAVID BEC	DUNN
355	1-05-08H-147-92	DUNN		1479	34-7H DAVID BEC	DUNN
356	3-05-08H-147-92	DUNN		1480	24-7H DAVID BEC	DUNN
357	5-7-8-1H3 TWO S	DUNN		1481	1-22-10H CHARGI	DUNN
358	5-7-8-1H3 TWO S	DUNN		1482	1-22-10H CHARGI	DUNN
359	2-19H JOSEPH EA	DUNN		1483	1-22-23H CHARGI	DUNN
360	2-19H JOSEPH EA	DUNN		1484	1-22-23H CHARGI	DUNN
361	41X-29 INGA FED	DUNN		1485	14-14-10-2H CHA	DUNN
362	41X-29D INGA FE	DUNN		1486	14-14-10-2H CHA	DUNN
363	41X-29H INGA FE	DUNN		1487	14-14-10-2H3 CH	DUNN
364	41X-29C INGA FE	DUNN		1488	14-14-10-2H3 CH	DUNN
365	19C-18H KNUCKLE	DUNN		1489	14-14-10-3H3 CH	DUNN
366	19C-18H KNUCKLE	DUNN		1490	14-14-10-3H3 CH	DUNN
367	04B-03HTF SERGE	DUNN		1491	14-14-24-16H3 C	DUNN

368	41X-6 WILLIAM	DUNN		1492	14-14-24-16H3 C	DUNN
369	41X-6C WILLIAM	DUNN		1493	15-14-11-4H CHA	DUNN
370	41X-6H WILLIAM	DUNN		1494	15-14-11-4H CHA	DUNN
371	12X-5 TEDDY FED	DUNN		1495	15-14-24-16H CH	DUNN
372	15D-16H CATFISH	DUNN		1496	15-14-24-16H CH	DUNN
373	147-93-18B-19H	DUNN		1497	15-21-16-2H CHA	DUNN
374	147-93-18B-19H	DUNN		1498	15-21-16-2H CHA	DUNN
375	18B-19H TF PYGM	DUNN		1499	15-21-16-2H3 CH	DUNN
376	18B-19H TF PYGM	DUNN		1500	15-21-16-2H3 CH	DUNN
377	16-1H LINCOLN U	DUNN		1501	15-21-16-3H3 CH	DUNN
378	28-33HC HOWLING	DUNN		1502	15-21-16-3H3 CH	DUNN
379	28-33HC HOWLING	DUNN		1503	15-22-15-3H3 CH	DUNN
380	9-1H POINT USA	DUNN		1504	15-22-15-3H3 CH	DUNN
381	9-1H POINT USA	DUNN		1505	15-22-15-3H3 CH	DUNN
382	41-2H HUBER USA	DUNN		1506	15-22-15-4H CHA	DUNN
383	41-2H HUBER USA	DUNN		1507	15-22-15-4H CHA	DUNN
384	15-2H HOPKINS U	DUNN		1508	15-22-15-4H CHA	DUNN
385	44-34H WERRE TR	DUNN		1509	16-21-16-1H CHA	DUNN
386	14-10H LUCILLE	DUNN		1510	16-21-16-1H CHA	DUNN
387	27-2 FENTON	DUNN		1511	16-21-16-1H3 CH	DUNN
388	34-2 KNUTSON-WE	DUNN		1512	16-21-16-1H3 CH	DUNN
389	3-1 MARTIN	DUNN		1513	16-21-16-1HA CH	DUNN
390	27-1 BEAR CREEK	DUNN		1514	16-21-16-1HA CH	DUNN
391	3-1 BEAR CREEK	DUNN		1515	16-34H MOCCASIN	DUNN
392	11-2 BRANDVIK	DUNN		1516	16-34H MOCCASIN	DUNN
393	11-2 BRANDVIK	DUNN		1517	1-31H SKACHENKO	DUNN
394	11-2H PORCUPINE	DUNN		1518	11X-28B THORP F	DUNN
395	44-10H VIANI US	DUNN		1519	11X-28F THORP F	DUNN
396	14X-10A STROMME	DUNN		1520	11X-28B THORP F	DUNN
397	14X-10 STROMME	DUNN		1521	11X-28F THORP F	DUNN
398	31-18H IRENE KO	DUNN		1522	16-8-7H TWO SHI	DUNN
399	11-18H IRENE KO	DUNN		1523	16-8-7H TWO SHI	DUNN
400	31-18H IRENE KO	DUNN		1524	14-1H QUILLIAM	DUNN
401	11-18H IRENE KO	DUNN		1525	16-8-16H TWO SH	DUNN
402	32-4HBKCE FEDER	GOLDEN VALLEY		1526	16-8-16H TWO SH	DUNN
403	1-20-1A BOYCE F	GOLDEN VALLEY		1527	14-21-33-15H TW	DUNN
404	11-13TFH DRY CR	GOLDEN VALLEY		1528	14-21-33-15H TW	DUNN
405	21-1PH ELLISON	GOLDEN VALLEY		1529	14-21-33-16H3 T	DUNN
406	21-1PH ELLISON	GOLDEN VALLEY		1530	14-21-33-16H3 T	DUNN
407	42-26 STONE RAN	GOLDEN VALLEY		1531	14-33-28H TWO S	DUNN
408	14-24H FEDERAL	GOLDEN VALLEY		1532	14-33-28H TWO S	DUNN

409	41-16H STATE	GOLDEN VALLEY		1533	32-34H VOIGHT	DUNN
410	14-12H FEDERAL	GOLDEN VALLEY		1534	17D-08-1H FORT	DUNN
411	41-24H PETERSON	GOLDEN VALLEY		1535	17D-08-2H FORT	DUNN
412	41-19H BN	GOLDEN VALLEY		1536	13X-5A NYGAARD	DUNN
413	14-7H FEDERAL	GOLDEN VALLEY		1537	11X-20 THELMA F	DUNN
414	519 ANTELOPE-MA	MCKENZIE		1538	21X-19F BANG FE	DUNN
415	519 ANTELOPE-MA	MCKENZIE		1539	11X-20 ROBERT F	DUNN
416	519HR ANTELOPE-	MCKENZIE		1540	21-4H GERALD TU	DUNN
417	520HR ANTELOPE-	MCKENZIE		1541	21-4H GERALD TU	DUNN
418	520HR ANTELOPE-	MCKENZIE		1542	31-4H JUDY TUHY	DUNN
419	520HR ANTELOPE-	MCKENZIE		1543	41-4H LBM TUHY	DUNN
420	523 ANTELOPE-MA	MCKENZIE		1544	44-19H BOB TUHY	DUNN
421	523 ANTELOPE-MA	MCKENZIE		1545	11-18H GEORGE T	DUNN
422	523 ANTELOPE-MA	MCKENZIE		1546	44-19H BOB TUHY	DUNN
423	C522 ANTELOPE-M	MCKENZIE		1547	11-18H GEORGE T	DUNN
424	H-517HR AMU (DW	MCKENZIE		1548	34-7H KNUDSVIG	DUNN
425	H-517HR AMU (DW	MCKENZIE		1549	24-7H KNUDSVIG	DUNN
426	H-517HR AMU (DW	MCKENZIE		1550	34-7H KNUDSVIG	DUNN
427	H-521 AMU	MCKENZIE		1551	24-7H KNUDSVIG	DUNN
428	2-13H CROSS	MCKENZIE		1552	41X-28 SCHETTLE	DUNN
429	2-13H CROSS	MCKENZIE		1553	41X-28 SCHETTLE	DUNN
430	17-44H DANKS	MCKENZIE		1554	34X-28G ESTHER	DUNN
431	17-44H DANKS	MCKENZIE		1555	34X-28C ESTHER	DUNN
432	16-3H BENSON	MCKENZIE		1556	5-11H FREDERICK	DUNN
433	16-3H BENSON	MCKENZIE		1557	14-10H HANSEN R	DUNN
434	103-17H CLARKS	MCKENZIE		1558	44-10H HANSEN R	DUNN
435	6D-4-4H MCKENZI	MCKENZIE		1559	44-10TFH HANSEN	DUNN
436	6D-4-4H MCKENZI	MCKENZIE		1560	34-10TFH HANSEN	DUNN
437	6D-4-4H MCKENZI	MCKENZIE		1561	14-10H HANSEN R	DUNN
438	151-95-1615H-1	MCKENZIE		1562	44-10H HANSEN R	DUNN
439	4-25H NATHAN HA	MCKENZIE		1563	44-10TFH HANSEN	DUNN
440	4-25H NATHAN HA	MCKENZIE		1564	34-10TFH HANSEN	DUNN
441	1-10H MANDAREE	MCKENZIE		1565	6-31H FREDERICK	DUNN
442	5D-4-4HR USA	MCKENZIE		1566	11-1TFH ELLISON	GOLDEN VALLEY
443	5D-4-4HR USA	MCKENZIE		1567	14-23H FEDERAL	GOLDEN VALLEY
444	5D-4-4HR USA	MCKENZIE		1568	44-33TFH BANNER	GOLDEN VALLEY
445	1-29H MOBERG	MCKENZIE		1569	44-33TFH BANNER	GOLDEN VALLEY
446	29-32-2H MOBERG	MCKENZIE		1570	44-23TFH BELL L	GOLDEN VALLEY
447	29-32-3H MOBERG	MCKENZIE		1571	44-23TFH BELL L	GOLDEN VALLEY
448	12X-20 MARIANA	MCKENZIE		1572	20-41H DANKS	MCKENZIE
449	12X-20C MARIANA	MCKENZIE		1573	20-41H DANKS	MCKENZIE

450	12X-20H MARIANA	MCKENZIE		1574	4-30H BEAR DEN	MCKENZIE
451	12X-20G2 MARIAN	MCKENZIE		1575	A203X CMNU	MCKENZIE
452	151-95-0817H-1	MCKENZIE		1576	D407X CMNU	MCKENZIE
453	B151-95-2122H1	MCKENZIE		1577	A203X CMNU	MCKENZIE
454	15A-22-7H FORT	MCKENZIE		1578	D407X CMNU	MCKENZIE
455	15B-22-3H FORT	MCKENZIE		1579	A203X CMNU	MCKENZIE
456	15B-22-4H FORT	MCKENZIE		1580	D407X CMNU	MCKENZIE
457	15B-22-5H FORT	MCKENZIE		1581	A203X CMNU	MCKENZIE
458	15B-22-6H FORT	MCKENZIE		1582	D407X CMNU	MCKENZIE
459	22D-15-1H FORT	MCKENZIE		1583	F208XHR BBMU	MCKENZIE
460	22D-15-1H FORT	MCKENZIE		1584	G208 BBMU	MCKENZIE
461	22D-15-2H FORT	MCKENZIE		1585	0 BBMU	MCKENZIE
462	22D-15-2H FORT	MCKENZIE		1586	7-1X SILURIAN 7	MCKENZIE
463	13-3H ROLLEFSTA	MCKENZIE		1587	6-1 SILURIAN 6	MCKENZIE
464	14-3H2 ROLLEFST	MCKENZIE		1588	7-1X SILURIAN 7	MCKENZIE
465	7-3H1 ROLLEFSTA	MCKENZIE		1589	6-1 SILURIAN 6	MCKENZIE
466	8-3H3 ROLLEFSTA	MCKENZIE		1590	7-1X SILURIAN 7	MCKENZIE
467	9-3H ROLLEFSTAD	MCKENZIE		1591	6-1 SILURIAN 6	MCKENZIE
468	24-12H INGA	MCKENZIE		1592	7-1X SILURIAN 7	MCKENZIE
469	14-12H INGA	MCKENZIE		1593	3328H-1 BB-EIDE	MCKENZIE
470	24-12H INGA	MCKENZIE		1594	3328H-2 BB-EIDE	MCKENZIE
471	14-12H INGA	MCKENZIE		1595	3328H-1 BB-EIDE	MCKENZIE
472	24-12H INGA	MCKENZIE		1596	3328H-2 BB-EIDE	MCKENZIE
473	14-12H INGA	MCKENZIE		1597	3328H-1 BB-EIDE	MCKENZIE
474	5-3-10BH PONCHO	MCKENZIE		1598	3328H-2 BB-EIDE	MCKENZIE
475	13-23/14H KIRKL	MCKENZIE		1599	41X-30 BURNS FE	MCKENZIE
476	14-10H ZACHERY	MCKENZIE		1600	34X-31-1 USA	MCKENZIE
477	14-10H ZACHERY	MCKENZIE		1601	33-11H AUDREY R	MCKENZIE
478	41-14MBH OLE BO	MCKENZIE		1602	33-11H RED TIPP	MCKENZIE
479	34X-36G RUBY ST	MCKENZIE		1603	44X-31H CHARLSO	MCKENZIE
480	6-24H ROCHESTER	MCKENZIE		1604	2-09H MANDAREE	MCKENZIE
481	1-5H GARFIELD	MCKENZIE		1605	2-36H HENDRICKS	MCKENZIE
482	101-1819H CLARK	MCKENZIE		1606	17C-08-1H FORT	MCKENZIE
483	11-0706H CLARKS	MCKENZIE		1607	17C-08-2H FORT	MCKENZIE
484	12-0719H CLARKS	MCKENZIE		1608	17C-08-3H FORT	MCKENZIE
485	13-1806H CLARKS	MCKENZIE		1609	17C-08-4H FORT	MCKENZIE
486	14-1819H CLARKS	MCKENZIE		1610	17D-08-5H FORT	MCKENZIE
487	16-0706H CLARKS	MCKENZIE		1611	17D-08-6H FORT	MCKENZIE
488	27-34H KYW	MCKENZIE		1612	17D-08-7H FORT	MCKENZIE
489	27-34H KYW	MCKENZIE		1613	12-1H HUNTS ALO	MCKENZIE
490	34-27HB GOOD VO	MCKENZIE		1614	12-1H HUNTS ALO	MCKENZIE

491	34-27HD GOOD VO	MCKENZIE		1615	151-95-0910H-1	MCKENZIE
492	34-27HZ GOOD VO	MCKENZIE		1616	2-35H BOHMBACH	MCKENZIE
493	5-2 1H FOREMAN	MCKENZIE		1617	41-14MBH AMANDA	MCKENZIE
494	03-0805H CLARKS	MCKENZIE		1618	41-14MBH AMANDA	MCKENZIE
495	100-0805H CLARK	MCKENZIE		1619	41-14MBH AMANDA	MCKENZIE
496	15-0805H CLARKS	MCKENZIE		1620	1-29H OLE	MCKENZIE
497	15-0805H CLARKS	MCKENZIE		1621	21-5H WRIGHT FE	MCKENZIE
498	12-26H DEBBIE B	MCKENZIE		1622	21-5-2H WRIGHT	MCKENZIE
499	12-26H DEBBIE B	MCKENZIE		1623	21-14MBH CRATER	MCKENZIE
500	14C-11-1H FORT	MCKENZIE		1624	31-14MBH CRATER	MCKENZIE
501	14C-11-2H FORT	MCKENZIE		1625	41-14TFH CRATER	MCKENZIE
502	14D-11-3H FORT	MCKENZIE		1626	31X-9 LUNDIN FE	MCKENZIE
503	14D-11-4H FORT	MCKENZIE		1627	05-31H BEAR DEN	MCKENZIE
504	150-94-3B-10-1H	MCKENZIE		1628	1-26/35H PAUL	MCKENZIE
505	150-94-3B-10-1H	MCKENZIE		1629	2-26-35TH PAUL	MCKENZIE
506	150-94-3B-10-2H	MCKENZIE		1630	2-26-35BH PAUL	MCKENZIE
507	12-35H WINDY BO	MCKENZIE		1631	1-26-35BH PAUL	MCKENZIE
508	31-11NWH THOMPS	MCKENZIE		1632	4-35-26BH ZORRO	MCKENZIE
509	08-1621H BEAR D	MCKENZIE		1633	3-35-26BH ZORRO	MCKENZIE
510	103-21H BEAR DE	MCKENZIE		1634	27-34-26-35LL Z	MCKENZIE
511	103-21H BEAR DE	MCKENZIE		1635	9-04H MANDAREE	MCKENZIE
512	104-2116H BEAR	MCKENZIE		1636	9-04H MANDAREE	MCKENZIE
513	104-2116H BEAR	MCKENZIE		1637	35-26H MORSETTE	MCKENZIE
514	17-16H BEAR DEN	MCKENZIE		1638	35-26H MORSETTE	MCKENZIE
515	18-21H BEAR DEN	MCKENZIE		1639	35-26HD MORSETT	MCKENZIE
516	18-21H BEAR DEN	MCKENZIE		1640	35-26HX MORSETT	MCKENZIE
517	19-2116H BEAR D	MCKENZIE		1641	35-26HZ MORSETT	MCKENZIE
518	19-2116H BEAR D	MCKENZIE		1642	14-14H JONES US	MCKENZIE
519	24-1621H BEAR D	MCKENZIE		1643	11-29H GOODALL	MCKENZIE
520	18-19HC PLENTY	MCKENZIE		1644	11-29H GOODALL	MCKENZIE
521	18-19HC PLENTY	MCKENZIE		1645	13-23H TAT USA	MCKENZIE
522	3-21H BLUE BUTT	MCKENZIE		1646	34-22H TAT USA	MCKENZIE
523	3-21H BLUE BUTT	MCKENZIE		1647	14-21/16H LEVAN	MCKENZIE
524	16-7H WOLD	MCKENZIE		1648	10-15H PAYETTE	MCKENZIE
525	16-7H WOLD	MCKENZIE		1649	11-3H DANKS USA	MCKENZIE
526	12X-21 ROEDESKE	MCKENZIE		1650	11-3H DANKS USA	MCKENZIE
527	44X-1 DWYER FED	MCKENZIE		1651	10-3H2 ROLLEFST	MCKENZIE
528	4-2425H WEST CL	MCKENZIE		1652	11-3H1 ROLLEFST	MCKENZIE
529	5-2425H WEST CL	MCKENZIE		1653	12-3H3 ROLLEFST	MCKENZIE
530	1-3-10H BARNSTO	MCKENZIE		1654	31-4H CROW FLIE	MCKENZIE
531	33-4 1-H SEDLAC	MCKENZIE		1655	31-4H CROW FLIE	MCKENZIE

532	43-34H OLD HICK	MCKENZIE		1656	1-35H SEATTLE	MCKENZIE
533	31-13MBH AIDEN	MCKENZIE		1657	13-35H LUELLA	MCKENZIE
534	31-13H AIDEN	MCKENZIE		1658	16X-35HB JAMES	MCKENZIE
535	31-13MBH AIDEN	MCKENZIE		1659	16X-35HA JAMES	MCKENZIE
536	31-13H AIDEN	MCKENZIE		1660	16-35H JAMES	MCKENZIE
537	31-13MBH AIDEN	MCKENZIE		1661	3-3/10H GABBERT	MCKENZIE
538	1-20H BUELINGO	MCKENZIE		1662	3-3-10BH PONCHO	MCKENZIE
539	11-1H JOSEPH	MCKENZIE		1663	4-3-10BH PONCHO	MCKENZIE
540	31-11SWH THOMPS	MCKENZIE		1664	1-3-10BH PONCHO	MCKENZIE
541	4-20/21H MOBERG	MCKENZIE		1665	1-3-10TH PONCHO	MCKENZIE
542	44-23H WOLSKI	MCKENZIE		1666	2-3-10BH PONCHO	MCKENZIE
543	21X-28 EDWARD (	MCKENZIE		1667	2-3-10TH PONCHO	MCKENZIE
544	149-98-11-2-3H	MCKENZIE		1668	31-20H QUALE US	MCKENZIE
545	149-98-11-2-2H	MCKENZIE		1669	10B-2-4H USA	MCKENZIE
546	149-98-11-2-10H	MCKENZIE		1670	10B-2-4H USA	MCKENZIE
547	13-24ENH WOLFF	MCKENZIE		1671	10B-2-4H USA	MCKENZIE
548	1-3H JOHNSON	MCKENZIE		1672	13A-24-3H FORT	MCKENZIE
549	1-3H JOHNSON	MCKENZIE		1673	13A-24-4H FORT	MCKENZIE
550	31-30HA RUBY *(	MCKENZIE		1674	13B-24-1H FORT	MCKENZIE
551	31-30HB RUBY (M	MCKENZIE		1675	44-32H CHARLSON	MCKENZIE
552	31-30HB RUBY (M	MCKENZIE		1676	28-44H SHERWOOD	MCKENZIE
553	31-30HW RUBY (M	MCKENZIE		1677	28-44H SHERWOOD	MCKENZIE
554	31-30HX RUBY (M	MCKENZIE		1678	28D-21H TF MILE	MCKENZIE
555	15-22 1H BORSET	MCKENZIE		1679	28D-21H TF MILE	MCKENZIE
556	15-22 1H BORSET	MCKENZIE		1680	4-12/13H DAILEY	MCKENZIE
557	21-4H TARPON FE	MCKENZIE		1681	18B-19-1H FORT	MCKENZIE
558	21-4-1H TARPON	MCKENZIE		1682	18B-19-1H FORT	MCKENZIE
559	21-4-3H TARPON	MCKENZIE		1683	18B-19-2H FORT	MCKENZIE
560	11-4TFH FLATLAN	MCKENZIE		1684	18B-19-2H FORT	MCKENZIE
561	11-4HR FLATLAND	MCKENZIE		1685	18B-19-3H FORT	MCKENZIE
562	21-30H WADE 530	MCKENZIE		1686	18B-19-3H FORT	MCKENZIE
563	20HC CORN STALK	MCKENZIE		1687	2-1HB PATRICIA	MCKENZIE
564	20HC CORN STALK	MCKENZIE		1688	2-1HB PATRICIA	MCKENZIE
565	20HC CORN STALK	MCKENZIE		1689	16-22H LUCY LON	MCKENZIE
566	20HD CORN STALK	MCKENZIE		1690	16-22H LUCY LON	MCKENZIE
567	20HD CORN STALK	MCKENZIE		1691	26-35H SPOTTED	MCKENZIE
568	20HD CORN STALK	MCKENZIE		1692	26-35H SPOTTED	MCKENZIE
569	33-28H GERALD H	MCKENZIE		1693	29-32H DELORES	MCKENZIE
570	33-28H GERALD H	MCKENZIE		1694	29-32H DELORES	MCKENZIE
571	15-8H STEVENSON	MCKENZIE		1695	29-32HA LUCY EV	MCKENZIE
572	15-8H STEVENSON	MCKENZIE		1696	29-32HB LUCY EV	MCKENZIE

573	15-8HD STEVENSO	MCKENZIE		1697	29-32HX LUCY EV	MCKENZIE
574	15-8HD STEVENSO	MCKENZIE		1698	16-24H RUBIA	MCKENZIE
575	31-31H LEWIS FE	MCKENZIE		1699	16-24H RUBIA	MCKENZIE
576	3-12H KUHN FEDE	MCKENZIE		1700	14-11H MANDAREE	MCKENZIE
577	1-12H KUHN	MCKENZIE		1701	14-11H MANDAREE	MCKENZIE
578	2-25-36-15H KOA	MCKENZIE		1702	9C-10-1H FORT B	MCKENZIE
579	2-25-36-14H3 KO	MCKENZIE		1703	9C-10-2H FORT B	MCKENZIE
580	2-25-36-16H3 KO	MCKENZIE		1704	9C-10-3H FORT B	MCKENZIE
581	2-25-36-15H KOA	MCKENZIE		1705	42X-12 ALBERT F	MCKENZIE
582	2-25-36-14H3 KO	MCKENZIE		1706	24-13H2 BEAR DE	MCKENZIE
583	2-25-36-16H3 KO	MCKENZIE		1707	24-13H2 BEAR DE	MCKENZIE
584	1-21H SAND CREE	MCKENZIE		1708	41X-5G NELSON F	MCKENZIE
585	1-23H SAND CREE	MCKENZIE		1709	100-2413H WEST	MCKENZIE
586	1-4H BOULDER	MCKENZIE		1710	101-2425H WEST	MCKENZIE
587	15-33/28H TAT	MCKENZIE		1711	102-2413H WEST	MCKENZIE
588	4-33-28BH TAT	MCKENZIE		1712	1-2413H WEST CL	MCKENZIE
589	3-33-28TH TAT	MCKENZIE		1713	1-2413H WEST CL	MCKENZIE
590	3-33-28BH TAT	MCKENZIE		1714	2-2425H WEST CL	MCKENZIE
591	2-33-28TH TAT (	MCKENZIE		1715	3-2413H WEST CL	MCKENZIE
592	15-33/28H TAT	MCKENZIE		1716	1-19-20H STOCKE	MCKENZIE
593	13-35/26H TAT	MCKENZIE		1717	1-19-20H STOCKE	MCKENZIE
594	2-35-26TH TAT	MCKENZIE		1718	1-19-20H STOCKE	MCKENZIE
595	3-35-26BH TAT	MCKENZIE		1719	1-19-20H STOCKE	MCKENZIE
596	4-35-26BH TAT	MCKENZIE		1720	9-5-6-5H KOALA	MCKENZIE
597	13-35/26H TAT	MCKENZIE		1721	9-5-6-12H3 KOAL	MCKENZIE
598	23-14HZ KATE SO	MCKENZIE		1722	8-5-6-5H3 KOALA	MCKENZIE
599	23-14HZ KATE SO	MCKENZIE		1723	9-5-6-5H KOALA	MCKENZIE
600	12-18H ANDERSON	MCKENZIE		1724	9-5-6-12H3 KOAL	MCKENZIE
601	12-18H ANDERSON	MCKENZIE		1725	1-27HA SAND CRE	MCKENZIE
602	04-20H BEAR DEN	MCKENZIE		1726	11-27TFH MOSSER	MCKENZIE
603	07-17H BEAR DEN	MCKENZIE		1727	14X-11 MONDAK F	MCKENZIE
604	100-2017H BEAR	MCKENZIE		1728	11X-14 MONDAK F	MCKENZIE
605	101-2019H BEAR	MCKENZIE		1729	27-34H WOLF	MCKENZIE
606	102-1708H BEAR	MCKENZIE		1730	27-34H WOLF	MCKENZIE
607	108-1708H BEAR	MCKENZIE		1731	24X-12 MONDAK F	MCKENZIE
608	20-1708H BEAR D	MCKENZIE		1732	32-29 1H LARSEN	MCKENZIE
609	23-2019H BEAR D	MCKENZIE		1733	15-5H SORENSON	MCKENZIE
610	15-12-1-2H GRIZ	MCKENZIE		1734	15-5H SORENSON	MCKENZIE
611	1-5-8H BEAR BUT	MCKENZIE		1735	2-12H KUHN	MCKENZIE
612	1-5-8H BEAR BUT	MCKENZIE		1736	1-12H KUHN	MCKENZIE
613	1-5-8H BEAR BUT	MCKENZIE		1737	2-12H KUHN	MCKENZIE

614	1-5-8H BEAR BUT	MCKENZIE		1738	3-25-13-3H EAST	MCKENZIE
615	1-5-8H BEAR BUT	MCKENZIE		1739	3-25-36-15H EAS	MCKENZIE
616	150-94-06B-07H	MCKENZIE		1740	21X-29 VIOLET	MCKENZIE
617	22C-15-2H USA 1	MCKENZIE		1741	11-18H KLINE FE	MCKENZIE
618	1-11-2H BEAR BU	MCKENZIE		1742	22-15HB SWEET G	MCKENZIE
619	1-11-2H BEAR BU	MCKENZIE		1743	22-15HB SWEET G	MCKENZIE
620	1-11-2H BEAR BU	MCKENZIE		1744	32-29H BEARSTAI	MCKENZIE
621	1-11-2H BEAR BU	MCKENZIE		1745	32-29H BEARSTAI	MCKENZIE
622	1-11-2H BEAR BU	MCKENZIE		1746	44-35H MISSOURI	MCKENZIE
623	26B-35-1H KLOSE	MCKENZIE		1747	3-11H FLORIDA	MCKENZIE
624	13-12HW LINSETH	MCKENZIE		1748	1-11H FLORIDA	MCKENZIE
625	13-12HW LINSETH	MCKENZIE		1749	2-11H FLORIDA	MCKENZIE
626	41X-6 JORGENSON	MCKENZIE		1750	3-14H ALPHA (M	MCKENZIE
627	21X-13 BADLANDS	MCKENZIE		1751	1-14H ALPHA (M	MCKENZIE
628	14X-34 BENNIE P	MCKENZIE		1752	2-14H ALPHA	MCKENZIE
629	34X-14 FEDERAL	MCKENZIE		1753	1-27H AKRON	MCKENZIE
630	34X-14 JOHNSRUD	MCKENZIE		1754	4-34H AKRON	MCKENZIE
631	24-1H KLOSE (DW	MCKENZIE		1755	1-6H TODD	MCKENZIE
632	24X-32 DEDRICK	MCKENZIE		1756	100-2501H HAWKE	MCKENZIE
633	44-33 4-9H SLAS	MCKENZIE		1757	100-2501H HAWKE	MCKENZIE
634	31-4-1H JOHNSTO	MCKENZIE		1758	102-2501H HAWKE	MCKENZIE
635	41-25 25-30H HA	MCKENZIE		1759	1-2501H HAWKEYE	MCKENZIE
636	14-22-15-4H3 GR	MCKENZIE		1760	11-5SEH JOHNSON	MCKENZIE
637	15-33H WOLD	MCKENZIE		1761	11-4SH LUNDIN	MCKENZIE
638	152-97-13-24-1H	MCKENZIE		1762	03A-10H EMERALD	MCKENZIE
639	152-97-13-24-1H	MCKENZIE		1763	1-4-9H BEAR BUT	MCKENZIE
640	152-97-13-24-2H	MCKENZIE		1764	1-4-9H BEAR BUT	MCKENZIE
641	152-97-13-24-3H	MCKENZIE		1765	1-4-9H BEAR BUT	MCKENZIE
642	13-24-10H DARLE	MCKENZIE		1766	1-4-9H BEAR BUT	MCKENZIE
643	1-2H MONROE	MCKENZIE		1767	33DHTF COYOTE	MCKENZIE
644	1-26-35H BERG T	MCKENZIE		1768	33DHTF COYOTE	MCKENZIE
645	153-94-2833H-1	MCKENZIE		1769	14X-36 ROLFSRUD	MCKENZIE
646	153-94-2833H-1	MCKENZIE		1770	43X-19 VAN DYKE	MCKENZIE
647	25-26H CLIFFSID	MCKENZIE		1771	43X-19 WALTON	MCKENZIE
648	1819H-1 HA-SANF	MCKENZIE		1772	43X-19 VAN DYKE	MCKENZIE
649	1819H-1 HA-SANF	MCKENZIE		1773	43X-19 WALTON	MCKENZIE
650	11-2 1H SKORPIL	MCKENZIE		1774	41X-19G WALTON	MCKENZIE
651	15-11H NELSON	MCKENZIE		1775	41X-19H WALTON	MCKENZIE
652	6-17H JAMESTOWN	MCKENZIE		1776	41X-19D WALTON	MCKENZIE
653	7-17H JAMESTOWN	MCKENZIE		1777	41X-15 ALKALI C	MCKENZIE
654	1-6-7H BEAR BUT	MCKENZIE		1778	18-19H ROLFSRUD	MCKENZIE

655	1-6-7H BEAR BUT	MCKENZIE		1779	04A-09H PRAIRIE	MCKENZIE
656	1-6-7H BEAR BUT	MCKENZIE		1780	04A-09H PRAIRIE	MCKENZIE
657	1-6-7H BEAR BUT	MCKENZIE		1781	04A-09H TF BOBC	MCKENZIE
658	1-6-7H BEAR BUT	MCKENZIE		1782	04A-09H TF BOBC	MCKENZIE
659	15-22-34-15H SM	MCKENZIE		1783	150-94-04A-09H	MCKENZIE
660	15-22-34-15H SM	MCKENZIE		1784	150-94-04A-09H	MCKENZIE
661	19-18 1-H GARMA	MCKENZIE		1785	1-11-2H BEAR BU	MCKENZIE
662	19-18 2TFH GARM	MCKENZIE		1786	1-31-30H WOLVER	MCKENZIE
663	19-18 3H GARMAN	MCKENZIE		1787	4-31-30TFH WOLV	MCKENZIE
664	19-18 4TFH GARM	MCKENZIE		1788	2-31-30H WOLVER	MCKENZIE
665	23-25 30-29H HA	MCKENZIE		1789	31-14H BRADFIEL	MCKENZIE
666	1-11H PASADENA	MCKENZIE		1790	21-30H JOANNE Q	MCKENZIE
667	11-29TFH ANNIE	MCKENZIE		1791	21-30TFH JOANNE	MCKENZIE
668	21-29H CHUCK QU	MCKENZIE		1792	149-94-33D-28H	MCKENZIE
669	21-29TFH SCOTT	MCKENZIE		1793	149-94-33D-28H	MCKENZIE
670	3-4H SCHMITZ	MCKENZIE		1794	33D-28H NIMBUS	MCKENZIE
671	24-34-1H AKOVEN	MCKENZIE		1795	33D-28H NIMBUS	MCKENZIE
672	44-14MBH ULW OL	MCKENZIE		1796	33D-28H NIMBUS	MCKENZIE
673	06A-18H COURAGE	MCKENZIE		1797	7D-6-1H FORT BE	MCKENZIE
674	06A-18H TF PRID	MCKENZIE		1798	7D-6-2H FORT BE	MCKENZIE
675	06B-18H TF HONO	MCKENZIE		1799	7D-6-3H FORT BE	MCKENZIE
676	1-1-12H BOWLINE	MCKENZIE		1800	7D-6-4H FORT BE	MCKENZIE
677	1-1-12H BOWLINE	MCKENZIE		1801	1-25H NILS	MCKENZIE
678	1-1-12H BOWLINE	MCKENZIE		1802	23-14 1-H ABELM	MCKENZIE
679	1-1-12H BOWLINE	MCKENZIE		1803	34X-34 WHITE FE	MCKENZIE
680	1-1-12H BOWLINE	MCKENZIE		1804	151-95-0403H-1	MCKENZIE
681	1-1-12H BOWLINE	MCKENZIE		1805	13-16TFH FLICKA	MCKENZIE
682	1-1-12H BOWLINE	MCKENZIE		1806	14-16H DARREL Q	MCKENZIE
683	1-1-12H BOWLINE	MCKENZIE		1807	14-16TFH CHEETA	MCKENZIE
684	1-15-16H BEAR B	MCKENZIE		1808	31-26MBH HAMMER	MCKENZIE
685	1-15-16H BEAR B	MCKENZIE		1809	3-2413H HAWKEYE	MCKENZIE
686	1-15-16H BEAR B	MCKENZIE		1810	3-2413H HAWKEYE	MCKENZIE
687	149-97-30-31-3H	MCKENZIE		1811	3-2413H HAWKEYE	MCKENZIE
688	149-97-30-31-1H	MCKENZIE		1812	21-6 6-7H TRUE	MCKENZIE
689	149-97-30-31-2H	MCKENZIE		1813	4-9H SCHMITZ	MCKENZIE
690	31-30 1H YOUNG	MCKENZIE		1814	22-15 1-H HILLY	MCKENZIE
691	31-30 1H YOUNG	MCKENZIE		1815	2-15H DAHL FEDE	MCKENZIE
692	34X-12B CHARLSO	MCKENZIE		1816	15-11H DAHL	MCKENZIE
693	14-22MBH JACKSO	MCKENZIE		1817	13-14H PAULSON	MCKENZIE
694	34-9H CONNER	MCKENZIE		1818	24-10H ROEN FED	MCKENZIE
695	34-9H CONNER	MCKENZIE		1819	1-2H LAZORENKO	MCKENZIE

696	152-94-18B-19H	MCKENZIE		1820	13X-35R SAKAKAW	MCKENZIE
697	18B-19H TF HOGN	MCKENZIE		1821	41-25NWH ERICKS	MCKENZIE
698	1-9H ANGUS *(MW	MCKENZIE		1822	3-1H 3WX	MCKENZIE
699	11-2-1H HEISER	MCKENZIE		1823	3-1H 3WX	MCKENZIE
700	36-31H TF1 LIBE	MCKENZIE		1824	1H SC-1WX8	MCKENZIE
701	152-96-9-4-3H A	MCKENZIE		1825	1H SC-1WX8	MCKENZIE
702	152-96-9-4-10H	MCKENZIE		1826	1H SC-1WX8	MCKENZIE
703	152-96-9-4-3H A	MCKENZIE		1827	1-27H SALERS *(	MCKENZIE
704	30-19 1H EVELAN	MCKENZIE		1828	2-27H SALERS (M	MCKENZIE
705	31-6 1H GYDA (M	MCKENZIE		1829	3-27H SALERS FE	MCKENZIE
706	30-31 1-H BRODE	MCKENZIE		1830	29-20 1-TFH ELD	MCKENZIE
707	30-31 2H BRODER	MCKENZIE		1831	29-20 1-TFH ELD	MCKENZIE
708	30-31 3H BRODER	MCKENZIE		1832	3-34 1H LUND	MCKENZIE
709	30-31 4TFH BROD	MCKENZIE		1833	3-34 1H LUND	MCKENZIE
710	30-31 1-H BRODE	MCKENZIE		1834	1-33H POLK	MCKENZIE
711	25-36 1H SAX	MCKENZIE		1835	18B-2H USA (MWP	MCKENZIE
712	25-36 3H SAX	MCKENZIE		1836	18B-1H USA *(M	MCKENZIE
713	25-36 4TFH SAX	MCKENZIE		1837	14-22MBH DAYTON	MCKENZIE
714	3031147102-BTF	MCKENZIE		1838	14-22MBH DAYTON	MCKENZIE
715	41-11H BICENTEN	MCKENZIE		1839	44-33H CHARLSON	MCKENZIE
716	44-31H BUCKHORN	MCKENZIE		1840	44X-20E BULLY F	MCKENZIE
717	54-1 SILURIAN 5	MCKENZIE		1841	44X-20F BULLY F	MCKENZIE
718	54-1 SILURIAN 5	MCKENZIE		1842	44X-20A BULLY F	MCKENZIE
719	54-1 SILURIAN 5	MCKENZIE		1843	44X-20B BULLY F	MCKENZIE
720	54-1 SILURIAN 5	MCKENZIE		1844	31-28H JAIR	MCKENZIE
721	10-1 DEVONIAN 1	MCKENZIE		1845	31-28H JAIR	MCKENZIE
722	10-1 DEVONIAN 1	MCKENZIE		1846	21-3 3-10H TRUE	MCKENZIE
723	10-1 DEVONIAN 1	MCKENZIE		1847	41-5H GREGORY W	MCKENZIE
724	9-1 SIL UNIT 9	MCKENZIE		1848	1-3-10H BOWLINE	MCKENZIE
725	9-1 SIL UNIT 9	MCKENZIE		1849	1-3-10H BOWLINE	MCKENZIE
726	9-1 SIL UNIT 9	MCKENZIE		1850	1-3-10H BOWLINE	MCKENZIE
727	3-16H COLUMBUS	MCKENZIE		1851	1-3-10H BOWLINE	MCKENZIE
728	12-12H BICENTEN	MCKENZIE		1852	1-3-10H BOWLINE	MCKENZIE
729	1-28 WRRMU	MCKENZIE		1853	1-3-10H BOWLINE	MCKENZIE
730	4-28 WRRMU	MCKENZIE		1854	1-3-10H BOWLINE	MCKENZIE
731	1-29 WRRMU	MCKENZIE		1855	1-3-10H BOWLINE	MCKENZIE
732	7-28H WRRMU	MCKENZIE		1856	1-3-10H BOWLINE	MCKENZIE
733	31-26H ROUGHRID	MCKENZIE		1857	1-3-10H BOWLINE	MCKENZIE
734	13-19 ERRMU	MCKENZIE		1858	32D-29H MONARCH	MCKENZIE
735	4-12R ERRMU	MCKENZIE		1859	32D-29H TF VICE	MCKENZIE
736	1-18 ERRMU	MCKENZIE		1860	14-22MBH JACKSO	MCKENZIE

737	2-18 ERRMU	MCKENZIE		1861	25-36 5H SAX	MCKENZIE
738	24-2HR ERRMU	MCKENZIE		1862	25-36 6TFH SAX	MCKENZIE
739	13-19 ERRMU	MCKENZIE		1863	1-12 1H SKARSTO	MCKENZIE
740	14-32H GRASSY B	MCKENZIE		1864	7-6 1-H JOHNSTO	MCKENZIE
741	30-31H SNOWSHOE	MCKENZIE		1865	7-6 2TFH JOHNST	MCKENZIE
742	24-4 USA	MCKENZIE		1866	7-6 7H JOHNSTON	MCKENZIE
743	5C-2-3 CHARLSON	MCKENZIE		1867	1-18-17TFH MAUS	MCKENZIE
744	5C-2-3 CHARLSON	MCKENZIE		1868	7-18-17H MAUSER	MCKENZIE
745	5C-2-3 CHARLSON	MCKENZIE		1869	8-5 2H RICHARD	MCKENZIE
746	1-21H MANTLE	MCKENZIE		1870	3-23H ANTELOPE	MCKENZIE
747	33-35 2H MB1 TR	MCKENZIE		1871	4-23H ANTELOPE	MCKENZIE
748	31-32 TRUE FEDE	MCKENZIE		1872	3-35H BOHMBACH	MCKENZIE
749	31-32 TRUE FEDE	MCKENZIE		1873	4-35H BOHMBACH	MCKENZIE
750	21X-24 101 FEDE	MCKENZIE		1874	9-4H WOLF	MCKENZIE
751	14X-31 MCKENZIE	MCKENZIE		1875	5-8H SAFELY USA	MCKENZIE
752	1-28H KILLEBREW	MCKENZIE		1876	5-8H SAFELY USA	MCKENZIE
753	1-27H MCGWIRE	MCKENZIE		1877	1-2-11H BOWLINE	MCKENZIE
754	1-17H ROBINSON	MCKENZIE		1878	1-2-11H BOWLINE	MCKENZIE
755	1-20H MAYS	MCKENZIE		1879	1-2-11H BOWLINE	MCKENZIE
756	1-18H BANKS	MCKENZIE		1880	1-2-11H BOWLINE	MCKENZIE
757	1-24H GEHRIG	MCKENZIE		1881	1-2-11H BOWLINE	MCKENZIE
758	1-13H OTT	MCKENZIE		1882	3-10-2-11LL ERN	MCKENZIE
759	1-29H JACKSON	MCKENZIE		1883	41-6SWH SERRAHN	MCKENZIE
760	23X-3 FEDERAL	MCKENZIE		1884	1-1H IVERSON TR	MCKENZIE
761	1-9H CARTER	MCKENZIE		1885	6A-7-1H USA 1	MCKENZIE
762	3-28HR FEDERAL	MCKENZIE		1886	26-1 SILURIAN 2	MCKENZIE
763	3-28HR FEDERAL	MCKENZIE		1887	F24-34-2H AKOVE	MCKENZIE
764	1-8H GONZALEZ	MCKENZIE		1888	24-30H STORM FE	MCKENZIE
765	1-7H RIPKIN, JR	MCKENZIE		1889	14-19-23 USA	MCKENZIE
766	1-4H NETTLES	MCKENZIE		1890	1X-18 MULE CREE	MCKENZIE
767	1-5H BENCH	MCKENZIE		1891	1-34H MCKENZIE	MCKENZIE
768	1-1H HODGES	MCKENZIE		1892	21-10SH SAND CR	MCKENZIE
769	1-22H MCGRIFF	MCKENZIE		1893	1-23H WINFIELD	MCKENZIE
770	44X-16 STATE FE	MCKENZIE		1894	5-9H ANGUS FEDE	MCKENZIE
771	1-12H KINGMAN	MCKENZIE		1895	4-9H ANGUS FEDE	MCKENZIE
772	1-31H DAVIS	MCKENZIE		1896	2-9H ANGUS (MWP	MCKENZIE
773	44X-4 TRACY FED	MCKENZIE		1897	1-23H2 ANTELOPE	MCKENZIE
774	14X-34 DRANNEN	MCKENZIE		1898	2-23H ANTELOPE	MCKENZIE
775	14X-34 CRYSTAL	MCKENZIE		1899	14D-4-1H USA	MCKENZIE
776	11X-34 HATTER	MCKENZIE		1900	14D-4-1H USA	MCKENZIE
777	21-25MBH AIDEN	MCKENZIE		1901	14D-4-1H USA	MCKENZIE

778	21-25MBH AIDEN	MCKENZIE		1902	27-22 1TFH CAYK	MCKENZIE
779	31-29H HILMAN	MCKENZIE		1903	1-27H PVT. GIBS	MCKENZIE
780	31-29H HILMAN	MCKENZIE		1904	15-33-28-2H KOA	MCKENZIE
781	31-29H HILMAN	MCKENZIE		1905	15-33-28-2H3 KO	MCKENZIE
782	03-04 1H YAUCH	MCKENZIE		1906	15-33-28-2H KOA	MCKENZIE
783	1-27H COLAVITO	MCKENZIE		1907	15-33-28-2H3 KO	MCKENZIE
784	24-23H KNUTE	MCKENZIE		1908	14X-35H CHARLSO	MCKENZIE
785	8-5 1-H RICHARD	MCKENZIE		1909	0409H-1 AN NORB	MCKENZIE
786	35-26 2H KNIGHT	MCKENZIE		1910	0409H-1 AN NORB	MCKENZIE
787	35-26 3TFH KNIG	MCKENZIE		1911	2-32H HARMS	MCKENZIE
788	35-26 1H KNIGHT	MCKENZIE		1912	1-32H HARMS	MCKENZIE
789	35-26 4H KNIGHT	MCKENZIE		1913	2D-3-1H USA	MCKENZIE
790	35-26 1H KNIGHT	MCKENZIE		1914	2D-3-1H USA	MCKENZIE
791	31-16-4H FINSAA	MCKENZIE		1915	2D-3-1H USA	MCKENZIE
792	31-16-3H FINSAA	MCKENZIE		1916	1-35H CLARK	MCKENZIE
793	44-19-1RTF TARP	MCKENZIE		1917	44X-10 ALKALI C	MCKENZIE
794	44-19-2RTF TARP	MCKENZIE		1918	1-2H MYRMIDON	MCKENZIE
795	44-19-2RH TARPO	MCKENZIE		1919	1-2H MYRMIDON	MCKENZIE
796	44-19TFHU TARPO	MCKENZIE		1920	2-36H BEAR DEN	MCKENZIE
797	44-19-1RH TARPO	MCKENZIE		1921	42X-36 DAKOTA	MCKENZIE
798	44-19-3RTF TARP	MCKENZIE		1922	4-25H HENDERSON	MCKENZIE
799	28-21-1-H STUBB	MCKENZIE		1923	4-1H HENDERSON	MCKENZIE
800	4-11H KODIAK FE	MCKENZIE		1924	4-36H STATE	MCKENZIE
801	1-27H-R GRIZZLY	MCKENZIE		1925	4-13H LEVANG	MCKENZIE
802	1-34H PVT. FRAZ	MCKENZIE		1926	3-9H ANGUS (MWP	MCKENZIE
803	24-20-3RTF TARP	MCKENZIE		1927	1-08H-149-90 MH	MCLEAN
804	24-20-1H TARPON	MCKENZIE		1928	2-04-03H-149-90	MCLEAN
805	24-20-2RTF TARP	MCKENZIE		1929	1-32-31H-150-90	MCLEAN
806	24-20-2RH TARPO	MCKENZIE		1930	21-16H WALDOCK	MCLEAN
807	24-20-1RTF TARP	MCKENZIE		1931	31-16H BLACK HA	MCLEAN
808	41-3-1H SKAAR F	MCKENZIE		1932	34-9H DRIVER US	MCLEAN
809	41-3-2H SKAAR F	MCKENZIE		1933	1-05-06H-149-90	MCLEAN
810	41-3-3H SKAAR F	MCKENZIE		1934	6-05-06H-149-90	MCLEAN
811	41-3TFHU SKAAR	MCKENZIE		1935	2-05-06H-149-90	MCLEAN
812	41-3TFH SKAAR F	MCKENZIE		1936	5-05-06H-149-90	MCLEAN
813	32-29H LARS ROT	MCKENZIE		1937	2-07-18H-149-90	MCLEAN
814	153-94-2215H-1	MCKENZIE		1938	5-29-30H-150-90	MCLEAN
815	153-94-2215H-2	MCKENZIE		1939	34-7H GOODBIRD	MCLEAN
816	153-94-2215H-1	MCKENZIE		1940	44-7H GOODBIRD	MCLEAN
817	153-94-2215H-2	MCKENZIE		1941	44-7H GOODBIRD	MCLEAN
818	153-94-2215H-1	MCKENZIE		1942	1-18H-150-90 MH	MCLEAN

819	153-94-2215H-2	MCKENZIE		1943	21-5H FISHER US	MOUNTRAIL
820	11B-2-2H USA	MCKENZIE		1944	21-5H FISHER US	MOUNTRAIL
821	11B-2-2H USA	MCKENZIE		1945	41-5H FISHER US	MOUNTRAIL
822	11B-2-2H USA	MCKENZIE		1946	41-5H FISHER US	MOUNTRAIL
823	41-5-2H GREGORY	MCKENZIE		1947	16-15H PENNINGT	MOUNTRAIL
824	1-2H YORK	MCKENZIE		1948	16-15H PENNINGT	MOUNTRAIL
825	1-25H GASS	MCKENZIE		1949	21-3H HENRY CHA	MOUNTRAIL
826	1-09-16H-149-90	MCLEAN		1950	21-3H HENRY CHA	MOUNTRAIL
827	1-19H-150-90 MH	MCLEAN		1951	31-3TFH HENRY C	MOUNTRAIL
828	2-13-14H-150-91	MCLEAN		1952	41-3H HENRY CHA	MOUNTRAIL
829	1-29-30H-150-90	MCLEAN		1953	0310H-1 EN LABA	MOUNTRAIL
830	2-29-30H-150-90	MCLEAN		1954	0310H-2 EN-LABA	MOUNTRAIL
831	1-13-14H-150-91	MCLEAN		1955	0310H-3 EN-LABA	MOUNTRAIL
832	1-01-02H-149-91	MCLEAN		1956	16-4H VAN HOOK	MOUNTRAIL
833	5-13-14H-150-91	MCLEAN		1957	16-4H VAN HOOK	MOUNTRAIL
834	2-01-02H-149-91	MCLEAN		1958	4HC VAN HOOK R/	MOUNTRAIL
835	14-8H TORGERSON	MCLEAN		1959	16-9H BRUNSELL	MOUNTRAIL
836	34-8H SITTING O	MCLEAN		1960	16-9H BRUNSELL	MOUNTRAIL
837	11-17H ONE FEAT	MCLEAN		1961	11-1H HOWARD US	MOUNTRAIL
838	31-17H ONE FEAT	MCLEAN		1962	11-1H HOWARD US	MOUNTRAIL
839	2-32-31H-150-90	MCLEAN		1963	34-12H TARA JO	MOUNTRAIL
840	11-28H THOMAS M	MCLEAN		1964	34-12TFH TARA J	MOUNTRAIL
841	21-28H THOMAS M	MCLEAN		1965	12-32TFH KNIFE	MOUNTRAIL
842	14-34H VORWERK	MCLEAN		1966	44-34H WENINGER	MOUNTRAIL
843	5-32-31H-150-90	MCLEAN		1967	44-34H WENINGER	MOUNTRAIL
844	6-32-31H-150-90	MCLEAN		1968	41-8H BETTY SHO	MOUNTRAIL
845	11-16H ELLA USA	MOUNTRAIL		1969	41-8H BETTY SHO	MOUNTRAIL
846	11-16H ELLA USA	MOUNTRAIL		1970	43-8H WALJEN US	MOUNTRAIL
847	34-21H JERRY PE	MOUNTRAIL		1971	43-8TFH WALTOM	MOUNTRAIL
848	34-21H JERRY PE	MOUNTRAIL		1972	14-23H SPOTTED	MOUNTRAIL
849	12-27TFH LEE FE	MOUNTRAIL		1973	14-23H SPOTTED	MOUNTRAIL
850	11-4H MHA USA	MOUNTRAIL		1974	14-23HC GEORGE	MOUNTRAIL
851	11-4TFH MHA USA	MOUNTRAIL		1975	14-23HC GEORGE	MOUNTRAIL
852	41-4H RAYMOND U	MOUNTRAIL		1976	14-23HD GEORGE	MOUNTRAIL
853	41-4H RAYMOND U	MOUNTRAIL		1977	14-23HD GEORGE	MOUNTRAIL
854	21-2H GLADYS US	MOUNTRAIL		1978	14-23HW SPOTTED	MOUNTRAIL
855	21-2H GLADYS US	MOUNTRAIL		1979	14-23HY SPOTTED	MOUNTRAIL
856	31-2H WILLIAM U	MOUNTRAIL		1980	14-23HZ GEORGE	MOUNTRAIL
857	31-2TFH WILLIAM	MOUNTRAIL		1981	14-23HZ GEORGE	MOUNTRAIL
858	13-32H KNIFE RI	MOUNTRAIL		1982	34-5H JASPER L	MOUNTRAIL
859	13-32TFH KNIFE	MOUNTRAIL		1983	34-5H JASPER L	MOUNTRAIL

860	34-31H FLADELAN	MOUNTRAIL		1984	11-18H BAKER US	MOUNTRAIL
861	21-6TFH JESSICA	MOUNTRAIL		1985	11-18TFH BAKER	MOUNTRAIL
862	21-6TFH JESSICA	MOUNTRAIL		1986	31-18H ARVID BA	MOUNTRAIL
863	31-6H EVERETT F	MOUNTRAIL		1987	31-18H ARVID BA	MOUNTRAIL
864	31-6H EVERETT F	MOUNTRAIL		1988	11-16H LUTHER U	MOUNTRAIL
865	41-6H EVERETT F	MOUNTRAIL		1989	11-16H LUTHER U	MOUNTRAIL
866	41-6H EVERETT F	MOUNTRAIL		1990	31-16H LUTHER U	MOUNTRAIL
867	14-23H ROGSTAD	MOUNTRAIL		1991	31-16H LUTHER U	MOUNTRAIL
868	13-3TFH BURL TT	MOUNTRAIL		1992	1-12H OLSON	MOUNTRAIL
869	34-4H JONES	MOUNTRAIL		1993	1-12H OLSON	MOUNTRAIL
870	42-4TFH BILL TT	MOUNTRAIL		1994	1-12HW OLSON	MOUNTRAIL
871	41-4H GORDON TT	MOUNTRAIL		1995	12-1HC OLSON *(	MOUNTRAIL
872	1-34-35H-152-92	MOUNTRAIL		1996	12-1HD OLSON (M	MOUNTRAIL
873	7-21H COTTONWOO	MOUNTRAIL		1997	12-1HD OLSON (M	MOUNTRAIL
874	1-11-14H 1 TRUL	MOUNTRAIL		1998	12-1HY OLSON (M	MOUNTRAIL
875	1-11-14H 1 TRUL	MOUNTRAIL		1999	11-2HC GEORGE E	MOUNTRAIL
876	1-11-14H 1 TRUL	MOUNTRAIL		2000	11-2HZ GEORGE E	MOUNTRAIL
877	1-11-14H 1 TRUL	MOUNTRAIL		2001	2-11H MASON	MOUNTRAIL
878	1-11-14H 1 TRUL	MOUNTRAIL		2002	2-11H MASON	MOUNTRAIL
879	1-11-14H 1 TRUL	MOUNTRAIL		2003	2-11H MASON	MOUNTRAIL
880	2-33-4H LUNKER	MOUNTRAIL		2004	2-11HA MASON *(	MOUNTRAIL
881	24-7H GALEN FOX	MOUNTRAIL		2005	2-11HW-R MASON	MOUNTRAIL
882	24-7H GALEN FOX	MOUNTRAIL		2006	2-11HW-R MASON	MOUNTRAIL
883	31-6TFH OREN US	MOUNTRAIL		2007	2-11HX MASON (M	MOUNTRAIL
884	31-6TFH OREN US	MOUNTRAIL		2008	2-11HX MASON (M	MOUNTRAIL
885	41-6H CUMMINGS	MOUNTRAIL		2009	31-2H URAN	MOUNTRAIL
886	41-6TFH CUMMING	MOUNTRAIL		2010	21-2TFH LUCKY O	MOUNTRAIL
887	35-4H KING (DWO	MOUNTRAIL		2011	21-2H LUCKY ONE	MOUNTRAIL
888	2-35-4H 2 KING	MOUNTRAIL		2012	31-2H URAN	MOUNTRAIL
889	2-35-4H 2 KING	MOUNTRAIL		2013	21-2TFH LUCKY O	MOUNTRAIL
890	35-4H KING (DWO	MOUNTRAIL		2014	21-2H LUCKY ONE	MOUNTRAIL
891	35-4H KING (DWO	MOUNTRAIL		2015	24-11H MYLO WOL	MOUNTRAIL
892	2-35-4H 2 KING	MOUNTRAIL		2016	34-11TFH JENSON	MOUNTRAIL
893	35-4H KING (DWO	MOUNTRAIL		2017	24HD COYOTE NEC	MOUNTRAIL
894	2-35-4H 2 KING	MOUNTRAIL		2018	24HD COYOTE NEC	MOUNTRAIL
895	2-35-4H 2 KING	MOUNTRAIL		2019	15-22HC ARIKARA	MOUNTRAIL
896	2-35-4H 2 KING	MOUNTRAIL		2020	10-3H STATE OF	MOUNTRAIL
897	2-35-4H 2 KING	MOUNTRAIL		2021	10-3H STATE OF	MOUNTRAIL
898	35-4H KING (DWO	MOUNTRAIL		2022	10-3H STATE OF	MOUNTRAIL
899	11-15H-22 HELEN	MOUNTRAIL		2023	10-3HA STATE OF	MOUNTRAIL
900	15-22H JERRY	MOUNTRAIL		2024	10-3HC STATE OF	MOUNTRAIL

901	13-24H FBIR	MOUNTRAIL		2025	10-3HC STATE OF	MOUNTRAIL
902	13-24H FBIR	MOUNTRAIL		2026	10-3HW STATE OF	MOUNTRAIL
903	13-24HA GLENN F	MOUNTRAIL		2027	10-3HZ STATE OF	MOUNTRAIL
904	13-24HC FBIR (M	MOUNTRAIL		2028	10-3HZ STATE OF	MOUNTRAIL
905	13-24HD FBIR (M	MOUNTRAIL		2029	1-18-7H 1 MCGAH	MOUNTRAIL
906	13-24HW GLENN F	MOUNTRAIL		2030	1-18-7H 1 MCGAH	MOUNTRAIL
907	13-24HX GLENN F	MOUNTRAIL		2031	1-18-7H 1 MCGAH	MOUNTRAIL
908	13-24HZ FBIR (M	MOUNTRAIL		2032	1-18-7H 1 MCGAH	MOUNTRAIL
909	1-24-25H 1 PALE	MOUNTRAIL		2033	1-18-7H 1 MCGAH	MOUNTRAIL
910	1-24-25H 1 PALE	MOUNTRAIL		2034	1-18-7H 1 MCGAH	MOUNTRAIL
911	1-24-25H 1 PALE	MOUNTRAIL		2035	1-18-7H 1 MCGAH	MOUNTRAIL
912	13-14H MANDAN	MOUNTRAIL		2036	1-27H-152-92 FE	MOUNTRAIL
913	1-18-7H 1 MCGAH	MOUNTRAIL		2037	14-6TFX ROHDE F	MOUNTRAIL
914	1-18-7H 1 MCGAH	MOUNTRAIL		2038	15-22H ADAM GOO	MOUNTRAIL
915	16-21H ELK	MOUNTRAIL		2039	15-22H ADAM GOO	MOUNTRAIL
916	16-21HC DANCING	MOUNTRAIL		2040	15-22H ADAM GOO	MOUNTRAIL
917	16-21HC DANCING	MOUNTRAIL		2041	15-22HC ADAM GO	MOUNTRAIL
918	16-21HD DANCING	MOUNTRAIL		2042	15-22HD ADAM GO	MOUNTRAIL
919	16-21HD DANCING	MOUNTRAIL		2043	15-22HW ADAM GO	MOUNTRAIL
920	16-21HW ELK *(M	MOUNTRAIL		2044	15-22HX ADAM GO	MOUNTRAIL
921	16-21HX ELK (MW	MOUNTRAIL		2045	15-22HY ADAM GO	MOUNTRAIL
922	16-21HZ DANCING	MOUNTRAIL		2046	1-13-12H PALERM	MOUNTRAIL
923	16-21HZ DANCING	MOUNTRAIL		2047	1-13-12H PALERM	MOUNTRAIL
924	11-17H ELK USA	MOUNTRAIL		2048	1-13-12H PALERM	MOUNTRAIL
925	21-17H LONGORIA	MOUNTRAIL		2049	1-13-12H PALERM	MOUNTRAIL
926	21-17TFH WHEELE	MOUNTRAIL		2050	1-13-12H PALERM	MOUNTRAIL
927	31-17H CONKLIN	MOUNTRAIL		2051	1-13-12H PALERM	MOUNTRAIL
928	31-17TFH SNOW B	MOUNTRAIL		2052	21-17H RED FEAT	MOUNTRAIL
929	41-17TFH BIG EA	MOUNTRAIL		2053	21-17H RED FEAT	MOUNTRAIL
930	4-33 1-H WRIGHT	MOUNTRAIL		2054	31-17H RED FEAT	MOUNTRAIL
931	4-33 4H WRIGHT	MOUNTRAIL		2055	31-17H RED FEAT	MOUNTRAIL
932	4-33 3TFH WRIGH	MOUNTRAIL		2056	14-9XH LOCKEN	MOUNTRAIL
933	4-33 2TFH WRIGH	MOUNTRAIL		2057	11-27H2 VACHAL	MOUNTRAIL
934	4-33 5H WRIGHT	MOUNTRAIL		2058	10-27H3 VACHAL	MOUNTRAIL
935	14-23H LIBERTY	MOUNTRAIL		2059	5-8HD DORA SMIT	MOUNTRAIL
936	19-23H LIBERTY	MOUNTRAIL		2060	5-8HD DORA SMIT	MOUNTRAIL
937	13-14H LIBERTY	MOUNTRAIL		2061	5-8HW MARY R SM	MOUNTRAIL
938	18-14H LIBERTY	MOUNTRAIL		2062	5-8HX MARY R SM	MOUNTRAIL
939	1-13-12H PALERM	MOUNTRAIL		2063	5-8HY DORA SMIT	MOUNTRAIL
940	1-13-12H PALERM	MOUNTRAIL		2064	5-8HY DORA SMIT	MOUNTRAIL
941	34X-36 SORKNESS	MOUNTRAIL		2065	2932H-1 EN-WEYR	MOUNTRAIL

942	14-4-3XH WALDOC	MOUNTRAIL		2066	2932H-2 EN-WEYR	MOUNTRAIL
943	34-3 1-H AFSETH	MOUNTRAIL		2067	14-29XH SMITH F	MOUNTRAIL
944	34-3 1-H AFSETH	MOUNTRAIL		2068	14-29TFX ELSIE	MOUNTRAIL
945	10-11 1-H ESTHE	MOUNTRAIL		2069	14-29TFX ELMER	MOUNTRAIL
946	10-11 4TFH ESTH	MOUNTRAIL		2070	154-94-2029H-1	MOUNTRAIL
947	10-11 3H ESTHER	MOUNTRAIL		2071	154-94-2029H-1	MOUNTRAIL
948	10-11 2TFH ESTH	MOUNTRAIL		2072	16-21-22H JON R	MOUNTRAIL
949	10-11 7H ESTHER	MOUNTRAIL		2073	16-21-22H JON R	MOUNTRAIL
950	10-11 6TFH ESTH	MOUNTRAIL		2074	5792 24-9H EMIE	MOUNTRAIL
951	3-25H1 REHAK	MOUNTRAIL		2075	5792 24-9H EMIE	MOUNTRAIL
952	1-25H REHAK	MOUNTRAIL		2076	9-4HZ BRUNSELL	MOUNTRAIL
953	2-25H REHAK	MOUNTRAIL		2077	44-33H EARL PEN	MOUNTRAIL
954	3-25H1 REHAK	MOUNTRAIL		2078	2-26-35H JUGARD	MOUNTRAIL
955	4-25H REHAK FED	MOUNTRAIL		2079	6-26-35TFH JUGA	MOUNTRAIL
956	5-25H1 REHAK FE	MOUNTRAIL		2080	41-4H TOLLEFSON	MOUNTRAIL
957	3-25H1 REHAK	MOUNTRAIL		2081	21-28H JACK PEN	MOUNTRAIL
958	4-25H REHAK FED	MOUNTRAIL		2082	41-28H SKOGSTAD	MOUNTRAIL
959	5-25H1 REHAK FE	MOUNTRAIL		2083	21-28H JACK PEN	MOUNTRAIL
960	7-25H REHAK FED	MOUNTRAIL		2084	41-28H SKOGSTAD	MOUNTRAIL
961	6-25H1 REHAK FE	MOUNTRAIL		2085	34-22H BOTTLESO	MOUNTRAIL
962	1-27H VACHAL	MOUNTRAIL		2086	14-22H SHIRLEY	MOUNTRAIL
963	2-27H VACHAL	MOUNTRAIL		2087	34-22H BOTTLESO	MOUNTRAIL
964	3-27H1 VACHAL	MOUNTRAIL		2088	14-22H SHIRLEY	MOUNTRAIL
965	5-27H1 VACHAL	MOUNTRAIL		2089	41-15TFH RUDOLP	MOUNTRAIL
966	5-27H1 VACHAL	MOUNTRAIL		2090	2019H-1 EN MOLL	MOUNTRAIL
967	4-27H VACHAL	MOUNTRAIL		2091	2019H-1 EN MOLL	MOUNTRAIL
968	8-27H VACHAL	MOUNTRAIL		2092	44-19H CHARLES	MOUNTRAIL
969	7-27H VACHAL	MOUNTRAIL		2093	42-8-2TFH RODNE	MOUNTRAIL
970	6-27H1 VACHAL	MOUNTRAIL		2094	21-33TFH SELMA	MOUNTRAIL
971	9-27H2 VACHAL	MOUNTRAIL		2095	21-33H LEVI FED	MOUNTRAIL
972	5-8H MARY R SMI	MOUNTRAIL		2096	25-0107H LIBERT	MOUNTRAIL
973	5-8H MARY R SMI	MOUNTRAIL		2097	106-0107H LIBER	MOUNTRAIL
974	5-8H MARY R SMI	MOUNTRAIL		2098	25-0107H LIBERT	MOUNTRAIL
975	5-8HC DORA SMIT	MOUNTRAIL		2099	106-0107H LIBER	MOUNTRAIL
976	5-8HC DORA SMIT	MOUNTRAIL		2100	1102H-1 RS AGRI	MOUNTRAIL
977	8-5 1-H ROGER S	MOUNTRAIL		2101	1102H-1 RS AGRI	MOUNTRAIL
978	8-5 1-H ROGER S	MOUNTRAIL		2102	24-20H SHOBE	MOUNTRAIL
979	8-5 5H ROGER SO	MOUNTRAIL		2103	41-17H RANDI US	MOUNTRAIL
980	8-5 1-H ROGER S	MOUNTRAIL		2104	24-20H SHOBE	MOUNTRAIL
981	8-5 2TFH ROGER	MOUNTRAIL		2105	41-17H RANDI US	MOUNTRAIL
982	8-5 3H ROGER SO	MOUNTRAIL		2106	34-31H JAY SAND	MOUNTRAIL

983	8-5 6TFH ROGER	MOUNTRAIL		2107	24-31TFH JAHNKE	MOUNTRAIL
984	3526H-1 EN SORE	MOUNTRAIL		2108	24-31H JAHNKE U	MOUNTRAIL
985	1-10-11-12H PER	MOUNTRAIL		2109	34-31H JAY SAND	MOUNTRAIL
986	19-2523H VAN HO	MOUNTRAIL		2110	24-31TFH JAHNKE	MOUNTRAIL
987	126-2523H VAN H	MOUNTRAIL		2111	24-31H JAHNKE U	MOUNTRAIL
988	3-4-33H PURCELL	MOUNTRAIL		2112	44-31TFH KEITH	MOUNTRAIL
989	3-4-33H 3 JACKS	MOUNTRAIL		2113	11-4H PETERSON	MOUNTRAIL
990	3-4-33H PURCELL	MOUNTRAIL		2114	11-4TFH FOREMAN	MOUNTRAIL
991	3-4-33H 3 JACKS	MOUNTRAIL		2115	21-4H BREHM	MOUNTRAIL
992	44-31H BARTLESO	MOUNTRAIL		2116	21-4TFH FOREMAN	MOUNTRAIL
993	44-31H BARTLESO	MOUNTRAIL		2117	41-4H PENNINGTO	MOUNTRAIL
994	41-24TFX ROGGEN	MOUNTRAIL		2118	11-4-2H BREHM	MOUNTRAIL
995	41-28H BLANCHET	MOUNTRAIL		2119	41-4TFH PENNING	MOUNTRAIL
996	4-9HA ROGGENBUC	MOUNTRAIL		2120	41-4TFH PENNING	MOUNTRAIL
997	4-9HW ROGGENBUC	MOUNTRAIL		2121	31-4H PENNINGTO	MOUNTRAIL
998	4-9HX ROGGENBUC	MOUNTRAIL		2122	31-4H PENNINGTO	MOUNTRAIL
999	4-9HY ROGGENBUC	MOUNTRAIL		2123	31-4TFH PENNING	MOUNTRAIL
1000	9-4HB BRUNSELL	MOUNTRAIL		2124	31-4TFH PENNING	MOUNTRAIL
1001	7-8-9HC EDWARD	MOUNTRAIL		2125	41-4H PENNINGTO	MOUNTRAIL
1002	151-94-1H SANDS	MOUNTRAIL		2126	41-4H PENNINGTO	MOUNTRAIL
1003	151-94-2HTF SAN	MOUNTRAIL		2127	41-4H PENNINGTO	MOUNTRAIL
1004	41-25PH TALKING	STARK		2128	41-4TFH RENN	MOUNTRAIL
1005	34-12TFH RIDL(D	STARK		2129	44-4H VAN HOOK	MOUNTRAIL
1006	14-12PH RIDL FE	STARK		2130	34-35H ARNDT FE	MOUNTRAIL
1007	21-15PH CYMBALU	STARK		2131	5-8H KUDRNA	STARK
1008	11-15PH CYMBALU	STARK		2132	14-11PH KADRMAS	STARK
1009	14-22PH PRIVRAT	STARK		2133	34-11PH KADRMAS	STARK
1010	24-22PH PRIVRAT	STARK		2134	44-11PH KADRMAS	STARK
1011	21-16H DIAMOND	STARK		2135	44-4PH NEWTON F	STARK
1012	14-10PH KADRMAS	STARK		2136	44-7PH BOCK FED	STARK
1013	34-10PH KADRMAS	STARK		2137	42-4PH NEWTON F	STARK
1014	44-10PH KADRMAS	STARK		2138	14-23H PAVEL	STARK
1015	21-16H WEILER	STARK		2139	17-20H NORKEN	STARK
1016	21-16H DACKER	STARK		2140	17-20H NORKEN	STARK
1017	21-16H DACKER	STARK		2141	0 CMU	STARK
1018	0 BLMU	WILLIAMS		2142	0 CMU	WILLIAMS
1019	0 TIOGA MADISON	WILLIAMS		2143	41X-21 CROWDER	WILLIAMS
1020	0 TIOGA MADISON	WILLIAMS		2144	32-29H AUNE	WILLIAMS
1021	0 TMU	WILLIAMS		2145	31X-16 MICHAEL	WILLIAMS
1022	41X-21 BOUCHER	WILLIAMS		2146	11X-23 WARD	WILLIAMS
1023	44X-18 THOMAS	WILLIAMS		2147	3526H-1 GO-FOSS	WILLIAMS

1024	44X-18 NESSON G	WILLIAMS		2148	2-17-20-15H P V	WILLIAMS
1025	17-18H POMPEY	WILLIAMS		2149	4-17-20-13H3 P	WILLIAMS
1026	24X-35 DONNELLY	WILLIAMS		2150	4-17-20-13H P V	WILLIAMS
1027	29-32 1H OWAN (	WILLIAMS		2151	4-17-20-13H3A P	WILLIAMS
1028	29-32 1H OWAN (	WILLIAMS		2152	4-17-20-14H P V	WILLIAMS
1029	1-22H FASCHING	WILLIAMS		2153	2-17-20-15H P V	WILLIAMS
1030	11X-16 TRUAX ST	WILLIAMS		2154	4-17-20-13H3 P	WILLIAMS
1031	34X-13 BJARNE	WILLIAMS		2155	4-17-20-13H P V	WILLIAMS
1032	1-28-33H SIIRTO	WILLIAMS		2156	4-17-20-13H3A P	WILLIAMS
1033	1-5-8-15H P BIB	WILLIAMS		2157	4-17-20-14H P V	WILLIAMS
1034	1-5-8-15H P BIB	WILLIAMS		2158	1-12 1H GIBBINS	WILLIAMS
1035	1-5-8-16H3 P BI	WILLIAMS		2159	15-31H THOMPSON	WILLIAMS
1036	1-5-8-16H3 P BI	WILLIAMS		2160	15-31H THOMPSON	WILLIAMS
1037	58-1H 20711 SPR	WILLIAMS		2161	34-35H KAY ARNS	WILLIAMS
1038	58-1H 20711 SPR	WILLIAMS		2162	8-0409H HARDSCR	WILLIAMS
1039	2-3H OLSON	WILLIAMS		2163	24-20H OPAL HOL	WILLIAMS
1040	2-3H OLSON	WILLIAMS		2164	31-30H IONE BAR	WILLIAMS
1041	2-27H BERGSTROM	WILLIAMS		2165	23-2833H ROUND	WILLIAMS
1042	2-27H BERGSTROM	WILLIAMS		2166	3-16-21-13H3 P	WILLIAMS
1043	2-28H BERGSTROM	WILLIAMS		2167	2-4H OLSON	WILLIAMS
1044	44-12H MCFARLAN	WILLIAMS		2168	2-4H OLSON	WILLIAMS
1045	13-8-20-13H3 WI	WILLIAMS		2169	3031H-1 GO-HAUG	WILLIAMS
1046	2-17-5-5H P VAN	WILLIAMS		2170	3-3328H HARDSCR	WILLIAMS
1047	2-17-5-5H P VAN	WILLIAMS		2171	15-20H BECK LIV	WILLIAMS
1048	30-19 1-H GATHM	WILLIAMS		2172	15-31H SOLBERG	WILLIAMS
1049	21X-2 ALBERTINE	WILLIAMS		2173	15-31H SOLBERG	WILLIAMS
1050	15-33-28-2H THO	WILLIAMS		2174	18-19-1H A TUFT	WILLIAMS
1051	15-33-28-1H3 TH	WILLIAMS		2175	2-4H CAPSTICK	WILLIAMS
1052	15-33-28-2H THO	WILLIAMS		2176	13-24H HARP (DW	WILLIAMS
1053	15-33-28-1H3 TH	WILLIAMS		2177	157-98-2635H-1	WILLIAMS
1054	1-21H GJORVEN	WILLIAMS		2178	159-102-8-5-1H	WILLIAMS
1055	4-5H COLUMBIA	WILLIAMS		2179	156-95-2833H-1	WILLIAMS
1056	1-5H COLUMBIA	WILLIAMS		2180	4-9 #1H MARK	WILLIAMS
1057	2-5H COLUMBIA	WILLIAMS		2181	4-9 2TFH MARK	WILLIAMS
1058	3-5H COLUMBIA	WILLIAMS		2182	4-9 #1H MARK	WILLIAMS
1059	5-5H COLUMBIA	WILLIAMS		2183	1-2-11H PASTERN	WILLIAMS
1060	7-5H COLUMBIA F	WILLIAMS		2184	31X-13C AMES	WILLIAMS
1061	6-5H COLUMBIA F	WILLIAMS		2185	34X-34C ROSE FE	WILLIAMS
1062	12X-18 MENDENHA	WILLIAMS		2186	2-10H SACRAMENT	WILLIAMS
1063	3-16-21-14H P S	WILLIAMS		2187	4-10H SACRAMENT	WILLIAMS
1064	3-16-21-13H3 P	WILLIAMS		2188	5-10H SACRAMENT	WILLIAMS

1065	3-16-21-14H P S	WILLIAMS		2189	6-10H SACRAMENT	WILLIAMS
1066	2-4H1 ANDERSON	WILLIAMS		2190	7-10H1 SACRAMEN	WILLIAMS
1067	3-4H ANDERSON	WILLIAMS		2191	32-29 2TFH BEAG	WILLIAMS
1068	6-7 1H ART	WILLIAMS		2192	32-29 3H BEAGLE	WILLIAMS
1069	155-97-0310H-1	WILLIAMS		2193	32-29 3TFH SYLV	WILLIAMS
1070	5-10-11-8H3 P T	WILLIAMS		2194	32-29 1H SYLVES	WILLIAMS
1071	5-10-11-8H P TH	WILLIAMS		2195	32-29 4TFH SYLV	WILLIAMS
1072	5-10-11-1H P TH	WILLIAMS		2196	32-29 2H SYLVES	WILLIAMS
1073	5-10-11-8H3 P T	WILLIAMS		2197	32-29 3TFH SYLV	WILLIAMS
1074	5-10-11-8H P TH	WILLIAMS		2198	32-29 1H SYLVES	WILLIAMS
1075	5-10-11-1H P TH	WILLIAMS		2199	32-29 4TFH SYLV	WILLIAMS
1076	23-21H HARDSCRA	WILLIAMS		2200	32-29 2TFH BEAG	WILLIAMS
1077	2-0817H TRENTON	WILLIAMS		2201	32-29 3H BEAGLE	WILLIAMS
1078	16-21H MARTIN	WILLIAMS		2202	44X-7 FARM	WILLIAMS
1079	1-1410H GARDEN	WILLIAMS		2203	11X-15B KANYER	WILLIAMS
1080	1-32H BEAGLE	WILLIAMS		2204	11X-15F KANYER	WILLIAMS
1081	1-22H JAGUAR	WILLIAMS		2205	41X-21 DEANGELI	WILLIAMS
1082	20-17 1H LEOPAR	WILLIAMS		2206	7-24H2 LAWRENCE	WILLIAMS
1083	5-8 1H SJOL	WILLIAMS		2207	10-24H2 LAWRENC	WILLIAMS
1084	3-2734H GARDEN	WILLIAMS		2208	9-24H LAWRENCE	WILLIAMS
1085	1-27-34H QUARNE	WILLIAMS		2209	8-24H3 LAWRENCE	WILLIAMS
1086	1-23-14H C RASM	WILLIAMS		2210	6-24H1 LAWRENCE	WILLIAMS
1087	1-29-32H BOYDS	WILLIAMS		2211	0106H-1 TI - IV	WILLIAMS
1088	14-20H ANDERSON	WILLIAMS				
1089	33-28 2H BEAR C	WILLIAMS				
1090	33-28 8TFH HUSK	WILLIAMS				
1091	33-28 6H HUSKY	WILLIAMS				
1092	33-28 4TFH HUSK	WILLIAMS				
1093	33-28 2H HUSKY	WILLIAMS				
1094	33-28 8TFH HUSK	WILLIAMS				
1095	33-28 6H HUSKY	WILLIAMS				
1096	33-28 2H HUSKY	WILLIAMS				
1097	33-28 4TFH HUSK	WILLIAMS				
1098	14-13 1H TML	WILLIAMS				
1099	3TFH JAKE 2-11	WILLIAMS				
1100	4H JAKE 2-11 (M	WILLIAMS				
1101	2-11 1H JAKE	WILLIAMS				
1102	2TFH JAKE 2-11	WILLIAMS				
1103	2-11 6H JAKE	WILLIAMS				
1104	2-11 5TFH JAKE	WILLIAMS				
1105	1-34H1 PAMELA A	WILLIAMS				

1106	19-20H GARY RUS	WILLIAMS				
1107	1-30H FERGUSON	WILLIAMS				
1108	7-21H PIERRE FE	WILLIAMS				
1109	6-21H1 PIERRE F	WILLIAMS				
1110	11X-16 OLSON ST	WILLIAMS				
1111	18-19 1H FIELD	WILLIAMS				
1112	18-19 2H FIELD	WILLIAMS				
1113	18-19 3H FIELD	WILLIAMS				
1114	11X-11 MARMON H	WILLIAMS				
1115	21X-2 MYRNA	WILLIAMS				
1116	2932H-3 CA-E BU	WILLIAMS				
1117	29-32H E BURDIC	WILLIAMS				
1118	31X-3 LONNIE	WILLIAMS				
1119	44X-3 MARMON HA	WILLIAMS				
1120	31X-3 LONNIE	WILLIAMS				
1121	12-7H BAKKEN	WILLIAMS				
1122	14X-12 MARSDEN	WILLIAMS				
1123	21X-12 CHRISTOP	WILLIAMS				
1124	2116H-1 BL ODEG	WILLIAMS				

Appendix B. Standard Conditions of Approval for Flaring Requests

Below are a set of standard Conditions of Approval (COAs) the BLM would at a minimum apply to Federal and Indian flaring requests approvals. Additional site specific COAs would be identified during the review process and applied to the approval.

Sundry Notice for gas flared from wells connected to a pipeline:

1. Flaring in excess of 144 hours per month is considered royalty bearing. (The first 144 hours of flared volume is reported on OGOR B as Disposition Code 23 and the flared volumes beyond 144 hours are reported on OGOR B as Disposition Code 08).
2. This approval covers historical flaring as reported in the sundry notice. You must report any current/future flaring for approval.
3. For future royalty bearing (avoidably lost) flaring you must install a gas meter that meets all requirements for a sales meter according to Federal Regulations and Onshore Order #5.
4. All flaring from Fee or State wells within a federal communitization or unit agreement must comply with the requirements of NTL-4A

Sundry Notice for current/future requests – long term flaring (unavoidable):

1. Gas flared from this well is considered unavoidably lost and no royalties are due. (Report all flared volumes for the time period covered in this approval as Disposition Code 23).
2. This approval is in effect until market conditions change allowing for gas sales from this well. A new approval will be required at that time.
3. Recompletions to new production zones will require a new application for flaring.

Sundry Notice for current/future requests – short term flaring (unavoidable/1-yr capture plan)

1. This approval to flare gas is valid until (target date provided in the capture plan) and not to exceed one year from the completion date of the well. (Dates are application dependent).
2. Gas flared during this time period will be considered unavoidably lost and should be report on the OGOR B as Disposition Code 23.
3. Flaring beyond this approval that are determined to be royalty bearing will require metering.
4. If flaring is required beyond the approval date you must submit a new request for flaring approval.

Appendix C. Reasonably Foreseeable Development for this EA and Gas Capture Projections by Year

The Reasonably Foreseeable Development (RFD) scenario for this EA is based on information and assumptions contained in the RFD developed in 2009, revised in 2011 for the NDFO Resource Management Plan (RMP), and revised again in 2014 for the NDFO RMP to consider the increased rate of development in the Williston Basin portion of North Dakota. The 2014 RFD revision contains projections of oil and gas wells for the western portion of the NDFO area.

The 2014 RFD revision took into consideration the assumptions and methodology from the previous reports completed. It also incorporated current changes in development that resulted in an increase projection of oil and gas development for the next 20 years. For the RFD of this EA, only the first 5 years of projected development was used to complete this analysis. In the next 5 years, the 2014 RFD revision projects a baseline total of 6,353 wells to be producing wells in the western portion of North Dakota. Of those, 826 are Federal, 381 are Forest Service, 381 are Indian, and 4,765 are Fee/State administered wells.

Based on 2014 RFD, for the next five years, the BLM assumes a total of 6,648 wells are projected to produce gas and flare an average 121 MCFPD per well. The gas capture percentages requirements from NDIC Order 24665 were applied to the projected number of wells for the next five years to identify projected capture and projected flared short-term and long-term by year. Projections per year and percentages applied are listed below in Table A2-1.

1st Year: 5 percent of the pending SN requests that would require capture
80 percent would flare short-term (1-year gas capture plan, pipeline pressure)
15 percent would flare long-term (ROW, poor gas quality, etc)

2nd-5th Year: 3 percent of the pending SN requests that would require capture
85 percent would flare short-term (1-year gas capture plan, pipeline pressure)
12 percent would flare long-term (ROW, poor gas quality, etc)

6th Year: 3 percent of the pending SN requests that would require capture
90 percent would flare short-term (1-year gas capture plan, pipeline pressure)
7 percent would flare long-term (ROW, poor gas quality, etc)

For this analysis, short-term is defined as flaring up to 1 year, long-term is defined as greater than 1 year up to 5 years. The flaring request inventory BLM generated in 2014 was used to develop the initial 80/15/5 split. The NDIC's gas capture requirements moving forward make this a valid assumption. NDIC rule requires that by first quarter of 2016, gas capture rate should be at 85 percent which means that 15 percent would be flared; and by fourth quarter 2020, gas capture rate should be at least 90 percent which means that 10 percent would be flared. Therefore, the short-term flaring percentages would rise over the years based upon additional infrastructure, which in turn would reduce those wells that need long-term flaring. It also seems that the percent for those wells that BLM would require capture would be applied on a case-by-case basis, and BLM does not foresee this aspect as being all that common.

Based on February 2015 information maintained by NDIC (May 2015 Director's Cut), total gas production was 1,475,395 MCF/day (or 1.47 BCF/day). Total producing wells in Feb 2015 was 12,199 and the gas capture rate was at 80 percent. Therefore, it can be assume that 20 percent of the gas is flared and then apply this to all of the producing wells in the analysis area.

1,475,395 MCF per day/12,199 wells = 121 MCF per well per day

The 121 mcfpd would be an average over the life of the well. Wells in the Williston Basin will produce most of their gas in the first few years of production, and then will steadily produce low volumes of gas for the remaining life of the well.

For the EA, there are 1,943 SN requests for 1,474 wells that have flared gas and are connected to pipeline (i.e. pipeline capacity/pressure issues). Therefore, they are being analyzed for royalty determinations and are not being considered as currently flaring. There are multiple SN requests for the same well, thus unequal number of requests and wells.

There are 268 SN requests for 192 wells currently flaring gas and are not connected to a pipeline. Therefore, assumptions discussed above would be applied to estimate the number of wells to flare short-term, flare long-term, and those required to capture. For the SN requests for wells currently flaring, short-term would not consider pipeline capacity/pressure requests. They are being considered as part of the 1,943 SN requests for wells that flared gas and are being analyzed for royalty determinations in this EA. There are multiple SN requests for the same well, thus an unequal number of requests and number of wells.

Table A2-1. EA Reasonable Foreseeable Development and specific yearly percentages, gas capture, and gas flared estimates.

Year (% capture)	NDFO RFD Projected Wells to Produce Gas	Total Cumulative Wells to Produce Gas	NDIC Capture Requirement %	Calculated Average MCFPD per well	Total MCFPD	MCFPD Captured	MCFPD Flared	MCFPD required capture (5%, 3%)	MCFPD flaring short-term (1yr plan to capture gas within 1 yr and pipeline capacity/pressure) (80%, 85%, 90%)	MCFPD flaring long-term (poor quality, no ROW, low quantity, etc.) (15%, 12%, 7%)
Existing wells produce gas	12,199.00		80	121	1,476,079.00	1,180,863.20	295,215.80	14,760.79	236,172.64	44,282.37
2015 (80%)	1,294.13	13,493.13	80	121	1,632,668.73	1,306,134.98	326,533.75	16,326.69	261,227.00	48,980.06
2016 (85%)	1,236.79	14,729.92	85	121	1,782,320.32	1,514,972.27	267,348.05	8,020.44	227,245.84	32,081.77
2017 (85%)	1,096.97	15,826.89	85	121	1,915,053.69	1,627,795.64	287,258.05	8,617.74	244,169.35	34,470.97
2018 (85%)	1,082.59	16,909.48	85	121	2,046,047.08	1,739,140.02	306,907.06	9,207.21	260,871.00	36,828.85
2019 (85%)	1,022.14	17,931.62	85	121	2,169,726.02	1,844,267.12	325,458.90	9,763.77	276,640.07	39,055.07
2020 (90%)	915.01	18,846.63	90	121	2,280,442.23	2,052,398.01	228,044.22	6,841.33	205,239.80	15,963.10
EA: # of Wells currently flaring with Pending SNs (not connected to a pipeline)				**Calculated Average MCFPD per well**	**Total MCFPD**	**MCFPD Captured**	**MCFPD being Flared**	**MCFPD required capture (5%)**	**MCFPD expected to flare short-term (1yr plan, eventually capture gas within 1 yr) (80%)**	**MCFPD expected to flare long-term (poor quality, no ROW, low quantity, etc.) (15%)**
192				121	23,232.00	0	23,232.00	1,161.60	18,585.60	3,484.80
								# EA wells	**# EA wells**	**# of EA wells**
								9.6	153.6	28.8

Appendix D. Flaring Emissions

Flaring occurs when pipeline infrastructure is not available to capture and transport associated gas to a sales pipeline, pipeline upsets cause temporary flaring, or gas quality is not conducive to sales. North Dakota Department of Health (ND DOH) air quality regulations (NDAC 33-15-07-02) require oil and gas flaring to meet US Environmental Protection Agency (EPA) New Source Performance Standards in 40 CFR 60.18. These regulations impose operational requirements that are equivalent to 98% destruction efficiency organic compounds.

Heating value of associated gas	1571	Btu/scf	WRAP

Heating Value Emission Factors

Pollutant	Emission Factor (lb/MMBtu)	Emission Factor Source	Emission Factor (lb/MMscf)
CO	0.37	WRAP	581.27
NOx	0.068	WRAP	106.828

Emissions	Flaring (uncombusted)		Flaring (combusted)		Total Flaring Emissions (lb/MMscf)	Beneficial Combustion (lb/MMscf)
Pollutant	Emission Factor (lb/MMscf)	Emission Factor Source	Emission Factor (lb/MMscf)	Emission Factor Source		
PM_{10}	Negligible	Gas Analysis (GA)	7.60	AP 42 Section 1.4	7.45	7.60
$PM_{2.5}$	Negligible	GA	7.60	AP 42 Section 1.4	7.45	7.60
NOx	Negligible	GA	106.83	WRAP	104.69	106.83
SO_2	Negligible	GA	115.41	WRAP	113.10	115.41
CO	Negligible	GA	84.00	AP 42 Section 1.4	82.32	84.00
VOC	20136	GA	5.50	AP 42 Section 1.4	408.10	5.50
HAP	812	GA	1.88	AP 42 Section 1.4	18.09	1.88

CO_2	442	GA	120000.00	AP 42 Section 1.4	117608.84	120000.00
CH_4	18203	GA	2.30	AP 42 Section 1.4	366.32	2.30
N_2O	Negligible	GA	2.20	AP 42 Section 1.4	2.16	2.20

MMscf = Million standard cubic feet

Wellhead Gas Analysis (GA)

Gas Component	Mole Fraction	Source	Molecular Weight	Gas Weight	Weight Percent	Weight
	(%)		(lb/lb-mol)	(lb/lb-mol)	(wt%)	(lb/MMscf))
Methane	70.00	WRAP	16.04	11.23	42.87	18203
Carbon Dioxide	0.62	MCFO	43.99	0.27	1.04	442
VOC	23.00	WRAP	54.00	12.42	47.42	20136
HAPs	0.50	ND DOH	100.21	0.50	1.91	812
Other Compounds (primarily ethane)	5.88	---	30.07	1.77	6.75	2867
Totals	**100.00**		**---**	**26.19**	**100.00**	**42460**

Sources:
AP 42: US Environmental Protection Agency, AP 42 Fifth Edition, Volume 1, Section 1.4, Natural Gas Combustion, Supplement D, July 1998. http://www.epa.gov/ttn/chief/ap42/ch01/final/c01s04.pdf
MCFO: Gas analysis data provided by Charles Laakso, BLM Miles City Field Office, 2010.
ND DOH: North Dakota Department of Health Emission Calculation Workbook, March 2013, http://www.ndhealth.gov/aq/bakken.aspx.
WRAP: Western Regional Air Partnership, Williston Basin 2011 Baseline Emission Inventory, August 2014, http://www.wrapair2.org/ND-SD-MT.aspx.

Total Flaring Emissions by Year and Cumulative Emissions

	Year						Cumulative
	2015	2016	2017	2018	2019	2020	
Methane Flared (MSCF/day)							
Short-term (no more than 1 year)	261,227	227,246	244,169	260,871	276,640	205,240	1,475,393
Long-term (5 years)	48,980	32,082	34,471	36,829	39,055	15,963	207,380
Emissions (short tons/year)							
PM_{10}	422	352	379	405	429	301	2,287
$PM_{2.5}$	422	352	379	405	429	301	2,287
NOx	5,927	4,955	5,324	5,688	6,032	4,226	32,151
SO_2	6,403	5,353	5,751	6,145	6,516	4,566	34,734
CO	4,660	3,896	4,186	4,472	4,743	3,323	25,281
VOC	23,104	19,314	20,753	22,172	23,513	16,475	125,331
HAP	1,024	856	920	983	1,042	730	5,555
CO_2	6,658,165	5,566,108	5,980,628	6,389,715	6,775,959	4,747,814	36,118,387
CH_4	20,738	17,337	18,628	19,902	21,105	14,788	112,499
N_2O	122	102	110	117	124	87	662
GHG Emissions (metric tons/year)							
CO_2	6,040,154	5,049,462	5,425,506	5,796,621	6,147,014	4,307,122	32,765,878

CH_4	18,813	15,728	16,899	18,055	19,146	13,415	102,057
N_2O	111	93	99	106	113	79	601
CO_2e	**6,543,485**	**5,470,238**	**5,877,619**	**6,279,659**	**6,659,250**	**4,666,038**	**35,496,289**

MSCF = thousand standard cubic feet per day
CO2e emissions are calculated using 100-year global warming potentials (GWPs) of CO2 =1, CH4 = 25, and N2O = 298, as provided in EPA regulations in 40 CFR Part 98, Subpart A, Table A-1. Other GWPs can be used by multiplying the quantity of each gas by its GWP and summing the results.

Criteria Pollutant Emission Comparison for North Dakota

	North Dakota NEI (short tons/year)	Maximum Flaring Percent (Year 2019)	Source
PM_{10}	365,857	0%	EPA 2011 NEI, Version 2, March 4, 2015, http://www.epa.gov/ttnchie1/net/2011inventory.html
$PM_{2.5}$	90,086	0%	EPA 2011 NEI, Version 2, March 4, 2015, http://www.epa.gov/ttnchie1/net/2011inventory.html
NOx	163,788	4%	EPA 2011 NEI, Version 2, March 4, 2015, http://www.epa.gov/ttnchie1/net/2011inventory.html
SO_2	1,074,343	1%	EPA 2011 NEI, Version 2, March 4, 2015, http://www.epa.gov/ttnchie1/net/2011inventory.html
CO	488,511	1%	EPA 2011 NEI, Version 2, March 4, 2015, http://www.epa.gov/ttnchie1/net/2011inventory.html
VOC	281,219	8%	EPA 2011 NEI, Version 2, March 4, 2015, http://www.epa.gov/ttnchie1/net/2011inventory.html

NEI = National Emissions Inventory

GHG Emission Comparison

	CO_2e (metric tons/year)	Maximum Flaring Percent (Year 2019)	Source
North Dakota GHG Emissions (2013)	37,003,286	18%	EPA FLIGHT website, http://ghgdata.epa.gov/ghgp/main.do#/, data current through August 18, 2014.
US Emissions (2014)	6,673,000,000	0.100%	U.S. Greenhouse Gas Inventory Report: 1990-2013, EPA, http://www.epa.gov/climatechange/ghgemissions/usinventoryreport.html

Appendix E. Viewshed Analysis Method for Historic Properties

According to Section 106 of the National Historic Preservation Act, the introduction of visual elements that diminish the integrity of a historic property's significant historic features are an example of an adverse effect (36 CFR 800.5(2)(v)). Cultural resource specialists can employ various geospatial processing programs to simulate the geographic area that is visible from a historic property's location. The simulated geographic areas are known as viewsheds.

Geospatial processing programs simulate viewsheds by employing the data contained within a digital elevation model and a historic property's Universal Transverse Mercator (UTM) coordinates. The software produces a boolean overlay that indicates geographic areas that are "true" (can be seen) or "false" (can't be seen). The variables typically employed in the analysis are the average height of a person (1.77m) or the average height of a proposed element, such as a flare stack, building, or facility.

Digital elevation models for North Dakota can be obtained from the North Dakota GIS hub found at http://www.nd.gov/gis/. The North Dakota Information Technology Department and the North Dakota GIS Technical Committee operate the GIS Hub.

The purpose of the viewshed analysis is to test two hypotheses:

Hypothesis # 1. The proposed action introduces elements that can be observed from a historic property.

Hypothesis # 2. Existing modern elements have diminished the integrity of a historic property's significant historic features.

If the viewshed analysis does not support Hypothesis # 1 then the proposed action will not introduce a visual element to the historic property.

If the viewshed analysis supports Hypothesis # 1 then the potential to introduce a visual element remains. The specialists will employ Hypothesis # 2 to analyze the historic "setting."

The historic "setting" refers to the "character of the place in which the property played its historical role" (National Register Bulletin 15). When other modern elements exist and have introduced visual elements, then the "setting" may lack the ability to convey the property's historic significance.

The viewsheds will indicate if any modern elements exist. If modern elements exist, the participants in the Section 106 process will employ the viewshed analysis and visual inspections to determine if the proposed action will introduce elements that diminish the integrity of a historic property.